Anticipated acquisition by Thermo Fisher Scientific Inc of Gatan

Provisional findings report

Notified: 17 April 2019

The Competition and Markets Authority has excluded from this published version of the provisional findings 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 [✂]. [Some numbers have been replaced by a range. These are shown in square brackets.] [Non-sensitive wording is also indicated in square brackets.]

Contents

Page

Appendices

Glossary.

Summary

1. The Competition and Markets Authority (CMA) has provisionally found that the anticipated acquisition by Thermo Fisher Scientific Inc. (Thermo Fisher) of the electron microscope peripherals business (Gatan) of Roper Technologies, Inc. (Roper) (the Proposed Merger) may be expected to result in a substantial lessening of competition (SLC) due to:

   (a) Horizontal competition concerns in the market for the supply of DD cameras for sale in the UK;

   (b) Potential competition concerns in the market for the supply of filters for sale in the UK;

   (c) Vertical competition concerns, both with regard to foreclosure and information sharing in the markets for respectively the supply of GI cameras, DD cameras and filters to TEM suppliers for sale in the UK.

2. These are our provisional findings. We invite any parties to make representations to us on these provisional findings. Parties should refer to our notice of provisional findings for details of how to do this.

Background

3. On 7 January 2019, the CMA referred the Proposed Merger for further investigation and report by a group of CMA panel members (the Inquiry Group) following a phase 1 review.

4. The CMA must decide:

   (a) whether arrangements are in progress or in contemplation which, if carried into effect, will result in the creation of a relevant merger situation; and

   (b) if so, whether the creation of that situation may be expected to result in an SLC within any market or markets in the UK for goods or services.

5. This document, together with its appendices, sets out our provisional findings. We are required to come to, and report on, a final decision by 23 June 2019.

The parties

6. Thermo Fisher is a US-based corporation and manufactures a broad range of analytical instruments, scientific equipment, consumables, services and software for research, analysis, discovery and diagnostics.

7. Thermo Fisher manufactures electron microscopes (EMs) through its wholly-owned subsidiary FEI Company (FEI). Thermo Fisher supplies both transmission EMs (TEMs) and scanning EMs (SEMs) for use in life science, material science and semiconductor applications.

8. Thermo Fisher also supplies EM peripherals such as cameras and detectors, both with its EMs and separately to customers who already have a compatible Thermo Fisher EM.

9. Roper is a US-based manufacturer of technological equipment. Roper manufactures and supplies EM peripherals globally under the Gatan brand, including: filters, direct detection (DD) and general imaging (GI) cameras, detectors, and specimen preparation kits.

10. On 24 April 2018, Thermo Fisher agreed to acquire Gatan. Gatan consists of the entire share capital of several Roper subsidiaries, as well as certain other associated assets and liabilities of Roper. We refer to Thermo Fisher and Gatan as 'the Parties' or the 'Merged Entity' in this document.

11. The Proposed Merger is not yet complete and is conditional upon clearance by the CMA.

Relevant merger situation

12. We have provisionally found that arrangements are in progress or in contemplation which, if carried into effect, will result in the creation of a relevant merger situation within the meaning of the Enterprise Act 2002 (the Act).

13. We have also established that there is a sufficient nexus within the UK on a share of supply basis to give us jurisdiction to investigate.

Counterfactual

14. Before we assess the effects of the Proposed Merger, we have determined what we would expect the competitive situation to be absent the Proposed Merger - the 'counterfactual'.

15. The counterfactual is a benchmark against which the expected effects of a merger are assessed. In this case, our provisional view is, as submitted by the Parties, that the counterfactual is that of the pre-Proposed Merger conditions of competition.

Our competition assessment

16. We set out two main theories of harm in our published Issues Statement and our competition assessment has focussed on these. They are:

    (a) Horizontal effects: we have considered the extent to which there may be a loss of competition arising from the Proposed Merger in the supply of TEM peripherals.

    (b) Vertical effects: we have considered the extent to which the Merged Entity would have the ability and incentive to harm rivals through customer or input foreclosure, either partial or total. We have also considered whether the Merged Entity would have the ability and incentive to harm competition through the effect of information sharing.

17. We have considered the extent to which the following countervailing factors might mitigate any competition concerns we have provisionally found:

    (a) Market entry and expansion;

    (b) Rivalry-enhancing efficiencies arising from the Proposed Merger.

Market definition

18. Market definition provides a framework for the analysis of the competitive effects of a merger. We have considered the definition of the relevant markets in which the effects of the Proposed Merger should be assessed. We have assessed the relevant product market(s) and the relevant geographic market(s).

19. The Parties submitted that the relevant product markets are:

    (a) the supply of filters for TEMs

    (b) the supply of cameras for TEMs, and

    (c) the supply of TEM systems (including peripherals).

20. The Parties told us that they consider that further segmentation of these product markets would be inappropriate, particularly given the significant potential for supply-side substitution within each category.

21. Having considered both demand-side and supply-side factors, our provisional view is that filters should be treated as a single product market. We recognise that there are notable differences in the price and application of different types

of filter, and in particular, that life science filters typically incorporate a DD camera. We take these points into account in our competitive assessment.

22. Our provisional view is that GI and DD cameras constitute separate product markets.

(a) From a demand side perspective, our provisional view is that the two products are unlikely to be considered close substitutes by the majority of customers. DD cameras tend to be used for specific life science applications such as cryo-EM. The more specialised role of DD cameras is reflected in their price. Whilst some customers may view GI cameras and DD cameras as substitutes, most do not.

(b) From the supply-side, manufacturers of GI cameras cannot rapidly shift production between the two products and few firms supply both products.

23. For TEMs, we have found that there is significant variation in the price, application and customer base between the supply of TEMs to life science customers, and the supply of TEMs to material science customers.

24. We recognise that there are some defined segments within these markets, such as cryo-EM, and that TEM prices and specifications can vary. However, we do not view these as distinct product markets. We have examined how competitive conditions vary across relevant segments in our competitive assessment, as well as constraints from within and outside each of the markets.

25. Our provisional view is therefore that the relevant product markets in which to assess the effects of the Proposed Merger are:

(a) The supply of DD cameras.

(b) The supply of GI cameras.

(c) The supply of filters.

(d) The supply of TEM systems (including peripherals) to life science customers.

(e) The supply of TEM systems (including peripherals) to material science customers.

26. The Parties have submitted that the relevant geographic market is worldwide for all of the relevant product markets. This is consistent with our analysis of the evidence provided to us. Accordingly, our provisional view is that the relevant geographic market for these products is worldwide.

Horizontal competition

27. We have investigated whether, due to the loss of competition between the Parties, the Merged Entity could increase the price of its products, deteriorate quality and/or reduce the supply of new products. To do this, we have assessed the closeness of competition between the Parties and the constraint imposed by current and potential rivals on them.

28. We have considered competition issues relating to the supply of direct detection (DD) and general imaging (GI) cameras, and potential competition issues in filters.

29. We have considered horizontal competition between the Parties in terms of upstream competition (supply of peripherals to TEM manufacturers and TEM customers) and downstream (the supply of peripherals as part of TEM systems) and have provisionally found that there are some competition concerns in both respects.

30. We have considered competition at the level of each of our defined product markets, as set out below.

GI cameras

31. The Parties are the two largest suppliers of GI cameras with a combined share of [70 – 80]% of global revenue. Their products are similar, in terms of specifications and prices. There is a lack of evidence from internal documents or third-parties to indicate that Thermo Fisher and Gatan compete closely in the supply of GI cameras.

32. Our provisional view is therefore that the Proposed Merger may not be expected to result in an SLC in the market for the supply of GI cameras.

DD cameras

33. Thermo Fisher and Gatan are the two largest suppliers of DD cameras. There is only one other established supplier of DD cameras (Direct Electron) and one new entrant (Company B).

34. The evidence shows that the Parties are close competitors in the supply of DD cameras. This is supported by evidence from internal documents and third-parties. This evidence shows that competition between the Parties has driven quality improvements. These quality improvements benefit both Thermo Fisher and non-Thermo Fisher TEM users.

35. Our provisional view is that the Proposed Merger may be expected to result in an SLC in the market for the supply of DD cameras.

Filters

36. Gatan supplies filters for Thermo Fisher, JEOL and Hitachi TEMs. Thermo Fisher [✂].

37. There is little competitive constraint on the parties: JEOL supplies an 'in-column' filter on some of its TEMs (that can be used for life science applications), and Hitachi and Nion both self-supply spectrometers (that can be used for certain material science applications). Evidence from internal documents and third-parties however shows that Gatan faces limited competition in the supply of filters in both life science and material science.

38. An established scientific instruments firm, CEOS, is expected to enter the filters market although it is our provisional view (based on the evidence provided to us) that this potential entry will not be sufficient to offset the impact of the Proposed Merger on competition in the supply of filters.

39. Our provisional view is that the Proposed Merger may be expected to result in an SLC in the market for the future supply of filters.

Vertical competition - foreclosure

40. We have considered the degree to which the Proposed Merger may be expected to give rise to harmful vertical effects by assessing the Merged Entity's ability and incentive to engage in input foreclosure of rival TEM suppliers. We have also considered the effect that foreclosure could have on competition in the TEM market.

41. Our assessment considered these issues in the absence of the Parties' supply agreements with other TEM manufacturers before evaluating the extent to which these agreements address any foreclosure concerns that would otherwise arise.

42. The Parties submitted that they would have no ability or incentive to foreclose downstream rivals due to the supply agreements, the ability of rivals to react and protect themselves through competing entry upstream and the threats of retaliation and reputational damage.

Ability to foreclose

43. Our provisional finding is that the Merged Entity would have the ability to foreclose competing TEM suppliers in relation to filters and DD cameras and

to a lesser extent in relation to GI cameras. This is because these filters and DD cameras are an important part of TEM systems and Gatan has market power in the supply of these products.

Incentive to foreclose

44. We have also provisionally found that the Merged Entity would have a large incentive to foreclose on each peripheral.

45. The per-unit profits earned on downstream TEM system sales are greater than those earned on upstream peripheral sales. In addition, the importance of the peripherals for downstream TEM customers and the lack of effective substitutes available for filters, DD cameras and, to a lesser extent, GI cameras indicates that a large number of potential JEOL or Hitachi customers may switch their TEM system purchase to Thermo Fisher if access to Gatan's peripherals is restricted. The combination of these factors creates a large incentive to foreclose.

46. We considered the extent to which the Merged Entity's incentive to foreclose would be reduced by the risk of retaliation or reputational damage but found that they would have a very limited impact on Thermo Fisher's overall incentive to foreclose.

47. Similarly, we considered the impact of entry by JEOL, Hitachi or others in the supply of new peripherals but our provisional view is that entry or expansion would not be timely, likely and sufficient to prevent the large incentive to foreclose.

Effect of foreclosure

48. Our view is that both of Thermo Fisher's current established TEM supplier rivals could be significantly impacted by foreclosure of Gatan's peripherals along with any potential new entrants that require access to Gatan's products.

49. Thermo Fisher is by far the biggest supplier of TEMs supplied with filters, DD cameras and GI cameras in a concentrated market and in the presence of weak competition between suppliers, even a small lessening of competition can have a substantial impact.

50. Our provisional view is that, if Thermo Fisher's rivals were to be foreclosed, the effect would be significant harm to competition between TEM suppliers downstream. This would take the form of price increases and/or a reduction in quality and future innovation within the TEM market (both by Thermo Fisher and its current and future competitors).

The Supply Agreements

51. We have considered the extent to which supply agreements reached by the Parties with other TEM suppliers would address the foreclosure concerns identified. The Parties told us that these agreements mean that the Merged Entity would not have the ability to foreclose these rivals.

52. We consider that contractual arrangements are unlikely to completely remove the ability of a firm to foreclose its rivals. This is because contracts can be renegotiated or terminated and breaches waived. The relative bargaining power, and broader commercial considerations, of each party to an agreement will affect their incentive to agree to changes and decisions on contractual enforcement.

53. In addition, we have considered the specific terms of these supply agreements and the extent to which they remove the Merged Entity's ability to foreclose. These include: whether the terms relating to supply of Gatan products provide adequate protection against all methods of foreclosure; the extent to which compliance will be effectively monitored and enforced; whether circumvention of the agreements is a risk, given our provisional view that there is an incentive to foreclose; and the fact that the supply agreements may distort future entry into the TEM market and competition between JEOL and Hitachi.

54. Having considered evidence relating to all of these factors, our provisional finding is that the supply agreements are not sufficient to address fully the concern in respect of foreclosure by the Merged Entity of its rivals in the supply of TEMs.

Vertical competition – information sharing

55. We have considered the degree to which the Proposed Merger may be expected to give rise to harmful vertical effects as a result of the sharing of commercially sensitive information about rivals in the supply of TEMs by Gatan with Thermo Fisher within the Merged Entity. This could harm competition in the supply of TEMs by allowing the Merged Entity to compete less aggressively and/or otherwise by putting rivals at a competitive disadvantage.

56. We have considered the type of information that the Merged Entity will hold and which Thermo Fisher would not have access to absent the Proposed Merger and the extent to which provisions in supply agreements with other TEM suppliers prevent the sharing of that information between Gatan and Thermo Fisher within the Merged Entity.

57. Our provisional view is that access by Thermo Fisher to commercially sensitive information related to sales and bids after the Proposed Merger, would enable it to bid less aggressively against its rivals and/or otherwise put its TEM rivals at a competitive disadvantage compared to the situation absent the Proposed Merger.

58. We have considered whether access to commercially sensitive information related to Thermo Fisher's rivals' technical product specification information and product innovation plans would allow it to harm competition in TEM markets. Having considered evidence from the Parties and third parties, our provisional view is that access by Thermo Fisher to commercially sensitive information related to technical product specification and product innovation plans after the Proposed Merger, would enable it to compete less aggressively against its rivals and/or otherwise put its TEM rivals at a competitive disadvantage compared to the situation absent the Proposed Merger

59. We have provisionally found potential harmful vertical effects related to information sharing, and we do not consider that the terms of the supply agreements are sufficiently certain, robust or enforceable so as to address fully these effects.

Countervailing factors

60. We have considered countervailing factors that could give rise to effects with the result that there is no SLC arising from the Proposed Merger. In the present case, these are market entry and expansion and rivalry-enhancing efficiencies.

Entry and expansion

61. We have considered the likely market entry and expansion by rivals to the Parties in response to the Proposed Merger and the extent to which this may mitigate the effect of the Proposed Merger on competition.

62. We have considered potential entry into the TEM and TEM peripherals market and considered the Parties' and others' views on the requirements for market entry in terms of technical knowledge, finance and the time required to develop such products. We have also considered evidence of any potential new entrants.

63. We have provisionally found that barriers to entry within the TEM market are high, and the incentives for new entry are low. Entry and expansion in the TEM market is largely dependent on access to, and integration of, peripherals

and software. Our provisional finding is that entry or expansion into the TEM market would not be timely, likely and sufficient to prevent the SLCs we have provisionally found.

64. We have considered the barriers to entry and expansion in TEM peripherals. The Parties and third parties told us of the considerable technical knowledge, access to intellectual property and level of investment that would be required and the risks facing a new product being accepted in the market. The barriers to entry appear higher in the market for DD cameras than in the market for GI cameras.

65. Our provisional view is that barriers to entry in the DD market in particular are high. The current market share, product leadership and leading position of Gatan's software may also deter entry or expansion.

66. Despite high profit margins, there has been very little entry or expansion for peripherals that compete directly with the Parties' products. This would imply that, while there may be incentives for suppliers to enter or expand in the market, their ability to do so is limited.

67. Our provisional view is that market entry or expansion in TEM peripherals would not be timely, likely and sufficient to prevent the SLCs we have provisionally found.

Rivalry-enhancing efficiencies

68. We have considered whether efficiencies arising from the Proposed Merger may enhance rivalry, with the result that it does not give rise to an SLC.

69. The Parties have submitted some efficiencies that they expect to arise as a result of the Proposed Merger and which they have said should be considered as rivalry-enhancing. We have considered whether these efficiencies are timely, likely and sufficient to prevent an SLC from arising, and whether they are merger specific and our provisional view on each of these is as follows:

(a) Elimination of double marginalisation (EDM), by acquiring Gatan peripherals at cost, the Parties have told us that the Merged Entity will be able to pass cost savings onto customers in the form of lower prices. Our provisional view is that the Merged Entity will not have a strong incentive to pass these savings onto customers in the form of lower prices due to its market power and the greater importance placed on quality than price by many customers.

(b) Better integration of peripherals with TEMs, and reductions in the total costs of ownership of these. We have noted the Parties' intention to

achieve this, but we think it is unlikely that rivals of the Merged Entity would be able to respond in a way that enhances rivalry. We also consider that Thermo Fisher may be able to achieve some of these efficiencies, absent the Proposed Merger.

(c) Improved maintenance and support of Gatan's peripherals by Thermo Fisher's larger service support operation. We consider that the Merged Entity would be able to achieve this efficiency, but we think it is unlikely that rivals would be able to respond in a way that enhances rivalry.

(d) Repositioning of existing TEM peripherals to target different customer segments at different price points, resulting in greater choice for customers. We consider that repositioning of the Merged Entity's products away from each other would reduce, rather than enhance, horizontal and vertical competition. It is also not clear why the main example of product repositioning is merger-specific, as it could be achieved absent the Proposed Merger.

(e) The sale of more TEMs through the above efficiencies, enabling the Merged Entity to offer cheaper and more accessible microscopes. We have not seen sufficient evidence from the Parties to substantiate this claimed efficiency.

70. We note that Thermo Fisher is the largest supplier of TEMs, and Gatan is the largest supplier of cameras and filters (excluding Thermo Fisher itself). In view of the Parties' market positions and, given that we have provisionally found that they have the ability and incentive to foreclose smaller rivals, we consider that the claimed efficiencies are not such that they could lead to enhanced rivalry from other, smaller firms so as to prevent an SLC arising.

71. Our provisional view is that these claimed efficiencies are not timely, likely and sufficient to prevent an SLC from arising. We may consider them as relevant customer benefits, when we consider potential remedies to the SLCs we have provisionally found.

Provisional conclusions

72. As a result of our assessment, we have provisionally concluded that the anticipated acquisition by Thermo Fisher of Gatan will result in the creation of a relevant merger situation.

73. We have provisionally concluded that the Proposed Merger may be expected to result in an SLC due to:

(a) Horizontal competition concerns in the market for the supply of DD cameras for sale in the UK;

(b) Potential competition concerns in the market for the supply of filters for sale in the UK;

(c) Vertical competition concerns, both with regard to foreclosure and information sharing in the markets for respectively the supply of GI cameras, DD cameras and filters to TEM suppliers for sale in the UK.

Provisional findings

1. The reference

1.1 On 7 January 2019, the Competition and Markets Authority (CMA), in exercise of its duty under section 33(1) of the Enterprise Act 2002 (the Act), referred the anticipated acquisition by Thermo Fisher Scientific Inc. (Thermo Fisher) of the electron microscope peripherals business (Gatan) of Roper Technologies, Inc. (Roper) (the Proposed Merger) for further investigation and report by a group of CMA panel members.

1.2 Throughout this document, Roper and Thermo Fisher are referred to collectively as 'the Parties', and Thermo Fisher and Gatan are referred to collectively post-Proposed Merger as 'the Merged Entity'.

1.3 In exercise of its duty under section 36(1) of the Act, the CMA must decide:

(a) whether arrangements are in progress or in contemplation which, if carried into effect, will result in the creation of a relevant merger situation; and

(b) if so, whether the creation of that situation may be expected to result in a substantial lessening of competition (SLC) within any market or markets in the UK for goods or services.

1.4 In answering these two questions, the CMA will apply a 'balance of probabilities' threshold. That is, it will decide whether it is more likely than not that an SLC may be expected to result from the Proposed Merger.

1.5 Our terms of reference, along with information on the conduct of the inquiry, are set out in the appendices to this report.

1.6 This document, together with its appendices, constitutes the CMA's provisional findings. Further information, including a non-commercially sensitive version of the Parties' response to the phase 1 decision, can be found on the CMA case webpage.[1]

2. The Industry

2.1 Electron microscopes (EMs) are part of the global analytical and life science instruments sector. The sector supplies customers with tools to complete research, diagnostic testing and quality assurance in public sector agencies,

[1] https://www.gov.uk/cma-cases/thermo-fisher-scientific-roper-technologies-merger-inquiry.

academia and a variety of industries. The sector is complex with several complementary and competing techniques provided by numerous companies. The analytical and life science instruments sector was worth over £40bn worldwide in 2017.[2]

2.2 EMs are used by, among others, universities, research institutes and industrial companies in a wide array of sectors, including semi-conductors, tissue imaging, toxicology, forensics, food science and pharmaceuticals.

2.3 The Parties are active at overlapping levels of the supply chain. Thermo Fisher is a supplier of EM systems and peripherals for use with its EM systems, whereas Gatan is a supplier of peripherals used in EM systems.

Product Background

2.4 Electron microscopy is a powerful technique for observing small particles in life science and materials science research and semi-conductor analysis. EMs use electron beams to produce an image of a specimen, resulting in greater magnification and resolving power than an optical microscope.[3]

2.5 EMs can be either scanning EMs (SEMs) or transmission EMs (TEMs). SEMs are used to observe the shape and size of a specimen as they provide a three-dimensional view. TEMs allow imaging at the molecular level, which increases their applicability in chemistry to study the structures of compounds.

2.6 The focus of our assessment is on TEMs, which offer the most powerful magnification: they can have the capacity to magnify to over ten million times.[4]

2.7 Other relevant issues relating to TEMs are as follows:[5]

(a) TEMs are one of the largest and most expensive types of microscope.

(b) They require a significant amount of sample preparation time.

(c) Their operation and analysis require special training.

(d) They require special housing and maintenance.

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[2] See Phase 1 Initial Submission Attachment D-23 - Global Assessment Report Global 2018, slide 11
[3] See Phase Merger Notice Attachment D-24 - Microscope Transmission Electron Global 2017.
[4] Teach in session from the Parties, January 2018.
[5] See *Phase 1 Initial Submission Attachment D-24 - Microscope Transmission Electron Global 2017*, Page 27.

(e) The samples prepared are limited to those that are electron transparent and are small enough to fit in the vacuum chamber.

2.8 There has been innovation in the TEM sector in recent years with cryo-EM (low temperature) becoming commercially available. The 2017 Nobel prize in chemistry was awarded to three scientists 'for developing cryo-electron microscopy for the high-resolution structure determination of biomolecules in solution'. Cryo-EM overcomes some of the issues around sample sensitivity to the electron beam by keeping the sample frozen, widening the utility of the technique and opening new markets.[6]

2.9 TEMs are typically procured by customers via a tender process in the public sector and direct procurement in the private sector. The customer, such as a university, will issue an Invitation to Tender (ITT), setting out its specific needs.

2.10 EMs are expensive products with a life cycle of typically ten years, although this can be longer. Accordingly, they are procured relatively rarely. The average price of a TEM system supplied by Thermo Fisher in 2017 was £[✂]; the average price of a SEM system supplied by Thermo Fisher in 2017 was £[✂].[7]

2.11 When procuring an EM, customers may require various additional peripherals, these include:[8]

(a) Cameras: Cameras are used to render an image from the electrons striking a sensor. There are different types of camera which can be used with an EM, dependent on the precise application and the type of specimen used. These include Direct Detection (DD) cameras and General Imaging (GI) cameras.[9]

(i) A DD camera is used to capture an image where only a low dose of electrons can be applied and therefore tends to be used largely in relation to certain very specific life science applications where the sample being analysed is delicate and can only be subject to a low dose of electrons without being destroyed.

(ii) In a GI camera, a scintillator transfers the electron image into a light image which is then projected onto the image sensor. A GI camera

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[6] https://www.nobelprize.org/prizes/chemistry/2017/press-release/.
[7] See Phase 1 FRI 2 Annex 4 to the Parties' response.
[8] Certain of the peripherals may only be used with a TEM and others may only be used with a SEM. For example, filters, DD cameras and GI cameras are only used with TEMs.
[9] Phase 2 RF1 Attachment 006 Presentation TEM Cameras.

has a much wider application and is used for a range of purposes including system configuration and image capture.

(b) Filters: energy filters and electron energy loss spectrometers (EELS) are used alongside GI and DD cameras to increase the quality of the image by filtering 'out of focus' electrons and boosting the signal-to-noise ratio; and also to analyse the sample by capturing or producing an image showing the presence of specific chemical species or elements. The main advantage/use of an energy filters is to enhance contrast for thick samples, largely in tomography (imaging by sections). The majority of high-end TEMs are equipped with an energy filter.[10]

Customers

2.12 Thermo Fisher segments its EM customers for into the following sets: life sciences, material sciences and semi-conductor.[11]

(a) The life sciences segment develops imaging solutions that help biologists, biophysicists, biochemists and medical scientists in research and industry to discover critical insights into biological processes. [✂].

(b) Material sciences is focused on studying the performance, structure and properties of materials. [✂].

(c) The semiconductor segment is focused on imaging, metrology and trace elemental analysis solutions for manufacturing processes and trace contaminant analysis.

3. The Parties

Thermo Fisher Scientific Inc.

3.1 Thermo Fisher is a US-based corporation listed on the New York Stock Exchange. Thermo Fisher is a global manufacturer of a broad range of analytical instruments, scientific equipment, consumables, services and software for research, analysis, discovery and diagnostics.

3.2 Thermo Fisher supplies a number of end markets with a diverse customer base. Its revenues splits between Diagnostics & Healthcare (21% Q1 2018 revenue), Biotech & Pharma (37%), Industrial & Applied (19%) and Government & Academic (23%). Thermo Fisher provides consumables (52%

[10] [✂].
[11] phase 2 response MQ Section 17.

of Q1 2018 revenue), Instruments (26%) and services (22%) to these end users.

3.3 Thermo Fisher's revenue is derived from North America (51%), Europe (25%), Asia-Pacific (21%) and the rest of the world (3%). China accounts for 46% of the £3.6bn revenue from Asia-Pacific.[12]

3.4 Thermo Fisher manufactures EMs through its wholly-owned subsidiary FEI Company (FEI), which it acquired in 2016. Thermo Fisher supplies both TEMs and SEMs for use in both life science and material science applications. These types of EM vary in price and functionality. Thermo Fisher also supplies EM peripherals (i.e. cameras and detectors), both with its EMs and separately to customers who already have a compatible Thermo Fisher EM.

3.5 As at 31 December 2018, the value of UK assets of Thermo Fisher's EM business was $[✂].[13] In the UK Thermo Fisher's head count was 5,181 in 2018.[14]

Table 1 Thermo Fisher UK Assets (EM Business).

Asset Type	Value $
Demo Tools/ Loans of machinery	[✂]
Inventory	[✂]
Total	[✂]

Source: Thermo Fisher Phase 2 Response MQ Section 2.2

Thermo Fisher Financial Performance

3.6 Thermo Fisher's revenue grew by 16% to $24.36 (£18.6) billion in 2018, compared with $20.9 (£15.4) billion in 2017.[15]

3.7 In 2018, the revenue of the Analytical Instruments Segment rose by 13% to $5.47 (£4.2billion), compared with $4.82bn (£3.7) billion in 2017. The segment's adjusted operating margin grew to 22.8%, compared with 21.3% in 2017.[16]

3.8 Thermo Fisher's group revenue exceeded $[✂]bn in the UK in 2018.[17]

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[12] Thermo Fisher 2018 Analyst Meeting Presentation. 1.31 USD/GBP conversion used.
[13] Phase 2 Response MQ Section 2.2.
[14] Phase 2 Response FQ Annex 019 - Thermo Fisher Total UK Financial Information.
[15] Thermo Fisher GAAP/Non-GAAP Reconciliation and Financial Package, Jan 30, 2019, Slide 4.
[16] Thermo Fisher Q4 Results News, Jan 30, 2019. 16% is the dollar figure.
[17] Phase 2 Response FQ Annex 019 - Thermo Fisher Total UK Financial Information.

Table 2: Thermo Fisher Total UK P&L Summary.

Financials (Source UK) ($m)	2014	2015	2016	2017	2018
Revenue	[✂]	[✂]	[✂]	[✂]	[✂]
Cost of Sales	[✂]	[✂]	[✂]	[✂]	[✂]
Gross Margin	[✂]	[✂]	[✂]	[✂]	[✂]
Operating Expense	[✂]	[✂]	[✂]	[✂]	[✂]
EBITA	[✂]	[✂]	[✂]	[✂]	[✂]
Rev by Geo (Destination UK)	[✂]	[✂]	[✂]	[✂]	[✂]

Source: Thermo Fisher See Phase 2 Response FQ Annex 019 - Thermo Fisher Total UK Financial Information.

3.9 Thermo Fisher has its own peripherals, such as cameras, some of which are produced by third party manufacturers, for use with its TEM systems. It also offers peripherals supplied by third parties for use with its TEMs.

3.10 Thermo Fisher's EM business had worldwide revenues of $[✂] in 2018. [✂].[18]

Table 3 Electron Microscopy (excluding CTS) P&L Global.

$m	2014	2015	2016	2017	2018
Revenue	[✂]	[✂]	[✂]	[✂]	[✂]
Gross Margin	[✂]	[✂]	[✂]	[✂]	[✂]
% of Sales	[✂]	[✂]	[✂]	[✂]	[✂]
Total SG&A Expense	[✂]	[✂]	[✂]	[✂]	[✂]
% of Sales	[✂]	[✂]	[✂]	[✂]	[✂]
R&D Expense	[✂]	[✂]	[✂]	[✂]	[✂]
% of Sales	[✂]	[✂]	[✂]	[✂]	[✂]
EBITA	[✂]	[✂]	[✂]	[✂]	[✂]
% of Sales	[✂]	[✂]	[✂]	[✂]	[✂]

Source: See Phase 2 Response FQ Annex 020 - Thermo Fisher Global and UK EM Business Financial Information.

3.11 Thermo Fisher's UK EM business had revenues of $[✂] in 2018. [✂].[19]

Table 4 Electron Microscopy (excluding CTS) P&L UK.

$m	2014	2015	2016	2017	2018
Revenue	[✂]	[✂]	[✂]	[✂]	[✂]
Gross Margin	[✂]	[✂]	[✂]	[✂]	[✂]
% of Sales	[✂]	[✂]	[✂]	[✂]	[✂]
Total SG&A Expense	[✂]	[✂]	[✂]	[✂]	[✂]
% of Sales	[✂]	[✂]	[✂]	[✂]	[✂]
R&D Expense	[✂]	[✂]	[✂]	[✂]	[✂]
% of Sales	[✂]	[✂]	[✂]	[✂]	[✂]

[18] Phase 2 Response FQ Annex 020 - Thermo Fisher Global and UK EM Business Financial Information.
[19] Phase 2 Response FQ Annex 020 - Thermo Fisher Global and UK EM Business Financial Information.

EBITA % of Sales	[✂] [✂]	[✂] [✂]	[✂] [✂]	[✂] [✂]	[✂] [✂]

Source: Thermo Fisher Phase 2 Response FQ Annex 020 - Thermo Fisher Global and UK EM Business Financial Information.

Thermo Fisher transactions relating to EMs since 2014

FEI

3.12 Thermo Fisher acquired FEI in September 2016 from its previous shareholders.

3.13 FEI was active in the Electron and Optical Microscopy segments. FEI designed and manufactured three main product categories: TEMs, SEMs and Focused Ion Beam for life science, materials science, semiconductor and oil and gas applications.

Phenom-World

3.14 Thermo Fisher acquired Phenom-World in December 2017. Prior to the acquisition, Thermo Fisher already owned 19% of Phenom-World and purchased the remaining 81% from Sioux Group B.V. (40.5%) and NTS-Group B.V. (40.5%).

3.15 Phenom-World manufactured compact, entry-level and desktop SEMs as well as related software, accessories and services for education, fibre, metal, particle and semiconductor applications. The company was founded in 2009 and was mainly active in Europe (and based in Eindhoven in the Netherlands) as well as North America and China.[20]

Roper Technologies, Inc. (Roper)

3.16 Roper is a US-based provider of software solutions and of technological equipment. Roper Technologies is a constituent of the S&P 500, Fortune 1000 and the Russell 1000 indices.

3.17 Roper designs and develops software (both license and software-as-a-service) and engineered products and solutions for a variety of niche end markets.

[20] Phase 2 Thermo Fisher Response to FQ Paragraph 2.2.

3.18 Gatan is a business within Roper Technologies that manufactures and supplies platform-agnostic peripherals for EMs, including filters and cameras, under the Gatan brand.[21]

3.19 Roper's turnover in the last fiscal year (2018) was approximately £4 billion worldwide.[22] Its 2017 revenue was split between the following segments: Energy (12% revenue contribution, 30% Adj EBITDA Margin); Industrial Technology (17% revenue contribution, 32% Adj EBITDA Margin); Medical (30% revenue contribution, 43% Adj EBITDA Margin); RF & Software (41% revenue contribution, 38% Adj EBITDA Margin).[23]

Roper's EM acquisitions and disposals

3.20 In 2000, Gatan acquired several TEM and SEM products from Oxford Instruments. After initial growth, the products did poorly and many were discontinued. The manufacturing of the remaining SEM products in the UK was consolidated into Gatan's US production facility, and UK manufacturing was discontinued in 2018.[24] The subsidiary, Gatan UK Limited, is still active in the UK with a salesforce and servicing team.

3.21 In 2005, Gatan [✂].[25]

Gatan

3.22 Gatan supplies several peripherals products, including:

(a) Cameras: DD cameras and GI cameras;

(b) Filters;

(c) Detectors: both Bright Field/Dark Field Detectors (BF/DF Detectors) and Cathodoluminescence Detectors (CL Detectors);

(d) Sample holders; and

(e) Specimen preparation kits.

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[21] Phase 1 Merger Notice. Attachment D-13 - Project Pasteur Functional Diligence Report Out.
[22] FY 17. Roper Technologies, May 2018 Raymond James 39th Annual Institutional Investors Conference.
[23] Roper Technologies Overview Raymond James Conference March 2018, slide 17
[24] Phase 2 Response MQ Section 1.4.
[25] Phase 2 Response MQ Section 1.4.

3.23 Gatan's only TEM manufacturer customers for peripherals, apart from Thermo Fisher, are [✂], which are [✂] based in [✂]. Gatan also supplies to distributors and directly to end users around the world.

Gatan's financial performance

3.24 Gatan's turnover in 2017 was approximately £[✂] million worldwide, of which approximately £[✂] million was generated in the UK.[26]

3.25 Gatan maintains profit and loss statements for the following product lines: [✂].

3.26 [✂].[27]

3.27 Gatan's 2017 revenue is split between the following distribution channels: [✂]% direct to end-user, [✂]% to distributors, [✂]% to EM manufacturers (with 28% to Thermo Fisher and rest to other companies).[28]

3.28 Gatan's global net sales have [✂] at a CAGR of [0 – 10]% from 2014-18, however, this figure is largely driven by [✂], driven by the [✂].[29]

3.29 From 2014-18, the Analytical product line has [✂] in 2018. Over this period the Imaging product line has [✂] in 2018. [✂].[30]

3.30 A Thermo Fisher internal document states that [✂].[31]

3.31 Gatan's revenue from [✂].

3.32 Gatan's revenue from [✂].

3.33 Gatan's revenue for 2018 [✂].[32]

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[26] The CMA notes that the Target received additional revenue from sales to customers based outside the UK for resale to end-users based in the UK.
[27] [✂].
[28] [✂].
[29] [✂].
[30] [✂].
[31] [✂].
[32] [✂]

Table 5: Global Net Sales Gatan 2014-18 ($,000)

Year	Specimen Prep	Holders	Analytical	Imaging	SEM Products	Software	Service	Total
2014	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
2015	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
2016	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
2017	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
2018	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]

Source: [✂].

3.34 Gatan's [✂].[33]

Table 6 UK Net Sales Gatan 2014-18 ($,000).

Year	Specimen Prep	Holders	Analytical	Imaging	SEM Products	Software	Service	Total
2014	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
2015	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
2016	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
2017	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
2018	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]

Source: [✂].

3.35 Gatan's global gross margin [✂].[34] [✂].[35]

3.36 Gatan's research and development spending [✂].[36]

4. The Proposed Merger

Overview

4.1 The Roper board approved a plan to sell the Gatan business (as well as the Roper Scientific Camera business) [✂].[37] [✂].

4.2 Thermo Fisher was only [✂]. The timeline for the transaction was as follows.[38,39]

[33] [✂].
[34] [✂].
[35] [✂].
[36] [✂].
[37] First Day Response, 114. 20161115-16 Board Minutes.
[38] Thermo Fisher's response FQ Section 7.
[39] Phase 2 Response FQ Section 6.1.

(a) [✂].

(b) [✂].

(c) The purchase agreement between Thermo Fisher and Roper was executed on 24 April 2018. The proposed transaction will be [✂] be carried out directly by Thermo Fisher.

4.3 [✂].[40] Under the terms of the Proposed Merger:

(a) [✂].

(b) [✂].[41]

Valuation

4.4 The Proposed Merger would lead to the Gatan business being purchased by Thermo Fisher for $925m. [✂].[42]

4.5 [✂][43] [✂].[44]

Figure 1: [✂]

[✂]

Source: [✂].

Thermo Fisher's transaction rationale

4.6 [✂].[45]

4.7 During the course of our Inquiry, Thermo Fisher developed and provided us with a post-transaction business plan in order to demonstrate efficiencies / customer benefits that Thermo Fisher considers will arise as a result of the merger.[46] The business plan shows that Thermo Fisher [✂]:

(a) [✂].

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[40] Phase 2 Thermo Fisher's Response to FQ, Paragraph 6.1.
[41] All references to Gatan in this report refer to the entirety of the electron microscope business of Roper being acquired by Thermo Fisher, as per the purchase agreement concluded between Thermo Fisher and Roper on 24 April 2018.
[42] [✂].
[43] [✂].
[44] [✂].
[45] [✂].
[46] Qualitative evaluation of efficiencies and customer benefits, Update based on TFS business plan, 27 March 2019.

(b) [✂].

4.8 The updated business plan shows [✂].[47]

4.9 [✂].[48]

4.10 Thermo Fisher told us that the following are the key constraints to its growth plans:[49]

(a) The TEM and its peripherals are controlled by different software and the control of the TEM is complex, requiring a high level of expertise to operate it, typically by PhD-level staff. TEM productivity is limited by the number of people with the necessary training to operate one, most of whom work at existing customers. In order to grow sales of TEMs to other potential customers (such as universities and pharmaceutical companies), it is necessary to simplify the operation of the TEM so that less specialised staff can operate them.

(b) TEMs are expensive to operate and are beyond the budget of many potential customers. Customers must construct special rooms, that are often beyond the budget of many institutions, to adequately control and calibrate a TEM.

(c) A lack of integration of the TEM and its peripherals causes the instrument to generate terabytes of data that require expensive data storage solutions. This cost could be minimised through integration.

4.11 Thermo Fisher stated that an important obstacle is that it is not currently able to [✂].[50]

(a) [✂];

(b) [✂];

(c) [✂].

4.12 Thermo Fisher told us that it believes that the Proposed Merger will help remove these constraints, bringing benefits for customers and their scientific research. A key part of Thermo Fisher's strategy is [✂].[51]

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[47] [✂].
[48] [✂].
[49] Phase 2 Initial Submission 21.1.19 (Confidential version), Sections 1.4– 1.6.
[50] [✂].
[51] [✂].

4.13 Thermo Fisher stated that [✂].[52]

4.14 Thermo Fisher outlined the following key benefits of the Proposed Merger:[53]

(a) It will result in more and faster innovation than the Parties can achieve today, making TEM systems less expensive and easier to use.

(b) Ultimately, it will allow more customers in the UK and globally to access high-end TEMs to support their scientific research.

(c) It will enable Thermo Fisher to [✂].

4.15 During our Inquiry Thermo Fisher claimed that the following efficiencies would arise as result of the merger:[54]

(a) Lower prices/operating costs;

(b) Greater choice;

(c) Greater quality/ease of use;

(d) More TEM sales, and

(e) One stop shopping for maintenance and support.

4.16 Thermo Fisher has set out the commercial rationale behind the Proposed Merger as follows:[55]

(a) [✂].

(b) [✂].

(c) [✂].'

4.17 [✂]. However, Thermo Fisher told us that the Proposed Merger will result in customer benefits being secured more reliably and more quickly than would otherwise be the case:[56]

(a) Gatan cannot achieve the benefits itself because it does not produce an EM; and

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[52] [✂].
[53] Phase 2 Initial Submission 21.1.19 (Confidential version), Section 1.8 – 1.9.
[54] Rebuttal of Working Paper on Efficiencies, 31 March 2019. Section 1.
[55] [✂].
[56] Phase 2 Initial Submission 21.1.19 (Confidential version), Section 3.

(b) Thermo Fisher cannot achieve the benefits itself because it does not [✂]. While Thermo Fisher produces its own DD camera, Thermo Fisher's products are differentiated from the market-leading Gatan filter/camera products. By acquiring Gatan, Thermo Fisher will be able to [✂].

Roper's transaction rationale

4.18 Roper has stated [✂].[57]

4.19 In November 2017, [✂].[58] [✂]. Gatan stated '[✂].

4.20 [✂].

4.21 [✂]:[59]

(a) [✂].

(b) [✂].

(c) [✂].

(d) [✂].

5. Relevant Merger Situation

5.1 In accordance with section 36 of the Act and pursuant to our terms of reference (see Appendix A) we are required to investigate and report on two statutory questions: (a) whether arrangements are in progress or in contemplation which, if carried into effect, will result in the creation of a relevant merger situation; and (b) if so, whether the creation of that situation may be expected to result in a substantial lessening of competition (SLC) within any market or markets in the United Kingdom (UK) for goods or services.

5.2 We address the first of the statutory questions in this section.

Enterprises ceasing to be distinct

5.3 A relevant merger situation will be created if, as a result of the Proposed Merger, two or more enterprises cease to be distinct within the statutory

[57] [✂].
[58] Phase 1 RFI3 Attachment 37 - November 2017 Gatan Operating Review.
[59] [✂]

period for reference[60] and the turnover test and/or the share of supply test is satisfied.[61]

5.4 The Act defines an 'enterprise' as 'the activities or part of the activities of a business'.[62] A 'business' is defined as including 'a professional practice and includes any other undertaking which is carried on for gain or reward or which is an undertaking in the course of which goods or services are supplied otherwise than free of charge'.[63]

5.5 Thermo Fisher is active in the supply of EM systems in the UK. Gatan is active upstream in the supply of EM peripherals to the manufacturers of EM systems and downstream to end-users of EM systems. We are therefore satisfied that Thermo Fisher and Gatan are businesses and their activities are 'enterprises' for the purposes of the Act.

5.6 The Act provides that two enterprises cease to be distinct if they are brought under common ownership or common control.[64] The Proposed Merger concerns the acquisition by Thermo Fisher of the entire issued share capital of several Roper subsidiary companies, as well as certain other associated assets and liabilities of Roper that constitute the electron microscope peripherals business of Roper (i.e. Gatan). On completion of the Proposed Merger, the enterprises that constitute Gatan will be under the common ownership and control of Thermo Fisher.

5.7 Accordingly, we are satisfied that arrangements are in progress or in contemplation which, if carried into effect, would result in Thermo Fisher and Gatan ceasing to be distinct enterprises for the purposes of the Act.

5.8 The Proposed Merger has not yet completed and so Thermo Fisher and Gatan remain independent enterprises. Therefore, we are satisfied that the four-month time limit for a relevant merger situation under the Act is not engaged in the present circumstances.[65]

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[60] Section 23 and section 24 of the Act.
[61] Section 23 of the Act.
[62] Section 129(1) of the Act.
[63] Section 129(1) and (3) of the Act.
[64] Section 26 of the Act.
[65] Section 24 of the Act. In summary, the four-month time limit applies only where the enterprises *have ceased* to be distinct.

Jurisdiction test

5.9 The second element of the relevant merger situation test seeks to establish a sufficient nexus with the UK on a turnover and/or share of supply basis to give us jurisdiction to investigate.

5.10 The turnover test, which is that the value of the turnover in the UK of the enterprise being taken over exceeds £70 million, is not met in the present case: the turnover of Gatan in the UK in its last financial year for which it had audited accounts(2017) was approximately [✂].[66]

5.11 The share of supply test is satisfied where, as a result of enterprises ceasing to be distinct, the following condition prevails or prevails to a greater extent: at least one quarter of goods or services of any description which are supplied in the UK, or in a substantial part of the UK, are supplied either by or to one and the same person.[67]

5.12 The Parties overlap in the supply of EM cameras to customers in the UK. The estimates submitted by the Parties indicate that the Proposed Merger would result in a combined share of supply of [70 -80]% (with an increment of [10 – 20]%) based on revenues generated in the UK from the supply of cameras for EMs.[68]

5.13 We are therefore satisfied that the share of supply test in section 23 of the Act is met.

Provisional conclusion on the relevant merger situation

5.14 In the light of the above, we have provisionally found that the Proposed Merger, if carried into effect, will result in the creation of a relevant merger situation. As a result, we must consider whether the creation of that situation may be expected to result in an SLC within any market or markets in the UK for goods or services.

6. Counterfactual

6.1 Before we assess the effects of the Proposed Merger, we need to determine what we would expect the competitive situation to be absent the Proposed

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[66] The Parties' Merger Notice, paragraph 6.1, table 2.
[67] Section 23(2), (3) and (4) of the Act. The reference to supply 'by' or 'to' one and the same person catches aggregations with regard to the supply or purchase of goods or services. The test is also met where at least one quarter of the goods or services is supplied by the persons by whom the enterprises concerned are carried on, or are supplied to or for those persons.
[68] Parties' Merger Notice.

Merger. This is called the 'counterfactual'.[69] The counterfactual is a benchmark against which the expected effects of a merger can be assessed. The counterfactual takes events or circumstances and their consequences into account to the extent that they are foreseeable.[70]

6.2 The CMA may examine several possible scenarios against which to assess the competitive effects of a merger. One of those may be the continuation of the pre-merger situation. Ultimately only the most likely scenario will be selected as the counterfactual.[71]

The views of the Parties

6.3 Thermo Fisher has submitted that, given the uncertainties regarding future developments, the prevailing conditions of competition before the Proposed Merger largely represent the appropriate counterfactual for assessing this transaction.[72]

6.4 Thermo Fisher has submitted that these conditions will need to be adjusted to take into account probable developments including new entry.[73] In this respect, Thermo Fisher also notes [✂].[74] We consider this [✂] scenario in our competitive assessment.[75]

Assessment of the Counterfactual

6.5 We have considered the likely competitive situation to the Proposed Merger. Roper, the owner of Gatan, outlined the strategic options for the Gatan business in [✂].[76] [✂].[77] [✂].

6.6 [✂].[78] In the event that the Gatan business [✂][79]

6.7 Based on the information available about other potential buyers, our view is that, while it is possible that another purchaser might have been found, we consider that it is more likely that Roper [✂], at least in the foreseeable future.

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[69] *Merger Assessment Guidelines*, paragraph 4.3.1.
[70] *Merger Assessment Guidelines*, paragraph 4.3.2.
[71] *Merger Assessment Guidelines*, paragraph 4.3.6.
[72] Phase 2 Response FQ Annex 023 - Counterfactual Analysis paragraph 1.3.
[73] Phase 2 Response FQ Annex 023 - Counterfactual Analysis paragraph 1.4.
[74] [✂].
[75] See chapter 9.
[76] Phase 1 RFI3 Attachment 37 - November 2017 Gatan Operating Review.
[77] [✂].
[78] Phase 2 Response FQ Section 18.
[79] Phase 2 Response FQ Section 19.

6.8 On the basis of the evidence we have been provided with, our provisional view is therefore that the appropriate counterfactual, in line with the Parties' view, is that of pre-merger conditions of competition.

6.9 Future changes in market conditions [✂], as well as the Supply Agreements between Thermo Fisher and each of [✂][80] JEOL and Hitachi are dealt with in our competitive assessment.

7. Introduction to our assessment

Introduction

7.1 Our competitive assessment in the following chapters examines whether the Proposed Merger may be expected to result in an SLC in the supply of the following peripherals to EM manufacturers: DD cameras, GI cameras and filters (the horizontal assessment). We also examine whether the Proposed Merger may be expected to result in an SLC in the supply of TEMs to end customers (the vertical assessment).

7.2 We have examined the possible effects of the Proposed Merger on competition compared with the degree of competition in the counterfactual situation (that is, the situation that is most likely to have arisen absent the Proposed Merger).

7.3 We have considered the possible effects under a horizontal (unilateral) effects theory of harm (chapter 9); that is, whether the removal of one party as a competitor allows the Merged Entity to increase prices, lower quality, reduce the range of their services and/or reduce product development. As part of our assessment of horizontal effects, we have also considered a potential competition theory of harm.

7.4 We have also examined the possible effects of the Proposed Merger under a vertical theory of harm (chapter 10); that is, whether the Proposed Merger creates or increases the ability or incentive of the Merged Entity to harm competition at downstream through its behaviour upstream and the effect of this.

[80] [✂].

8. Market definition

Overview

8.1 The purpose of market definition is to provide a framework for the analysis of the competitive effects of a merger. Market definition is a useful analytical tool, but not an end in itself, and identifying the relevant market involves an element of judgement.[81]

8.2 The boundaries of the market do not determine the outcome of our analysis of the competitive effects of a merger in any mechanistic way. In assessing whether a merger may be expected to give rise to an SLC, we may take into account constraints outside the relevant market, segmentation within the relevant market, or other ways in which some constraints are more important than others.[82]

8.3 In practice, the analysis underpinning the identification of the market or markets and the assessment of the competitive effects of a merger overlap, with many of the factors affecting market definition being relevant to the assessment of competitive effects and vice versa. Therefore, market definition and the assessment of competitive effects should not be viewed as distinct analyses.[83]

8.4 In this chapter we consider the definition of the relevant markets in which the effects of the Proposed Merger should be assessed. For each, we have assessed the relevant product market(s) and the relevant geographic market(s).

Product markets

8.5 The Parties submitted that the relevant product markets are (i) the supply of filters for TEMs, (ii) the supply of cameras for TEMs, and (iii) the supply of TEM systems (including peripherals).[84] The Parties consider that further segmentation of these product markets would be inappropriate, particularly given the significant potential for supply-side substitution within each category.

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[81] Merger Assessment Guidelines CC2 (Revised) (Merger Assessment Guidelines), paragraphs 5.2.1–5.2.2.
[82] Merger Assessment Guidelines, paragraph 5.2.2.
[83] Merger Assessment Guidelines, paragraph 5.1.1.
[84] Annex 1 of the Parties' response to the Issues Statement.

8.6 We consider each of these proposed product markets in turn. Before proceeding however, we note that the CMA's guidelines state that the CMA will have particular regard to demand side factors when identifying relevant product markets.[85] From a demand side perspective, the relevant product market is the set of products that customers consider to be close substitutes.[86] The relevant product market is therefore primarily identified by considering the response of customers to an increase in price of one of the products.[87]

8.7 As stated in the guidelines, the CMA may on occasion aggregate several narrow markets into a single broader market based on a consideration of the response of suppliers to changes in prices.[88] Such 'supply side substitution' may be considered, for example, in cases (such as the present) which involve bidding and tendering, and in which some customers have highly bespoke requirements.[89]

8.8 There are two circumstances in which the CMA may consider aggregating several narrow markets into a broader market based on supply side factors:[90]

(a) Firms have the ability and incentive to shift capacity between the different products quickly, that is, generally within a year; and

(b) The same firms compete to supply the different products and the conditions of competition between the firms are the same for each product.

The supply of filters

8.9 There are two related products that we collectively refer to as filters:[91]

(a) **Energy filters.** Energy filters are capable of performing both 'electron energy loss spectroscopy' (EELS) and 'energy filtered transmission electron microscopy' (EFTEM). There are notable differences between material science and life science energy filters.

(i) Material science energy filters are used primarily for EELS applications, but also have EFTEM capabilities. Material science

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[85] Merger Assessment Guidelines, paragraphs 5.2.6 – 5.2.7.
[86] Merger Assessment Guidelines, paragraph 5.2.5.
[87] Merger Assessment Guidelines, paragraph 5.2.7.
[88] Merger Assessment Guidelines, paragraph 5.2.17.
[89] Merger Assessment Guidelines, paragraph 5.2.18.
[90] Merger Assessment Guidelines, paragraph 5.2.17.
[91] The information in sub-paragraphs (a) and (b) is based primarily on Thermo Fisher and Gatan responses to CMA information request, dated 26 February 2019.

energy filters mostly incorporate GI cameras, although they are capable of incorporating DD cameras. Gatan's material science energy filters have list prices ranging from [✂].[92]

(ii) Life science energy filters are used for EFTEM applications. The energy filter removes out-of-focus electrons, thereby increasing the signal-to-noise ratio in the image and reducing data collection time. Life science energy filters primarily incorporate DD cameras. Gatan's life science energy filter has a list price of approximately $[✂].[93]

(b) **Spectrometers**. Spectrometers are used for material science applications. Dedicated spectrometers only record spectra and do not record energy filtered images or diffraction patterns. They are therefore restricted to specific EELS applications. Spectrometers are typically cheaper than energy filters: Gatan's dedicated spectrometer has a list price of $[✂].[94]

8.10 Based on the different applications and price points of the above products, demand-side substitutability would indicate that they constitute separate product markets.

8.11 The Parties submitted that there is a high degree of supply-side substitutability between energy filters and spectrometers.[95] Gatan stated for example that a spectrometer supplier could produce an energy filter in [✂] for $[✂].[96] It considers that a similar estimate applies for energy filter suppliers aiming to produce a spectrometer.

8.12 Thermo Fisher has submitted that [✂].[97] [✂].

8.13 Based on the evidence provided to us, we understand that the conditions of competition are broadly comparable for the different types of filter. In both life science and material science, the evidence indicates that Gatan is the largest supplier, with a small number of sales accruing to alternative suppliers.[98] JEOL's in-column filter is [✂].[99] We also note that [✂].

8.14 It is therefore our provisional view that filters should be treated as a single product market. We recognise that there are notable differences in the price and application of different types of filter, and in particular, that life science

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[92] Annex 66 of Gatan's Market Questionnaire response.
[93] Annex 66 of Gatan's Market Questionnaire response.
[94] Annex 66 of Gatan's Market Questionnaire response.
[95] Thermo Fisher and Gatan response to CMA information request, dated 26 February 2019.
[96] Gatan response to CMA information request, dated 26 February 2019.
[97] [✂].
[98] Details on alternative suppliers are provided in chapter 9.
[99] See chapter 9, the Horizontal TOH for a discussion.

filters typically incorporate a DD camera. We take these points into account in our competitive assessment.

The supply of cameras

8.15 Based on the evidence provided to us, it is our provisional view that general imaging (GI) and direct detection (DD) cameras constitute separate product markets for the reasons set out below.

8.16 From a demand side perspective, our provisional view is that the two products are unlikely to be considered close substitutes by the majority of customers. Thermo Fisher for example submitted that its GI camera is a 'system camera' used for 'general purpose, high-resolution imaging [and] fast recording'.[100] DD cameras, by contrast, tend to be used for specific life science applications such as low-dose cryo-EM. Thermo Fisher stated that GI cameras are not a direct demand-side substitute for DD cameras.[101]

8.17 The more specialised role of DD cameras is reflected in the price. The average price of a Gatan DD camera sold to UK end users over the period 2014-2018 was $[✂], compared to $[✂] for a GI camera.[102] This price differential limits the extent of demand side substitution.

8.18 We recognise that there may be circumstances in which some customers view GI cameras and DD cameras as substitutes. TVIPS for example told us that its GI camera is capable of electron counting, similar to a DD camera, and it sometimes competes against Thermo Fisher's DD camera. TVIPS said that, for single particle analysis, its GI camera is as good as Thermo Fisher's DD camera when used on 'screening' TEMs.[103] We assess the strength of these 'out of market' constraints in our competitive assessment. We do not consider that this is relevant for market definition, as in our view GI cameras are not a relevant substitute for DD cameras for the large majority of customers or applications.[104]

8.19 From a supply side perspective, the evidence provided to us indicates that suppliers could not rapidly shift production between the two products. We have been told by several GI camera suppliers for example that the technical barriers to supplying DD cameras are very high:

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[100] Thermo Fisher Market Questionnaire response, table 10.1.
[101] Thermo Fisher response to CMA information request, dated 26 February 2019.
[102] Source: Annex 1 of Gatan's response to the CMA Initial S109 request (dated 7 January 2019).
[103] Call with TVIPs, 19/2/2019.
[104] We have received no indication from internal documents, end-customers or other competitors for example that TVIPS' GI camera is a viable substitute to a DD camera.

(a) EMSIS stated that it does not have any plans to develop a direct electron detection camera as it believes that intellectual property patents would prevent this. EMSIS believed that it would take a great deal of money to develop a new, non-patented, sensor. In addition, the market is too small to attract other electronics firms to take an interest, although it is possible to partner with an academic institute. EMSIS estimated that for it to develop new sensor technology it would need to spend between $1.5m–$5m and even then, it may not be possible.[105]

(b) Company D stated that it would take at least 5 to 10 years for them to develop a DD camera [✂].[106]

(c) TVIPS stated that for it to compete against Gatan's K3 DD camera it would take TVIPS three to four years.[107]

8.20 We also note that the competitor set for the two products is different, with few parties supplying both products. AMT, EMSIS, JEOL and TVIPS all produce GI cameras, but do not produce DD cameras. Aside from the Parties, only Direct Electron and (more recently) Company B currently produce DD cameras.

8.21 Based on the evidence we have of limited demand side and supply side substitutability, our provisional view is therefore that GI cameras and DD cameras constitute separate product markets.

The supply of TEM systems

8.22 The Parties submitted that there is a single market for the supply of TEM systems (including peripherals).[108] They stated that it would be wrong to segment the market based on peripheral usage, as the CMA had done in Phase 1,[109] as TEMs are not confined to a single use based on the peripherals that they are sold with. The Parties also stated that there is significant supply side substitution within TEMs, as a supplier of one type of TEM could relatively quickly and easily produce another type of TEM.

8.23 We have found that there is significant variation in the price, application and customer base of TEMs. We understand that Thermo Fisher currently offers 15 unique TEM models with list prices ranging from around $[✂] to around $[✂]million.[110] Each customer has a specific set of requirements, often within

[105] Call with EMSIS, 20/2/2019.
[106] [✂].
[107] Call Summary, TVIPs, 19 February 2019.
[108] Annex 1 of the Parties' Issues Statement response, paragraph 2.
[109] CMA Phase 1 Decision Paper.
[110] Annex 8 of Thermo Fisher's Market Questionnaire response.

a fixed budget, and so very few (if any) customers are likely to view each of these models as close substitutes. This indicates that the relevant product market is narrower than the supply of all TEMs.

8.24 The evidence provided to us to date indicates that there is a clear distinction between the supply of TEMs to life science customers, and the supply of TEMs to material science customers. We note that each of the Parties distinguishes [✂] [✂].[111] Although there is some overlap in the TEM models at the lower-end of the range, the mid-range and high-end TEMs are specialised for each segment.[112]

8.25 Further, evidence from customers indicates a significant variation in the peripherals used by material science and life science customers. DD cameras for example are almost exclusively used in life science: all of Thermo Fisher's UK TEM sales over the last 5 years that included a DD camera [✂].[113] Similarly, the application of filters differs between life science and material science customers (see paragraphs 8.9 to 8.14). Gatan produces both an imaging energy filter/spectrometer and a dedicated spectrometer for use in material science applications, and a dedicated energy filter for use in life science applications.[114]

8.26 Finally, we note that the conditions of competition are significantly different for life science and material science TEM systems.[115] In life sciences, the evidence indicates that Thermo Fisher and JEOL respectively had around [✂] [70 – 80]% and [✂] [10 – 20]% global revenue shares in 2018, whereas in material science the two suppliers each had approximately [✂] [30 – 40]% market share.[116]

8.27 The evidence therefore indicates that there are separate product markets for the supply of TEM systems (including peripherals) to life science and material science customers.

8.28 We note that even within these markets there is significant variation in the price and application of TEM systems, as well as the conditions of competition. Company D submitted for example that there is limited demand

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[111] Thermo Fisher segments customers into life science, material science and semi-conductor. [✂]. (Source: Market Questionnaire responses.)
[112] Annex 8 of Thermo Fisher's Market Questionnaire response.
[113] Annex 11 of Thermo Fisher's Market Questionnaire response.
[114] We also note that Compass Lexecon's submission entitled 'competition between TEM systems' (Annex 7 of the Parties' Issues Statement response) [✂] (paragraph 4.2).
[115] As noted in paragraph 8.10, one of the factors determining whether the CMA will consider aggregating several narrow markets into a broader market on the basis of supply side substitutability is if the conditions of competition between firms are the same for each product.
[116] Annex 10 of Thermo Fisher's Market Questionnaire response.

side and supply side substitution between 'cryo-EMs' and other TEMs, with Thermo Fisher having over 90% share of cryo-EMs.[117] This is consistent with evidence we have received from third-parties.[118]

8.29 Whilst we recognise that there are relevant customer segments within each market, in our view these segments do not constitute distinct (and well-defined) product markets. Even within cryo-EM for example, there is a wide range of applications and prices of TEM systems. Thermo Fisher's 200kv 'screening' cryo-EM machine for example has a list price of $[✂], whereas its 300kv Krios machine has a list price of $[✂].[119] Similarly, many cryo-EM users performing tomography require an energy filter, whereas those performing SPA generally do not.[120] The relevant choice set (and potential suppliers) for these customers is therefore significantly different.

8.30 Within each of life science and material science, our provisional view is therefore that there are relevant customer segments, rather than distinct product markets per se. In our competitive assessment we examine how competitive conditions vary across these customer segments, as well as constraints from within and outside the relevant markets.

Geographic markets

8.31 The Parties submitted that the relevant geographic market for all products is worldwide.[121] Suppliers access global markets from a small number of sites, regulatory barriers are limited, and transport costs are low relative to product prices.

8.32 This is consistent with our analysis of the evidence provided to us. Our view is that the major suppliers of both peripherals and TEMs operate globally, and UK customers source their products from international suppliers. No third parties have submitted that a narrower geographic frame of reference would be appropriate.

8.33 For these reasons, our provisional view is that the relevant geographic market for all products is worldwide.

[117] Company D Phase 2 submission to the CMA, dated 28 January 2019.
[118] For example, Call Summary, Medical Research Council, 31 January 2019, Call Summary, TVIPS, 19 February.
[119] Source: Annex 8 of Thermo Fisher's Market Questionnaire response.
[120] For example, CMA call with York University, 12 February 2019.
[121] Annex 1 of the Parties' Issues Statement response.

Conclusions

8.34 Our provisional view on the basis of the evidence provided to us to date is that the relevant product markets in which to assess the effects of the Proposed Merger are:

(a) The supply of DD cameras.

(b) The supply of GI cameras.

(c) The supply of filters.

(d) The supply of TEM systems (including peripherals) to life science customers.

(e) The supply of TEM systems (including peripherals) to material science customers.

8.35 Our provisional view is that the relevant geographic market is worldwide for all of the above product markets.

9. Horizontal issues

Overview

9.1 This chapter covers the horizontal and potential competition theories of harm in respect of the proposed acquisition by Thermo Fisher of Gatan.

Cameras

9.2 Gatan sells GI and DD cameras to TEM manufacturers, distributors and directly to end-customers. Gatan's cameras are compatible with Thermo Fisher, JEOL and Hitachi TEMs. Thermo Fisher sells GI and DD cameras either together with its TEMs or to end-customers who already have a compatible Thermo Fisher TEM. Thermo Fisher's cameras are compatible only with Thermo Fisher TEMs.

9.3 We are investigating whether, due to the loss of competition between the Parties, the Merged Entity could profitably increase the price of its products, deteriorate quality[122] and/or reduce the supply of new products.[123] In general,

[122] In this context 'deteriorate quality' means that post-merger quality will be lower than in the counterfactual, e.g. the Parties may still improve quality, but this improvement will be less than it would be without the Proposed Merger or will occur at a slower rate.
[123] New products may also be sold at a higher price and/or lower quality.

for this horizontal TOH to be substantiated, the following conditions must be met:

(a) The Parties are close competitors in the relevant markets.

(b) Rivals are unlikely to replace effectively the competitive constraint that the Parties exert on one another, or that one Party exerts on the other if they constrain each other asymmetrically.

(c) Rivals are unlikely to enter or expand in the relevant markets within a reasonable timeframe and which can replace the competitive constraint that would be lost through the Proposed Merger. This is primarily addressed in chapter 12 on Entry and Expansion.

Filters

9.4 As set out in Our Issues Statement, we are investigating a 'potential competition' TOH if we find that [✂].

9.5 Thermo Fisher submitted that it is [✂].[124] [✂].[125] As with its cameras, Gatan's filters are compatible with Thermo Fisher, JEOL and Hitachi TEMs.

9.6 In general, the concern under a potential competition TOH is that the Proposed Merger removes a potential entrant to the market, thereby weakening future competition by weakening the competitive constraint on an incumbent supplier.[126] The CMA's guidelines state that the CMA will consider the following questions in assessing this TOH:[127]

(a) Would the potential entrant be likely to enter in the absence of the merger?

(b) Would such entry lead to greater competition?

9.7 In this case, [✂][128] [✂]. Our analysis therefore focuses on the [✂]. In doing so, we consider the potential closeness of competition between [✂], as well as the constraint imposed by other suppliers and potential entrants.

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[124] [✂].
[125] [✂].
[126] This is referred to in the Merger Assessment Guidelines as actual potential competition (paragraph 5.4.14). In this paper we refer to it as 'potential competition'.
[127] Merger Assessment Guidelines, paragraph 5.4.15.
[128] [✂]

9.8 Our analysis of the potential competition TOH (with respect to filters) is therefore similar in scope to our analysis of the horizontal TOH (with respect to DD and GI cameras).[129]

Structure of the chapter

9.9 Before proceeding to assess the closeness of competition between the Parties and the constraint imposed by current and potential rivals, we first present our conceptual framework for the analysis. This framework considers whether and how the Parties compete in the supply [✂].

9.10 Having set out our conceptual framework, we then consider in turn the horizontal TOH for each of GI cameras and DD cameras and the potential competition TOH for filters.

Conceptual framework

9.11 Our conceptual framework considers whether [✂]. Cameras and filters are referred to collectively as 'peripherals'. Our analysis of how *closely* the Parties and other suppliers compete is presented in later sections of the chapter.

9.12 In principle, Thermo Fisher and Gatan compete to supply peripherals to both:

(a) Customers that are purchasing a standalone peripheral for use on a Thermo Fisher TEM ('upstream' competition), and

(b) Customers that are purchasing a TEM system which includes peripherals ('downstream' competition).

9.13 We discuss these two cases in turn. For clarity, we note that in this context we include standalone sales of peripherals to both TEM manufacturers and end-customers within 'upstream' competition. Downstream competition refers only to the sale of TEM systems.

Upstream competition

9.14 Thermo Fisher self-supplies the relevant peripherals and does not supply any other TEM manufacturer. Upstream competition between Thermo Fisher and Gatan (in the relevant markets) is therefore limited to:

[129] We have not investigated a perceived potential competition TOH (as described in the Merger Assessment Guidelines, at paragraph 5.4.16) as we have received no evidence of Gatan's filters being constrained by [✂].

(a) Peripheral sales to Thermo Fisher for use on its TEMs.

(b) Peripheral sales to existing Thermo Fisher TEM users. We refer to such sales as 'aftermarket' sales.[130] This can include upgrades, replacements and additions. These are sometimes known as 'retrofit' sales.

Peripherals sold to Thermo Fisher for use on its TEMs

9.15 An end-customer purchasing a Thermo Fisher TEM can, in principle, choose between a Thermo Fisher or Gatan peripheral to purchase with the TEM system.[131] The Parties therefore, at least in principle, directly compete to supply peripherals to such customers.

9.16 The Parties submitted that, in practice, customers [✂] purchase a Thermo Fisher TEM system that includes a standalone Gatan camera.[132] This is particularly true for DD cameras: over the last 5 years, Thermo Fisher has [✂] TEMs in the UK with a Gatan DD camera.[133] This is demonstrated in Table 1.

9.17 Table 1 also indicates that the large majority of GI cameras sold with a Thermo Fisher TEM were supplied by Thermo Fisher itself. Thermo Fisher sourced its filters exclusively from Gatan, and no TEMs were sold [✂].

Table 7. Thermo Fisher UK TEM sales (2014-2018)

	TEM + GI camera	TEM + DD camera	TEM + filter
Total TEM sales	[✂]	[✂]	[✂]
Of which: Thermo Fisher peripheral	[✂]	[✂]	[✂]
Of which: Gatan peripheral	[✂]	[✂]	[✂]
Of which: Other peripheral supplier	[✂]	[✂]	[✂]

Source: CMA analysis based on Annex 11 of Thermo Fisher's Market Questionnaire response. Note: the sales figures attributed to Thermo Fisher and Gatan refer only to the relevant peripheral named in each column.

9.18 The figures in Table 7 are consistent with Thermo Fisher and Gatan not competing, or doing so only to a small extent, to supply peripherals to

[130] We note that sales to end-customers could be considered as downstream competition. In this context we use 'upstream' and 'downstream' to distinguish standalone sales of peripherals from sales of TEMs. Hence peripheral sales to end-customers are included in the upstream.
[131] Customers may also be able to choose the peripheral of another supplier. This is addressed further below. We are primarily concerned here with the mechanisms through which Thermo Fisher and Gatan compete with each other.
[132] Thermo Fisher Issues Statement response, paragraph 10.13.
[133] Excluding Gatan DD cameras sold as part of a filter.

customers purchasing a Thermo Fisher TEM system.[134] We note however that the figures in Table 7 at least in part reflect the commercial relationship between Thermo Fisher and Gatan pre-Proposed Merger (see the following sub-section), rather than customer preferences (eg over relative price and quality).

Supply Agreements

9.19 Gatan and Thermo Fisher agreed a basic supply agreement effective from [✂].

9.20 The Fifth Amendment to the Basic Supply Agreement signed on [✂]. As part of the amendment, Thermo Fisher [✂]. Thermo Fisher states that the renewal of the Basic Supply Agreement should be included as part of the counterfactual as both Parties have a strong interest in continuing the arrangement.

9.21 Gatan, in its 2017 strategic review, outlined that, absent the Proposed Merger, [✂]. We consider that Gatan, absent the Proposed Merger, would wish to continue to supply Gatan peripherals to Thermo Fisher. It is therefore likely that a new supply agreement would have been agreed and that this should form part of the counterfactual.

9.22 In contrast to the position regarding DD cameras under the Basic Supply Agreement and Amended Basic Supply Agreement, under both the original and amended Agreement, [✂].

9.23 In addition, we note that the Basic Supply Agreement provided that Thermo Fisher would [✂][135] [✂].

9.24 The impact of the Basic Supply Agreement on camera sales is supported in evidence we have received from third parties. Birkbeck College told us that Thermo Fisher was only able to provide a Gatan DD camera as part of a filter.[136] EMSIS told us that Thermo Fisher will not actively promote and sell EMSIS cameras.[137]

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[134] There is likely to be upstream quality competition between the Parties for peripherals, which will influence, to some degree, whether end-customers buy a JEOL TEM, for example, with a Gatan camera or a Thermo Fisher TEM and camera. We cover this aspect of competition in downstream competition.
[135] Basic Supply Agreement, page 3
[136] Call Summary, Birkbeck College, 1 February 2019.
[137] Call Summary, EMSIS, 20 February 2019.

Aftermarket sales to existing Thermo Fisher TEM users

9.25 In principle, the Parties directly compete for aftermarket sales of GI cameras and DD cameras to Thermo Fisher TEM users. [✂].[138] UK aftermarket sales for each peripheral are presented in Table 8.

Table 8. UK aftermarket sales to Thermo Fisher TEM users (2014-2018)

	GI cameras	DD cameras	Filters
Thermo Fisher sales (total value)	[✂]	[✂]	[✂]
Gatan sales (total value)	[✂]	[✂]	[✂]

Source: CMA analysis based on Parties' data. Thermo Fisher: Annex 10 of Thermo Fisher's Market Questionnaire response (Q.47). [✂]

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9.26 With specific reference to DD cameras, the Parties submitted that the volume of UK aftermarket sales is 'truly de minimis'.[139] We recognise that the UK aftermarket for DD cameras is relatively small in terms of volumes, although this is less true in terms of value – in which the DD camera aftermarket is larger than for GI cameras for example.

9.27 As set out in our Market Definition chapter however, our provisional view is that the geographic market for each of the relevant products is global. As demonstrated in Table 3, global aftermarket sales are substantial, particularly for Gatan. We note that for DD cameras, Gatan's revenues from direct sales to Thermo Fisher TEM users (and distributors) accounted for [✂] [60 – 70]% of its total worldwide DD camera revenues over the period.[140] For GI cameras and filters, Gatan's direct sales to Thermo Fisher users (and distributors) accounted for [✂] [40 – 50]% and [✂] [70 – 80]% of its aftermarket sales respectively.[141] (We recognise that Gatan's recent aftermarket sales of DD cameras were impacted by an Upgrade Programme; see paragraphs 9.105 to 9.106).

9.28 As the UK is part of the global market, the impact of competition between Thermo Fisher and Gatan in the global market translates into an impact on UK competition (in terms of both price and quality). In terms of quality, UK customers benefit from technical improvements (for example) that are driven by competition in the global market. In terms of price, [✂].[142]

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[138] [✂].
[139] Parties' response to the Issues Statement, paragraph 13.2.
[140] CMA calculation based on Gatan response to question 42 and 43 of the Market questionnaire. Total worldwide DD camera revenues were $[✂] over 2014-2018. Sales to Thermo Fisher TEM users accounted for [✂] [80 – 90]% of total aftermarket sales.
[141] Total aftermarket sales (including sales to distributors) over 2014-2018 were $[✂] for GI cameras and $[✂] for filters. Gatan's total sales to Thermo Fisher TEM users accounted for [✂] [20 – 30]% and [✂] [70 – 80]% of its total worldwide sales over the period for GI cameras and filters respectively.
[142] [✂].

9.29 Further, we note that competition for these aftermarket sales drives quality improvements that benefit all UK customers purchasing TEMs and peripherals.[143] In addition to Parties' peripheral sales, this includes those purchasing a JEOL or Hitachi TEM (with a Gatan camera or filter) and those purchasing rivals' products such as those of Direct Electron or TVIPS (who are also incentivised to compete on quality to successfully compete against Gatan and Thermo Fisher).

Table 9: Global aftermarket sales to Thermo Fisher TEM users (2014-2018)

	GI cameras	DD cameras	Filters
Total value of Thermo Fisher sales	[✂]	[✂]	[✂]
Total value of Gatan sales	[✂]	[✂]	[✂]

Source: CMA analysis based on Annex 10 of Thermo Fisher's Market Questionnaire response (Q.47) and [✂]

9.30 The Parties submitted that typically, customers wanting to replace their camera will purchase a replacement from their original supplier.[144] We note that this is more likely to be the case for replacements, but aftermarket sales can also be for upgrading or adding additional cameras and filters.

9.31 For example, although Thermo Fisher has [✂] Direct Electron or Gatan DD cameras as part of a TEM system in the UK over [✂], both suppliers have made aftermarket sales to Thermo Fisher TEM customers in the UK.[145] Further, Gatan has sold [✂] GI cameras in the UK to Thermo Fisher TEM customers over the last 5 years, but [✂] GI cameras to Thermo Fisher for sale as part of a Thermo Fisher TEM system sold to an end user in the UK.[146] Aftermarket sales are therefore not simply limited to replacements from their original supplier.[147]

Downstream competition

9.32 There is competitive interaction (and in that sense competition) between Thermo Fisher and Gatan in the downstream market, because microscopes are typically sold with a camera and/or filter (creating a 'TEM system').[148] For example, a customer may be choosing between a Thermo Fisher TEM which includes a Thermo Fisher camera, and a JEOL TEM which includes a Gatan camera. We refer to this here as 'downstream' competition.

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[143] As noted in paragraph 9.28, these aftermarket sales are particularly substantial for Gatan.
[144] Parties' response to the Issues Statement, paragraph 13.1.
[145] Based on Table 2 and CMA call with Direct Electron.
[146] As shown in Tables 1 and 2.
[147] [✂].
[148] Over the period 2014-2018, Thermo Fisher sold [✂] TEMs to UK end-customers. [✂] sales included a camera and/or filter.

9.33 In our view, this aspect of competition between the Parties is material if the price and/or quality of peripherals is an important factor in a customer's decision of which TEM system to purchase. In this case, Thermo Fisher's TEM sales are to some extent dependent on the competitiveness of the peripherals it supplies.

9.34 Evidence on the relative price of peripherals and TEMs is presented in Table 10. We have categorised TEM systems based on the inclusion of the most relevant peripherals in order to focus on relative prices for the most relevant TEM models in each case.

9.35 Table 10 shows that the price of cameras and filters in some cases accounts for a material proportion of the overall TEM system price and cost. This is particularly true for DD cameras and filters.[149]

9.36 This indicates that the price of the camera or filter may be a relevant factor in a customer's decision as to which TEM system to purchase. This is likely to be true for some customers more than others. We note in particular that the relative price of peripherals is considerably higher for some customers than indicated by the averages shown in Table 10. In life sciences for example, the average price paid by Thermo Fisher for a Gatan filter accounted for approximately [✂] of the overall TEM system cost.[150] Further, in a recent tender at [✂], Thermo Fisher submitted a bid for a TEM with a Thermo Fisher DD camera; the price of the camera accounted for [✂] of the total price.[151]

Table 10: Average UK TEM and peripheral prices (2014-2018)

	TEM + GI only (no DD or filter)	TEM + DD (no filter)	TEM + filter
Average Thermo Fisher TEM system price	[✂]	[✂]	[✂]
Average Thermo Fisher peripheral price	[✂]	[✂]	[✂]
Average Gatan peripheral price	[✂]* [✂]**	[✂]	[✂]* [✂]**

* Excluding Sales to Thermo Fisher
** Sales to Thermo Fisher
Source: TEM systems prices are calculated using [✂]. Thermo Fisher's GI camera price is taken from Annex 10 (Q.47) of Thermo Fisher's Market Questionnaire response. This is an approximation based on standalone sales only. Gatan prices are calculated using Annex 1 of Gatan's First Day Letter (Phase 2 RFI 1) response and Annex 11 of Thermo Fisher's Market Questionnaire response. We note that sales prices to Thermo Fisher and those excluding Thermo Fisher are not directly comparable as the models sold may be different (this is particularly true in the case of filters).

9.37 Peripherals can therefore account for a material percentage of the overall TEM system price. We note however, based on evidence from tender

[149] See also chapter 10 on the vertical TOH for further discussion of this point.
[150] Annex 11 of Thermo Fisher's Market Questionnaire response. We do not know how prices were allocated or presented to end-customers.
[151] Annex 447 of Thermo Fisher's Market Questionnaire response. [✂].

documents, that the quality of the TEM system is typically a more important factor than price in customers' purchasing decisions. For example:

(a) A [✂] ITT in 2017 (for a TEM with DD camera and filter) specified a weighting of 30% for price and 70% for quality.[152]

(b) A [✂] ITT in 2017 (for a TEM with GI camera and filter) specified a weighting of 20% for 'financial' criteria and 50% for quality criteria.153

(c) A [✂] ITT in 2018 (for a TEM with DD camera) specified a weighting of 30% for price and 50% for 'equipment and personnel'.[154]

(d) [✂].[155]

9.38 The relevant question in this context is therefore whether the quality of the camera or filter materially affects the quality of the overall TEM system. This is not completely clear from the tender documents that we have reviewed, as the quality weighting is not broken down into specific components (such as the quality of the camera or filter).[156] We note however that some tenders specify mandatory (and detailed) technical requirements for the performance of the camera or filter as part of the overall TEM system.[157]

9.39 We received limited evidence from customers on whether the quality of the camera was an important factor in their choice of TEM system, but the evidence indicates that for some customers the camera was an important factor:[158]

(a) Norwich Bioscience Institute told us that they attended demonstrations from Thermo Fisher, JEOL and Gatan when tendering for a TEM system. They told us that the quality of the TEM itself was the most important part of their purchase decision, but the camera was an 'important second' part of the decision.[159]

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[152] Annex 37b of Thermo Fisher's response to Phase 1 RFI 1.
[153] Annex 56 of Thermo Fisher's response to Phase 1 RFI 1.
[154] Annex 19 of Thermo Fisher's response to Phase 1 RFI 1. The tender was split into 5 lots, of which 'lot 1' was for a TEM and 'lot 4' was for a camera. Bidders were invited to tender for all lots.
[155] [✂].
[156] It is also the case that several ITTs consider bids for the TEM and camera (or filter) as separate 'lots', with firms invited to bid for multiple lots. The relative weighting of each lot is not indicated.
[157] [✂] ITT for a '300 keV TEM' for example specifies that 'the camera should have at least 50% DQE at half Nyquist frequency at 300 keV and at least ~4K x 4K pixels. It should be capable of integration, electron counting (within reasonable exposure times) and super-resolution operation'. Source: Annex 37a, Phase 1 RFI 1.
[158] A number of end-customers told us that they required access to a filter, and this was an essential part of their decision as to which TEM to purchase (Oxford University, National Nuclear Laboratory, Leeds University). These responses were generally referring to the importance of access to the peripheral rather than relative quality however, and so they are of less relevance here.
[159] Call Summary, Norwich Bioscience Institute, 20 February 2019.

(b) The National Nuclear Laboratory told us that when purchasing their TEM, performance and operability with the correct cameras and filters was the most important factor.[160]

(c) Company A told us that Thermo Fisher's cryo-EMs provide better performance than those of JEOL and Hitachi, but the main reason for the 'resolution revolution' in cryo-EM has been the development of DD cameras.[161] However, the customer also told us that if the TEM is used primarily for 'screening' purposes, camera performance is not paramount.

9.40 We have reviewed a number of internal documents which highlight the importance of cameras and filters to the quality of the overall TEM system:

(a) [✂].[162] [✂].

(b) Gatan's 2017 Annual Review states that [✂].[163] The document also states that '[✂].[164]

(c) A 2016 FEI internal document states [✂].[165] [✂].

(d) [✂].[166]

9.41 Based on the above evidence, our provisional view is therefore that there is significant competitive interaction (and in that sense competition) between Thermo Fisher and Gatan in the sale of cameras [✂] from the perspective of customers that are purchasing TEM systems. In particular, the quality of the camera [✂] is likely to be a material factor in some customers' decision as to which TEM system to purchase. We note that, for many customers, the price of the camera/[✂] is also a material percentage of the overall TEM system price. Tender documents indicate however that price is generally a less important factor for end-customers than quality when purchasing a TEM system.

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[160] Call Summary, National Nuclear Laboratory, 4 February 2019.
[161] Call Summary, Company A, 31 January 2019.
[162] [✂].
[163] [✂].
[164] [✂].
[165] [✂].
[166] [✂].

Parties' submissions on competition between TEM systems

Overview of the Parties' analysis

9.42 The Parties submitted a paper setting out their assessment of horizontal competition between TEM systems, concentrating on the relative importance of DD cameras and filters.[167]

9.43 The Parties' analysis focusses on the extent of upward pricing pressure on Thermo Fisher TEMs, post-Proposed Merger. In principle, this is higher after the Proposed Merger because some revenue from the loss of a TEM sale will be recaptured via the margin on Gatan peripherals. For example, if Thermo Fisher increases the price of its TEMs and a customer switches to JEOL, Thermo Fisher does not receive any revenue (pre-Proposed Merger). After the Proposed Merger however, Thermo Fisher would still receive some revenue in this scenario, if the customer purchased a Gatan peripheral with the JEOL TEM. This might increase the incentive for Thermo Fisher to raise the prices of its TEM systems post-Proposed Merger.

9.44 The Parties initially used a 'gross upward pricing pressure index' (GUPPI) framework to assess the extent of any increased incentive for Thermo Fisher to increase its TEM prices post-Proposed Merger before any efficiencies. In particular, the Parties calculate the 'critical diversion ratios' that would be necessary for the GUPPI to exceed 5% and 10%.[168] These critical diversion ratios are based on the proportion of Thermo Fisher's lost TEM customers that would divert to a JEOL or Hitachi TEM with Gatan peripherals.

9.45 The Parties' analysis indicates that GUPPIs generally do not exceed the thresholds of concern, at least at 10%, even before considering any efficiencies. The Parties state that 'this is due to the simple intuition that the TEM system is much more expensive than the input peripheral: a lost TEM system sale represents a significant lost margin to TFS [Thermo Fisher Scientific], as compared to the much more modest recaptured peripheral margin'.[169]

9.46 The Parties subsequently applied an upward pricing pressure (UPP) analysis (i.e. net of efficiencies), assessed at lower thresholds of 0% and 5%. This analysis indicates that the elimination of double marginalisation and the incorporation of reductions in the cost of ownership broadly offsets any

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[167] Parties' submission to the CMA entitled 'competition between TEM systems', dated 20 February 2019.
[168] In the text, we use 'price rise' as shorthand for the incentive to increase price.
[169] Parties' submission to the CMA entitled 'competition between TEM systems', dated 20 February 2019, paragraph 2.3.

positive upward pricing pressure. The Parties state that incorporating these efficiencies leads to net downward pressure on Thermo Fisher's TEM prices, post-Proposed Merger.[170]

CMA view

9.47 In our view the upward pricing pressure framework used by the Parties does not fully capture the competitive constraints placed on Thermo Fisher by Gatan in the sale of TEM systems. In particular, as argued above, there is evidence from third-parties and internal documents that the quality (and to some extent price) of the relevant peripherals is a material factor in customers' choice of which TEM system to purchase. There is also evidence that differentiation (and competitive advantage) in the supply of TEM systems is increasingly focussed on the quality of peripherals, software and the overall analytical 'workflow'. As noted in paragraph 9.42, we therefore consider that there is significant competitive interaction between the Parties from the prospective of customers that are purchasing TEM systems, which is potentially lost as a result of the Proposed Merger.

9.48 We recognise that, at least for certain customer segments, the upward pricing pressure on Thermo Fisher's TEMs – based purely on the recapture of Gatan's margins (on sales to JEOL, say) – is likely to be limited. That said, we make the following observations regarding the framework applied by the Parties:

(a) The framework is underpinned by a theoretical model which assumes that each firm posts a single price for all customers, without negotiation.[171] The sale of TEM systems, in contrast, is generally characterised by tendering and/or bilateral negotiations between firms and customers, with customised prices. The theoretical basis for applying the framework to such markets is uncertain.[172]

(b) The framework does not take into account the highly concentrated nature of the relevant markets. In a highly concentrated market, firms are more likely to respond to each other's strategies, rather than acting as price

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[170] Parties' submission to the CMA entitled 'competition between TEM systems', dated 20 February 2019, paragraph 2.12.
[171] GUPPI is underpinned by a theoretical model which assumes Bertrand competition where firms set prices simultaneously without negotiation.
[172] In its response to the Horizontal TOH Working Paper, Compass Lexecon (submission dated 31 March 2019) state that the framework can be applied to bidding markets. In particular, it states that the framework can be adapted to sealed bid auctions, using a 'winning probability diversion ratio'. We consider that whilst a sealed bid auction may reflect the tender process of some customers, it is not a general description of the procurement process in the current market.

takers. The responses of competitors such as JEOL would be more significant in this context than in a fragmented market (although we note that JEOL's ability to respond could be constrained by its access to relevant peripherals). This would likely exacerbate the impact of any price increases.[173]

(c) The analysis treats the prices and margins of Gatan's peripherals as given (or 'exogenous') from Thermo Fisher's perspective. After the Proposed Merger however, the Merged Entity can simultaneously flex the price and quality of both Thermo Fisher's and Gatan's products.[174] Thermo Fisher's incentive to increase price, lower quality or reduce the supply of new products post-Proposed Merger is therefore likely to be significantly greater than is implied by the upward pricing pressure analysis.[175]

9.49 We also note that the analysis in principle should be applied to both Parties: i.e. Gatan's incentives to increase prices or reduce quality/the supply of new products should be considered as well as Thermo Fisher's. We note that in this case, the relatively high TEM margin has the opposite effect than it does for Thermo Fisher. If Gatan increases its price (or lowers the quality) of peripherals on JEOL TEMs (say), the Merged Entity recaptures the margin on those sales that divert to a Thermo Fisher TEM system. Applying the Parties' GUPPI framework indicates that the Merged Entity would have a clear incentive to do so.[176]

9.50 In light of the above, our provisional view is that we should not place significant weight on the Parties' upward pricing pressure analysis. In our view, the framework fails to capture the true extent of competitive interaction between Thermo Fisher and Gatan for customers purchasing TEM systems. It therefore does not fully capture Thermo Fisher's ability or incentive to increase price, reduce quality or dampen the supply of products post-Proposed Merger.

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[173] In its response to the Horizontal TOH Working Paper, Compass Lexecon states that this observation does not apply in general as its primary finding is that there is downward pricing pressure once efficiencies have been taken into account. We assess the Parties' claimed efficiencies in chapter 13, but we recognise that this observation relates primarily to the GUPPI (rather than UPP) results.
[174] In its response to the Horizontal TOH Working Paper, Compass Lexecon states that this is affected by supply agreements. We consider the impact of the supply agreements in detail when assessing the vertical TOH in chapter 10.
[175] That is, post-Proposed Merger, the quality (say) of third party TEM systems (which include Gatan peripherals) is not exogenous from Thermo Fisher's perspective.
[176] This mirrors the analysis of the Merged Entity's incentives to foreclose, and so we do not elaborate on this point here. Gatan's ability to increase prices may be impacted by supply agreements, which again is covered in our assessment of the Vertical TOH.

Parameters of competition

9.51 As noted in paragraph 9.4, our concern under a horizontal TOH is whether, due to the loss of competition between the Parties, the Merged Entity could profitably increase the price of its products, deteriorate quality and/or reduce the supply of new products.

9.52 In the context of 'downstream' competition, we consider that competition in the supply of peripherals is likely to be predominantly based on quality and the supply of new products. Whilst there is likely to be some degree of price competition in this context, price competition is complicated by the fact that Thermo Fisher typically sells integrated TEM systems that include both the TEM and relevant peripherals. There is therefore flexibility in pricing which can make it difficult for the customer to accurately pin down the price of the peripheral relative to the TEM. This is reflected in responses from third parties, as detailed in paragraph 9.118.[177]

9.53 As illustrated by the internal documents and customer responses presented in paragraphs 9.40 and 9.41, we consider that the relative quality of the peripheral is a material factor in the quality of the overall TEM system. Post-Proposed Merger, it may therefore be the case that due to the loss of competition between the Parties in the supply of peripherals, the Merged Entity could profitably deteriorate quality or reduce the supply of new products. There may also be reduced competition on price, although it is our provisional view that this aspect of competition is more limited than competition on quality and the supply of new products.

Summary of the conceptual framework

9.54 Based on the above analysis, our provisional view is that Thermo Fisher and Gatan compete to supply GI and DD cameras both to (i) end-customers that are purchasing a standalone camera or filter for use on a Thermo Fisher TEM ('upstream competition'), and (ii) end-customers that are purchasing a TEM system ('downstream competition').

9.55 In respect of upstream competition, Thermo Fisher and Gatan compete only to supply cameras to Thermo Fisher TEM customers (because Thermo Fisher does not supply cameras to customers who do not already have a Thermo Fisher TEM). We recognise that customers purchasing a new Thermo Fisher TEM generally buy Thermo Fisher rather than Gatan cameras. In the case of

[177] We consider that the relative prices of peripherals in general, as set out in table 10, are meaningful because (i) there is likely to be some degree of price competition relating to peripherals in the 'downstream' market and (ii) the relative price is likely to be indicative (to some extent) of the relative importance of the peripheral in the overall TEM system.

DD cameras, however, we consider that this is likely to be primarily driven by the Basic Supply Agreement between the Parties which [✂], rather than customer preferences.

9.56 In either case, we note that Gatan's global sales of cameras and filters for use on Thermo Fisher TEMs are substantial and account for a [✂] share of its total revenues in the relevant markets ([✂]% for DD cameras, [✂]% for GI cameras and [✂]% for filters over 2014-2018).

9.57 In respect of downstream competition, internal documents indicate that the quality of the relevant peripherals is an important factor in the demand for the overall TEM system. We also note that some tender documents stipulate specific requirements for the camera and filter, and some customers have indicated that the quality of the peripheral was an important factor in their choice of TEM system.

9.58 Our provisional view is therefore that there is meaningful competition between Thermo Fisher and Gatan in the supply of peripherals as the quality (and to some extent price) of peripherals is a material consideration when purchasing a TEM system. Thermo Fisher (for example) is therefore incentivised to offer high quality and/or low-priced cameras in order to attract customers that might otherwise choose a JEOL TEM system which incorporates a Gatan camera.

9.59 In our provisional view, the Parties therefore compete against one another in the markets for GI and DD cameras. There is also scope for potential competition [✂].

9.60 In the following sections we analyse the closeness of competition between the Parties in these markets, as well as the constraint imposed by other competitors and potential entrants.

GI cameras

Competitive landscape

9.61 We understand that there are currently six suppliers of GI cameras: AMT, EMSIS, JEOL, Thermo Fisher, TVIPS and Gatan.[178]

9.62 The evidence we have received shows that this is a differentiated market, and so we treat market share estimates with some caution. For reference however, we note that Thermo Fisher's market share estimates indicate that

[178] See, for example, Annex 9 of Thermo Fisher Market Questionnaire response.

Thermo Fisher and Gatan are the largest suppliers with a combined worldwide market share of [✂]% over 2015-2017 ([✂]% for Thermo Fisher and [✂]% for Gatan).[179]

9.63 The largest third-party supplier, based on revenues, is AMT with [✂]% market share over 2015-2017; other suppliers each have less than [✂]% market share.[180]

Closeness of competition

9.64 Gatan has two GI camera models, the lower-end Rio camera and higher-end OneView, and Thermo Fisher has one model (the Ceta). Prices and key technical specifications of the cameras are presented in Table 11. We note that list prices and product specifications are broadly comparable, particularly between the Ceta and OneView.

9.65 We note however that the Gatan cameras are faster (particularly the OneView) and that list prices may not closely reflect average selling prices (particularly due to the bundling of Thermo Fisher's camera with its TEMs).

Table 11: Overview of Thermo Fisher and Gatan GI camera models

	Camera model	List price	Highest resolution	Pixel size	Frame rate
Thermo Fisher	Ceta 16M	[✂]	[✂]	[✂]	[✂]
Gatan	Rio	[✂]	[✂]	[✂]	[✂]
Gatan	OneView	[✂]	[✂]	[✂]	[✂]

Sources (price): Thermo Fisher Market Questionnaire response, Table 10.1; Gatan Market Questionnaire response, Annex 66. Sources (specifications): Thermo Fisher Market Questionnaire response, Annex 173; Gatan.com.

9.66 The Parties submitted that Gatan does not materially compete with Thermo Fisher in the market for GI cameras because Thermo Fisher's GI camera is tightly integrated into its TEM system.[181] Thermo Fisher submitted that its GI camera is a 'general purpose camera which also functions as a 'system camera'.[182] The camera is used to verify the performance of the TEM during the manufacturing process, as well as for remote troubleshooting while servicing a TEM in the field. Thermo Fisher also noted that its DD camera (the Falcon 3EC) always comes in combination with its GI camera (the Ceta).

[179] Thermo Fisher response to Phase 1 RFI 2.
[180] The Parties submit that excluding internal sales by TEM manufacturers, Gatan's 2017 market share was [✂], AMT's share was [✂] and all other suppliers had [✂] share or lower (Parties' response to the Horizontal TOH Working Paper, table 1).
[181] Parties' response to the Issues Statement, 11.2.
[182] Thermo Fisher response to the CMA Market Questionnaire, question 12.

9.67 The Parties also submitted that GI cameras are relatively standardised and so the large majority of customers simply take a Thermo Fisher GI camera as part of their TEM.[183] In 2018 the ([✂]%) of end-customers that purchased a Thermo Fisher TEM with a GI camera bought the Thermo Fisher camera (the remaining [✂]% bought a Gatan camera).[184]

9.68 We also note that over 2014-2018, [✂]% of Gatan's GI camera sales (based on revenues) were for use on a Thermo Fisher TEM.[185] This therefore indicates that Gatan faces competition from Thermo Fisher for a significant proportion of its GI camera sales.

9.69 Unlike for DD cameras (considered below), there is a lack of evidence in internal documents to indicate that the Parties impose a competitive constraint on one another in the supply of GI cameras. A 2016 Gatan '[✂].[186] There is some evidence of quality and price competition with Thermo Fisher:

(a) The document states that [✂].[187]

(b) The document states that '[✂].[188]

9.70 Gatan's internal data on [✂] indicates that Gatan lost at least [✂] worldwide GI camera sales to Thermo Fisher since 2016.[189] [✂].

9.71 Gatan submitted however [✂].[190] [✂].[191]

9.72 There is limited evidence from customers and competitors regarding closeness of competition. TVIPS told us however that the Ceta and OneView are quite similar cameras.[192] TVIPS stated that the OneView is slightly more sensitive but the Ceta has slightly lower noise.

9.73 The evidence above therefore indicates that Thermo Fisher's and Gatan's GI cameras are similar in terms of list prices and technical specifications, and Gatan may have lost sales to Thermo Fisher. However, there is a lack of evidence of closeness of competition from internal documents and customers.

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[183] Parties' response to the Issues Statement, 11.2.
[184] The numbers in this paragraph are based on Annex 10 of Thermo Fisher's Market Questionnaire response. The numbers refer to worldwide sales.
[185] Annex 57 of Gatan's Market Questionnaire response (Q.43).
[186] Annex 10 of Gatan's Market Questionnaire response.
[187] Annex 10 of Gatan's Market Questionnaire response, p.9.
[188] Annex 10 of Gatan's Market Questionnaire response, p.16.
[189] Annex 107 of Gatan response to CMA First Day Letter response.
[190] Gatan response to CMA information request, 26 March 2019, paragraph 5.2.
[191] Gatan response to CMA information request, 26 March 2019, paragraph 5.2.
[192] Call Summary, TVIPS, 19 February 2019.

Competitive constraints

9.74 There is some evidence that the cameras produced by TVIPS and EMSIS are comparable to those produced by the Parties.

(a) TVIPS told us that its camera sells for a similar price as the OneView, and it consider its camera to have superior performance than both the Ceta and OneView.[193] Its camera has a higher signal to noise ratio than both cameras and is also faster than the Ceta and OneView (measured by frames per second).

(b) EMSIS told us that its cameras (as well as those of TVIPS and AMT) have similar specifications to those of Thermo Fisher and Gatan.[194] It stated however that Gatan's software is widely used and has supported Gatan's expansion. EMSIS cameras are not compatible with by Gatan's software. Relatedly, a Gatan [✂].[195]

(c) A Gatan internal document from 2017 stated [✂][196] Another Gatan internal document from [✂]. [197] The document indicates [✂].

(d) Gatan's 'lost orders' data shows that Gatan has lost [✂] worldwide sales to each of [✂] since 2016.[198] Gatan submitted however [✂].[199] [✂] University Hospital Southampton, who told us that they had considered EMSIS, AMT and Gatan cameras.[200] They told us that Gatan's OneView camera was more than twice the price of the EMSIS camera and Gatan's DD camera would be far beyond what they required in terms of technical specifications.

9.75 The above evidence therefore indicates that TVIPS and EMSIS do compete against Thermo Fisher and Gatan in the supply of GI cameras for at least some customers. We note however that there is limited evidence from internal documents and end-customers indicating that TVIPS and EMSIS are considered close competitors. Further, as we note below, we consider that Gatan has a competitive advantage due to the widespread use of its filters and software. There is also evidence that Gatan's OneView camera is

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[193] Call Summary, TVIPS, 19 February 2019.
[194] Call Summary, EMSIS, 20 February 2019.
[195] [✂].
[196] [✂].
[197] [✂].
[198] Annex 107 of Gatan response to CMA First Day Letter response.
[199] [✂].
[200] Call Summary, Southampton University, 31 January 2019.

considerably more expensive than its competitors (see paragraph 9.75 above).

9.76 We note that TVIPS and EMSIS have both failed to gain significant market share despite being present in the market for several years. The Parties' share of supply figures indicate that TVIPS and EMSIS both had between [✂]% and [✂]% share of the global market over 2014-2017 (including self-supply from TEM manufacturers), without any notable increases over the period.[201]

9.77 Direct Electron told us that EMSIS and TVIPS) appear to be having difficulty competing in the general imaging space, particularly against the 'entrenched' Gatan detectors, even though it does not consider that Gatan's OneView is superior to the other GI cameras on offer.[202] Similarly, there is some evidence from internal documents which indicates that [✂].[203]

9.78 Company D submitted that it [✂].[204] However, it stated that compatibility of a GI camera with Gatan's material science (EELS) filter is a '[✂].

9.79 Company D stated that [✂].[205] We therefore consider that Gatan can leverage its market power in the supply of filters into the market for GI cameras.

9.80 It is our understanding that the widespread use of Gatan's software is also an important source of competitive advantage. This is supported by evidence from end-customers and third parties:[206]

(a) EMSIS told us that Gatan's software is widely used and is updated every 6 to 12 months, which supports Gatan's influence in the market.[207]

(b) The National Nuclear Laboratory told us that Gatan's software has become 'dominant' in imaging acquisition and data transfer.[208] Third-party software is available but does not have access to as many applications.

(c) Rutherford Appleton laboratory told us that Gatan has a competitive advantage due to the software that it has developed.[209]

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[201] Annex 1 of Parties' response to CMA RFI 2 (Phase 1).
[202] Call Summary, Direct Electron, 18 February 2019.
[203] Annex 10 and Annex 50 of Gatan's Market Questionnaire response.
[204] Company D response to CMA Questionnaire.
[205] Company D response to CMA Questionnaire.
[206] See the chapter 10 on the Vertical TOH for more detail.
[207] CMA call with EMSIS, 20 February 2019.
[208] Call Summary, National Nuclear Laboratory, 4 February 2019.
[209] Call Summary, Rutherford Appleton Laboratory, 6 February 2019.

9.81 The evidence that we have received regarding AMT's and JEOL's GI cameras mostly indicates that they compete less closely with Thermo Fisher and Gatan:

(a) Company D submitted that the only cameras it produces are 'lens-coupled' cameras.[210] Company D stated that these lens-coupled cameras are used mostly on inexpensive entry-level TEM models and are much cheaper than other 'scintillator' GI cameras (such as those offered by Thermo Fisher and Gatan).

(b) TVIPS told us that AMT only produce lens-coupled cameras, which are used for low-end applications only.[211] EMSIS told us however that AMT produces scintillator cameras that have similar specifications to those of Thermo Fisher and Gatan.[212]

(c) We understand that AMT primarily provides its cameras to Hitachi. Gatan submitted that [✂].[213] Similarly, data from AMT indicates that the majority of its sales are to Hitachi, and AMT stated that it does not sell any cameras for use on Thermo Fisher TEMs.[214]

(d) There is limited reference to AMT's cameras in Parties' internal documents, and we have seen no reference to JEOL's cameras. A Gatan internal document from 2017 [✂].[215]

(e) Gatan has recently lost a [✂] in the UK.[216] [✂].

9.82 Finally, we note that Direct Electron does not produce GI cameras, although it told us that its lowest priced DD camera (DE-12) competes with Gatan's and Thermo Fisher's GI cameras.[217] It is our understanding however that DD cameras are less robust than GI cameras, and are therefore not suitable for use as 'general purpose' or 'system' cameras. Therefore, we consider that Direct Electron's DD camera is likely to be a viable substitute for only a small number of GI camera customers.

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[210] Company D response to CMA Phase 1 information request.
[211] Call Summary, TVIPS, 19 February 2019.
[212] Call Summary, EMSIS, 20 February 2019.
[213] [✂].
[214] AMT's response to the Phase 1 questionnaire.
[215] [✂].
[216] [✂].
[217] Call Summary, Direct Electron, 18 February 2019.

Potential entrants

9.83 We have so far received no evidence that any potential supplier has concrete plans to enter the GI camera market. Direct Electron told us that it is considering offering a GI camera in the future, but that this is not certain at the moment.[218] It stated that it is much more difficult for a GI camera producer to move into the DD market than it is to do the reverse.

9.84 We also note that Company B has recently begun to sell DD cameras. It has told us that its camera may compete more closely with GI cameras than DD cameras.[219] We note however that the Company B's camera is aimed at niche material science applications, and therefore may not offer the 'general purpose' functionality of GI cameras.[220] It is also our understanding that DD cameras in general are not as robust as GI cameras and therefore of less use as a general purpose (or 'system') camera.

Conclusion

9.85 We understand that there are currently six suppliers of GI cameras: Thermo Fisher, Gatan, AMT, TVIPS, EMSIS and JEOL. Thermo Fisher and Gatan are the two largest suppliers (in terms of revenues), respectively accounting for approximately [✂]% and [✂]% of global revenues over 2015-2017.

9.86 The evidence shows that Thermo Fisher and Gatan produce products that have similar technical specifications and list prices. However, there is a lack of evidence from internal documents or third-parties to indicate that Thermo Fisher and Gatan compete closely in the supply of GI cameras.

9.87 There is evidence TVIPS, EMSIS and AMT compete against Gatan for at least some customers. We note however that all three suppliers have considerably lower market shares than Gatan. There is also evidence that Gatan has a competitive advantage over its rivals due to the widespread use of its filters and application software.

9.88 Based on the evidence above, our view is that Thermo Fisher and Gatan do not compete closely in the supply of GI cameras. Our provisional conclusion is therefore that the Proposed Merger may not be expected to result in a substantial lessening of competition in the market for the supply of GI cameras for sale in the UK.

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[218] Call Summary, Direct Electron, 18 February 2019.
[219] Call Summary, Company B, 6 March 2019.
[220] See for example Thermo Fisher's Market Questionnaire response, p.8, which refers to its GI camera as 'a general purpose camera'.

DD cameras

Competitive landscape

9.89 There are three main suppliers of DD cameras: Thermo Fisher, Gatan and Direct Electron. Thermo Fisher cameras are compatible only with Thermo Fisher TEMs, whilst Gatan and Direct Electron cameras are compatible with Thermo Fisher, JEOL and Hitachi TEMs. Company B entered the market in 2018, and its camera can be used with any brand of TEM.[221]

9.90 As this is a highly differentiated market, we treat market share estimates with some caution. For reference however, we note that Thermo Fisher and Gatan are the two largest suppliers in this market. Based on estimates submitted by Thermo Fisher, Thermo Fisher had [✂]% market share, Gatan had [✂]% market share and Direct Electron had [✂]% market share of the worldwide DD camera market over 2015-2017.[222]

9.91 Estimates from Company D indicate that the shares of Thermo Fisher and Gatan may be considerably higher. Company D stated its estimate for the market shares for the supply of DD cameras based on publicly available high-resolution data for protein structure analysis is that Gatan has around [✂]% market share, Thermo Fisher 'accounts for almost all of the rest' and Direct Electron 'has only a few percent market share'.[223]

9.92 Company B told us that it has developed a DD camera which entered commercial production and sale in 2018.[224] It estimates that it currently accounts for [✂] DD camera market, [✂]. Company B told us that its camera can be used with any brand of TEM.

Closeness of competition

9.93 This section considers closeness of competition between the Parties. We consider the competitive constraint imposed by Direct Electron, Company B and potential entrants in following sections.

9.94 Thermo Fisher's current DD camera model is called the Falcon 3EC (herein the 'Falcon'). This product has been on the market since 2016, replacing the

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[221] CMA call with Company B, 6 March 2019.
[222] Annex 1 of Phase 1 RFI 2.
[223] Company D response to CMA Phase 1 questionnaire.
[224] CMA call with Company B, 6 March 2019.

Falcon 2.[225] Gatan's current DD camera model is the K3. This has been on the market since 2017, replacing the K2.[226]

Relevant markets

TEM system sales

9.95 The Parties submitted that they are not active in the same market. Thermo Fisher sells TEM systems (including peripherals), whereas Gatan is a component supplier.[227] The Parties stated that customers prefer to purchase their TEM and accompanying peripheral(s) from a single supplier, and that this is supported by CMA's calls with end-customers.[228]

9.96 Due to [✂] as an integrated part of [✂] (see paragraph 9.35). The Parties submitted that this demonstrates that customers purchasing a TEM system are not making a direct choice between Thermo Fisher's and Gatan's DD cameras.

9.97 We recognise that some customers prefer to purchase both the TEM and peripheral from a single supplier. This is supported by the customer calls referenced by the Parties,[229] and by our call with Company B (a DD camera supplier) which noted that customers value dealing with only one supplier for both the TEM and camera, for example to have a single point of contact for installation and support.[230] (Company B also stated however that if a customer is purchasing its brand of DD camera as part of a TEM purchase, this is typically alongside a 'primary' DD camera such as Gatan's.)

9.98 There is evidence however of competition between Thermo Fisher and Gatan to supply DD cameras to customers purchasing a TEM system. Gatan's internal sales database indicates that Gatan lost at least [✂] UK orders to the Falcon over 2016-2019.[231] Gatan's [✂]include the following examples of lost sales:

(a) [✂].[232] [✂].[233] [✂].

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[225] Annex 4a of Phase 1 RFI 3.
[226] Gatan response to CMA information request, dated 7 April 2019.
[227] Parties' response to the Horizontal TOH Working Paper, paragraph 1.5.
[228] Examples are provided in Appendix H1 of the Parties' response to the Horizontal TOH Working Paper.
[229] Examples are provided in Appendix H1 of the Parties' response to the Horizontal TOH Working Paper.
[230] CMA call with Company B, 6 March 2019.
[231] In response to the CMA's First Day Letter, Gatan submitted data on 'lost orders' to its competitors for each of DD cameras, GI cameras and filters [✂]. Gatan has clarified that this data 'is imprecise and very limited' for several reasons [✂]. We therefore treat the precise numbers with some caution.
[232] [✂].
[233] [✂].

(b) [✂].[234] [✂].[235] [✂].

9.99 This evidence shows that Gatan has competed against Thermo Fisher to sell its DD camera as part of a TEM system sale (and/or alongside a customer's purchase of a TEM). Further, as discussed in our conceptual framework (paragraphs 9.11 to 9.60), we consider that a DD camera forms an important component of the overall TEM system. This is consistent with evidence from customer calls and internal documents.

9.100 We therefore consider that there is competition between Thermo Fisher and Gatan in the supply of DD cameras when a customer is purchasing a TEM system.

Aftermarket sales

9.101 Both Thermo Fisher and Gatan sell standalone DD cameras to Thermo Fisher TEM users in the aftermarket (or for 'retrofit'). For Gatan, these sales accounted for [✂]% of its worldwide DD camera sales (by revenue) over 2014-2018.[236]

9.102 Given the relative importance of such sales to Gatan, we consider that it is incentivised to produce cameras that are highly competitive to the Falcon; otherwise, customers would simply purchase only the embedded Falcon that is bundled with the Thermo Fisher TEM. This is reflected in internal documents:

(a) A 2016 document states [✂].[237]

(b) [✂].[238] [✂].[239]

9.103 The Parties have submitted [✂].[240] Thermo Fisher has also stated that the [✂].

9.104 Based on the figures submitted by Thermo Fisher,[241] we recognise that there are a limited number of aftermarket sales of DD cameras over the last two years in which Gatan faced direct competition from Thermo Fisher. As noted in paragraph 9.101 however, we consider that Gatan faces competitive pressure from Thermo Fisher's camera even in cases in which the customer

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[234] [✂].
[235] [✂].
[236] Annex 53 of Gatan's response to the Market Questionnaire.
[237] [✂].
[238] [✂].
[239] [✂].
[240] [✂].
[241] [✂].

has already purchased a Falcon as part of the TEM system. As a third-party, specialist provider, Gatan is incentivised to supply products that are highly competitive to the Falcon.

9.105 As noted in paragraph 9.99, we also consider that there is significant competitive interaction between Thermo Fisher and Gatan for customers that are purchasing a TEM system that includes a DD camera. This is true even in the case in which Gatan supplies the camera for a JEOL TEM system. It is therefore our provisional view that there is both 'upstream competition' and 'downstream competition' between Thermo Fisher and Gatan in the supply of DD cameras.

Product differentiation

9.106 The Parties submitted that the Falcon and K3 cameras are highly differentiated products. Thermo Fisher submitted that the Falcon is superior at taking high resolution images of very small samples, and is therefore primarily used for single particle analysis (SPA) as well as fragile samples.[242] The K3 on the other hand is [✂]. It is primarily used for tomography and larger particle SPA.[243] The K3 has an internal frame rate of 1,500 frames per second, compared to 40 frames per second on the current Falcon [✂].[244]

9.107 These differences in performance have been noted by end-customers and third-parties. The Medical Research Council noted for example that the Falcon has a bigger pixel size and so its technical performance is better on some measures, but the K2/K3 is much faster.[245] Birkbeck College also noted that the data quality of the Falcon 3 is very good, but the camera is very slow compared to the Gatan cameras.[246]

9.108 Whilst we recognise that the products are differentiated, we note that there is evidence from internal documents that the practical extent of differentiation may be limited, at least for some applications and customers. An internal (2017) Thermo Fisher document for example states that the superior DQE of the Falcon [✂].[247] The document acknowledges that the Falcon has [✂].[248] Although the above references refer to the K2 (rather than the new and faster K3), Birkbeck College told us that the data quality of the Falcon is very good,

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[242] Parties' Phase 2 Initial Submission to the CMA.
[243] Parties' Phase 2 Initial Submission to the CMA.
[244] Parties' response to the Horizontal TOH Working Paper, paragraph 1.7.
[245] CMA call with the Medical Research Council, 3 January 2019.
[246] CMA call with Birkbeck College, 1 February 2019.
[247] DQE stands for 'detective quantum efficiency'. See [✂].
[248] [✂].

which partly compensates for its slow speed (relative to both the K2 and K3), as good results can be obtained with smaller data sets.[249]

9.109 At the same time, there is evidence from internal documents that Gatan's cameras achieve resolutions that are similar to the Falcon. A Thermo Fisher internal document from 2017 for example, identifies Gatan [✂] for SPA; an area in which the Falcon is specialised.[250] Similarly, a 2016 Gatan internal document states [✂].[251] A separate 2016 Gatan internal document states that [✂].[252]

9.110 This evidence is supported by some customers and competitors. The customer at York University stated that they have seen data suggesting that the resolution of the Falcon and K2 cameras is similar.[253] The customer at the William Dunn School of Pathology (Oxford) stated that they did not think Thermo Fisher's DD camera was as good as Gatan's (K2) although its DQE is better, the slower rate of acquisition was a problem for their use.[254] The customer stated that in their opinion the biggest competitive threat to Gatan's K2 camera was the Falcon 3 (at that point in time) and there was divided opinion in the industry as to which camera was better.

9.111 Finally, we note that Company D submitted that [✂].[255]

Complementarity

9.112 The Parties submitted that customers purchasing Gatan's life science filter, which incorporates a K2/K3 camera, typically purchase an additional Falcon camera as well: [✂] of the [✂] UK customers who purchased a Thermo Fisher TEM with a BioQuantum filter over the last 5 years also purchased a Falcon DD camera.[256] The Parties submit that this demonstrates that their DD cameras are complementary.

9.113 This is consistent with responses from some end-customers. The Medical Research Council stated that the Falcon has a much bigger pixel size, so its technical performance is better for some measures, but the K2/K3 is significantly faster.[257] They have therefore purchased both cameras. Company A told us that they have both cameras, and switch between them to

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[249] CMA call with Birkbeck College, 1 February 2019.
[250] [✂].
[251] [✂].
[252] [✂].
[253] Call Summary, York University, 12 February 2019.
[254] Call Summary, William Dunn School of Pathology (Oxford), 12 October 2018.
[255] [✂].
[256] Parties' response to the Horizontal TOH Working Paper, paragraph 1.9.
[257] Call Summary, Medical Research Council, 31 January 2019.

take advantage of each camera's benefits for different applications.[258] Rutherford Appleton Laboratory told us that customers' current choice is between the Falcon, K3 and Direct Electron DE-64. It understands that customers will often demand both a Gatan and Thermo Fisher camera as they can be interchanged, as each is better suited to different scientific applications.[259]

9.114 Although we recognise that some customers currently choose to purchase both cameras, this does not imply that they are complementary.[260] It also does not imply that there is no competition between them. The Medical Research Council for example stated that whilst 'at the moment' it is worth having both cameras, in the future it may be that only one is needed.[261] York University stated that both companies are aiming to be better on both speed and resolution.[262]

9.115 This is supported by the evidence which shows that Thermo Fisher benchmarks the technical performance of its camera against Gatan's and [✂].[263] The evidence also shows that Thermo Fisher has made material improvements to the quality of its camera as a result of this competition (see paragraphs 9.124 to 9.128 below for details).

9.116 We also consider that whilst a high proportion of customers purchase a Falcon alongside a Gatan DD camera or BioQuantum filter (which includes a Gatan DD camera), the evidence indicates that this is partly driven by product bundling and discounting:

(a) Direct Electron told us that the price of the Falcon camera is included in the price for the overall TEM package and so is hidden from the customer.[264] If a customer wanted a Gatan or Direct Electron camera instead of a Falcon, Thermo Fisher would not 'credit back' the price of the Falcon. Direct Electron said that it therefore seems to the customer that the Falcon is being included for free or at a very low price.

(b) The William Dunn School of Pathology (Oxford) told us that Thermo Fisher included their camera for free when they purchased a TEM with a

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[258] Call Summary, Company A, 31 January 2019.
[259] Call Summary, Rutherford Appleton Laboratory, 6 February 2019.
[260] For products to be complementary, the demand for one product must be a direct (positive) function of the demand for another. We would therefore expect to see (for example) that a reduction in the price of the Falcon led to an increase in sales of the K2/K3. There is no evidence that such a relationship exists between these products.
[261] Call Summary, Medical Research Council, 31 January 2019.
[262] Call Summary, York University, 12 February 2019.
[263] [✂].
[264] Call Summary, Direct Electron, 18 February 2019.

Gatan filter and detector (or at least they would not supply without the Thermo camera for a discount on the quote), presumably, as Thermo Fisher wanted to prove that its camera would work just as well as Gatan's.[265]

(c) Birkbeck College told us that the price of the TEM system was not itemised, and they attempted to negotiate add-ons or price reductions, such as supplying an additional Falcon camera.[266]

Pricing

9.117 The Parties submitted that the K3 camera is [✂] more expensive than the Falcon. The Parties' data indicates that over 2014-2018, the average selling price of a Falcon was $[✂], and the average selling price of a K2/K3 was $[✂].[267] The Parties submit that this supports the view that the two products are differentiated and may indicate that they are not close substitutes for many customers.

9.118 We recognise that [✂]. We consider however that selling prices reflect a myriad of factors (such as bundling and discounting), and only partly reflect cost and customer demand for the particular product.[268] We therefore treat selling prices with some caution. We also note that the list price of the two products is broadly similar: approximately £[✂] for a Falcon and $[✂] for a K3.[269] Although list prices are generally discounted, the similarity of the list prices indicates that the products are targeted at customers within the same segment of the market.

9.119 We also consider that price differences could be explained by differences in quality. For example, Company A told us that it had a potential choice between the Falcon and K2 cameras.[270] It considered that both were good cameras but it was happy to go with the Falcon proposed by Thermo Fisher because performance was not paramount for the purposes of screening

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[265] Call Summary, William Dunn School of Pathology (Oxford), 12 October 2018.
[266] Call Summary, Birkbeck College, 1 February 2019.
[267] [✂]. The data here is based on global sales. Equivalent UK figures are $[✂] for the Gatan camera and $[✂] for the Thermo Fisher camera. We consider that the worldwide figures are more reliable as they are based on a larger number of data points.
[268] We understand for example that the Falcon is often bundled within the overall TEM system price, aftermarket sales can include refurbished products that sell well below list price, and list prices themselves are generally discounted.
[269] The Falcon list price is taken from Annex 447 of Thermo Fisher's Market Questionnaire response. The K3 list price is taken from Annex 66 of Gatan's Market Questionnaire response.
[270] Call Summary, Company A, 31 January 2019.

samples. [✂].[271] To the extent that this is true, this could explain the higher pricing of Gatan's product.

9.120 The Parties have submitted that their products do not constrain each other on price.[272] Thermo Fisher stated that this is evidenced by the fact that [✂]. [273] In contrast, [✂]. The Parties state that 'close competitors in a concentrated market would be expected to respond rapidly to changes in one another's pricing'.[274]

9.121 We note however that the relevant price change is that of a standalone DD camera, not that of a filter (which is in a different product market with different competitive conditions). The evidence indicates that [✂].[275] We note that in 2016 a K2 sold for $[✂] on average, and in 2018 a K3 sold for $[✂] on average.[276]

9.122 Further, there is evidence from [✂] that the price of the K2/K3 constrains the price of the Falcon. [✂].[277]

9.123 Overall, we recognise that the K2/K3 is more expensive on average than the Falcon. We also consider that Thermo Fisher's ability and incentive to flex the price of the Falcon is complicated by the fact that it is often sold as part of a TEM system. The evidence provided to us, [✂]), indicates that competition between the Parties in the supply of DD cameras primarily relates to quality competition (and the development of new products). There is some evidence of price competition however, as indicated for example in the [✂] above.

Evidence from internal documents

9.124 Several of the Parties' internal documents show that [✂]:

(a) Thermo Fisher's 2017 [✂].[278]

(b) [✂].[279]

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[271] Parties' response to the Horizontal TOH Working Paper, paragraph 5.3.
[272] Parties' response to the Horizontal TOH Working Paper.
[273] Based on the price charged to Thermo Fisher. Gatan has also announced an 18% increase in the list price for the replacement of the BioQuantum K2 with the BioContinuum K3. [✂].
[274] Parties' response to the Horizontal TOH Working Paper, paragraph 2.6.
[275] [✂].
[276] [✂]We consider that the most meaningful comparison between K2 and K3 prices uses the price of the K2 prior to the release of the K3 (at which point the K2 was an old model).
[277] [✂].
[278] [✂].
[279] [✂].

(c) [✂].[280]

(d) A Gatan internal presentation (2016) states that [✂].[281] [✂].

(e) [✂].[282]

9.125 Importantly, there is evidence that competition between Thermo Fisher and Gatan in the market for DD cameras is driving quality improvements, which benefit both Thermo Fisher and non-Thermo Fisher customers:

(a) [✂].[283] [✂].

(b) [✂].[284] [✂].

9.126 The Parties have submitted that many of the internal documents we have considered, including the [✂] are materially out of date, and prepared by product development engineers rather than those directly involved with assessing market conditions and formulating strategic responses.[285]

9.127 We consider however that these are recent documents which demonstrate material and tangible [✂].[286] The fact that they may have been prepared by product development engineers does not detract from the significance of how those involved with the products in question viewed them compared to other products both in a technical and a competitive sense. In fact, those closer to the technical aspects of the products in question would be better placed than others to judge relevant differences in performance and hence competition with other products.

9.128 The evidence therefore indicates that competition between Thermo Fisher and Gatan in the supply of DD cameras has led to material improvements in the quality of the products. [✂].[287] Internal documents indicate that [✂].[288]

Summary of the evidence on closeness of competition

9.129 The evidence above therefore indicates that, although the Falcon and K3 are differentiated products, both [✂] third-parties consider them to be close competitors. There is also evidence that [✂]. As noted in paragraph 9.123, this quality competition impacts other players in the market (such as Direct

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[280] [✂]
[281] [✂].
[282] [✂].
[283] [✂].
[284] [✂].
[285] Parties' response to the Horizontal TOH Working Paper, paragraph 1.2.
[286] We understand for example that [✂].
[287] [✂].
[288] [✂].

Electron) and therefore benefits customers purchasing JEOL and Hitachi TEMs, as well as those purchasing Thermo Fisher TEMs.

Competitive constraints

9.130 Based on the evidence submitted to us, it is our provisional view that Direct Electron's flagship DD camera, the DE-64, is a viable competitor to the Falcon and the K3. The evidence indicates however that the DE-64 imposes a more limited competitive constraint on the Parties than each other's DD camera does.

9.131 We note that there is evidence that the Parties focus primarily on the constraint imposed by each other (examples provided above). There is evidence that, where Direct Electron is mentioned, the constraint is more limited. For example:

(a) [✂].[289] [✂].

(b) A Gatan internal [✂] notes that [✂].[290] The document states that '[✂]'.

9.132 Evidence from third-parties is largely consistent with evidence in the internal documents:

(a) The Medical Research Council told us that Direct Electron's DD camera is worse quality and slower than the K2/K3 and Falcon. Direct Electron is significantly cheaper however, selling for around $300,000 compared to $400,000 for a Falcon and $600,000 for a K2/K3.[291]

(b) Birkbeck College told us that it has bought a Direct Electron DD camera in the past. It stated that in theory, the Direct Electron detectors should be a strong product as the components are good, but are let down by poor software and servicing.[292]

(c) Oxford University stated that Direct Electron's camera is a potential substitute for Gatan's DD cameras. Oxford University explained that the cameras are similar in pixel arrays and pixel sizes. They differ in a number of factors. Oxford's current assessment is that the K3 has

[289] [✂].
[290] [✂].
[291] Call Summary, Medical Research Council, 31 January 2019.
[292] Call Summary, Birkbeck College, 1 February 2019.

superior software, however, both of the products have individual aspects which are better.[293]

(d) TVIPS stated that it considers that the Direct Electron camera is better than the Falcon but not as good as the K2/K3.[294]

9.133 The evidence from internal documents and customers therefore indicates that Direct Electron is a competitor to Thermo Fisher and Gatan in the supply of DD cameras. Its cameras are somewhat cheaper however and are generally not considered to be of the same quality as the Parties' cameras.

9.134 This is supported by evidence from [✂].[295] Over the period 2016-2019, [✂].[296]

9.135 [✂].[297] [✂].[298]

9.136 The Parties submitted that [✂].[299] [✂].

9.137 Direct Electron told us that the customer in Glasgow had previous experience with both Direct Electron and Gatan.[300] The customer's previous experiences with Gatan were negative, and the customer felt that the Direct Electron camera would be more suitable for his specific requirements. Direct Electron also stated that both Glasgow and Kings College London were [✂] act as demonstration centres. The Medical Research Council told us that the Direct Electron camera is worse quality and slower than both the K2/K3 and Falcon, and it is likely that Direct Electron does not have the resources to develop a comparable product.[301]

9.138 We note however that Direct Electron told us that their DE-64 is priced at approximately $[✂].[302] Direct Electron also told us that the DE-64 is mainly used in cryo-tomography and competes directly with the Falcon 3 and K3 cameras. The Parties stated that Direct Electron compares [✂] to the Falcon for tomography applications, although they stated that (in general) it is a [✂] in terms of its characteristics.[303] Company D told us that there seems to be no

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[293] Call Summary, Oxford University, 5 February 2019.
[294] Call Summary, TVIPS, 19 February 2019.
[295] [✂].
[296] [✂].
[297] [✂].
[298] [✂].
[299] [✂].
[300] Call Summary, Direct Electron, 18 February 2019.
[301] Call Summary, Medical Research Council, 31 January 2019.
[302] CMA call with Direct Electron, 18 February 2019.
[303] Parties' response to the Horizontal TOH Working Paper, paragraphs 2.13 and 1.2.

practical difference between the Falcon, Direct Electron camera and Gatan's camera for cryo tomography primarily in the cell biology application. [✂].[304]

9.139 Company B stated that their DD camera [✂].[305] It told us that its camera is considerably cheaper than Gatan's DD camera, selling for around £150,000, and is better suited for some applications than rival cameras.[306] [✂].

9.140 Consistent with this evidence, we note that the Falcon and K3 cameras are primarily used for life science (rather than material science) applications.[307] [✂].[308] [✂].

9.141 Finally, TVIPS told us that its GI camera can be used on 'screening' cryo-EM microscopes to perform SPA and has on occasion competed against Thermo Fisher's Falcon camera.[309] We have received little evidence that this is a material competitive constraint however. We note that TVIPS is a relatively small GI camera supplier, and its cameras sell for [✂].[310] Further, we have received no indication from internal documents, end-customers or competitors that TVIPS' GI camera is a viable substitute to the Falcon DD camera. As shown in paragraph 9.23, we also note that the TVIPS camera cannot be 'embedded' into a Thermo Fisher TEM; this is likely to discourage Thermo Fisher end-users from choosing this camera over a Falcon.

9.142 We therefore consider that Direct Electron provides a competitive constraint on the Parties in the supply of DD cameras. We note however that Direct Electron's sales are lower than both Thermo Fisher's and Gatan's and some third-parties consider it to be a lower quality product. [✂]. The constraint from the only other active supplier, Company B, appears to be even more limited.

Potential entrants

9.143 As noted in paragraph 9.4, our competitive assessment considers whether rivals are likely to enter or expand within a reasonable timeframe and to an extent which can replace the competitive constraint that would be lost through the Proposed Merger.

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[304] Call Summary, Company D, 4 March 2019.
[305] CMA call with Company B, 6 March 2019, and Company B response to CMA questionnaire.
[306] CMA call with Company B, 6 March 2019.
[307] For example, [✂]. Over the same period, [✂].
[308] CMA call with Company B, 6 March 2019.
[309] Call Summary, TVIPS, 19 February 2019.
[310] Based on estimates provided by TVIPS (call with CMA on 19 February) and Parties' response to the Issues Statement (table 11.4).

9.144 Chapter 12 on Entry and Expansion presents our assessment of the timing and cost of likely entry into each relevant market. In the case of DD cameras, the evidence indicates that there is considerable uncertainty around the cost and time it would take a potential entrant to produce a DD camera that is comparable with the Parties' offering.

9.145 Currently, only Dectris has indicated to us that it plans to enter the market for DD cameras. Dectris told us that it is aiming to launch a DD camera (the 'Quadro Detector') in August 2019, potentially with three more models by the end of the year.[311] In principle, its cameras will work on all brands of TEM using an adaptor, and accompanying software will be supplied by Dectris. We have had no indication that Dectris' entry is related to the Proposed Merger.

9.146 Dectris told us that its DD camera uses different technology from the Falcon and K3, and its camera will be targeted at the material science market. It told us that it does not see its cameras as direct substitutes to either Thermo Fisher's or Gatan's K3 cameras. Given that its camera uses bigger pixels, it is not suitable for the cryo-EM life science market. [312]

9.147 The Parties submitted that leading UK life scientist Professor Richard Henderson is promoting the use of 100 kV machines for cryo-TEMs.[313] [✂].

9.148 The Medical Research Council told us that JEOL and Hitachi are much more competitive in the supply of 120kV TEMs.[314] Gatan, Thermo Fisher and Direct Electron DD cameras do not work on these machines, and there are companies trying to build DD cameras that will work and produce good results with a 100kV+ TEM.

9.149 We have little evidence however that this is likely to be a significant disruptive technology in the near future, or that it represents a significant competitive threat to the current market for DD cameras (which are optimised for 200-300kV TEMs). Further, Dectris told us that it is currently developing a life science camera, but this is at an early stage and unlikely to be commercialised until at least 2023.[315]

Conclusion

9.150 Based on the evidence above, we have found that Thermo Fisher and Gatan are the two largest suppliers in the market for DD cameras. Our provisional

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[311] Call Summary, Dectris, 22 February 2019.
[312] Call Summary, Dectris, 22 February 2019.
[313] Parties' response to the Horizontal TOH Working Paper, paragraphs 2.15 to 2.17.
[314] Call Summary, Medical Research Council, 31 January 2019.
[315] Call Summary, Dectris, 22 February 2019.

view is that Thermo Fisher and Gatan are close competitors which is supported by evidence from internal documents and third-parties.

9.151 There is currently only one other established provider in the market (Direct Electron). Evidence from internal documents and third-parties indicates that Direct Electron is a credible competitor to Thermo Fisher and Gatan but does not compete as closely as the Parties.

9.152 Company B has recently entered the DD camera market but currently has very limited market share. The evidence indicates that its camera is not a close competitor to those of Thermo Fisher and Gatan: it is substantially cheaper and optimised for specific material science applications. Similarly, Dectris, a potential entrant, is also producing cameras that are targeted at material science customers. By contrast, Thermo Fisher's and Gatan's cameras are used almost exclusively by life science customers.

9.153 Accordingly, we have provisionally concluded that, subject to the assessment of countervailing factors (see chapters 12 and 13), the Proposed Merger may be expected to result in a substantial lessening of competition in the market for the supply of DD cameras for sale in the UK.

Filters

Background

9.154 Gatan currently supplies life science and material science filters that are compatible with Thermo Fisher, JEOL and Hitachi TEMs. Thermo Fisher does not currently supply filters, [✂].[316] [✂].[317]

9.155 Thermo Fisher [✂].[318] [✂].

9.156 Our analysis of the potential competition TOH (with respect to filters) is similar in scope to our analysis of the horizontal TOH in previous sections (with respect to DD and GI cameras).

Competitive landscape

9.157 Gatan is currently the only major supplier of 'post-column' filters for use on TEM systems. JEOL offers an 'in-column' filter, which is inbuilt on specific TEM models and cannot be retro-fitted to a TEM system. End-customers have

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[316] [✂].
[317] [✂]
[318] [✂].

told us that JEOL's filter is available only on a small number of its TEM models. We also understand that [✂].[319]

9.158 We understand that Hitachi and Nion both self-supply spectrometers, which are used for certain material science applications.

[✂]

[✂]

9.159 [✂].[320]

9.160 [✂].

9.161 The Parties further submitted [✂].[321]

9.162 [✂].

9.163 [✂]:

(a) [✂].[322] [✂].

(b) [✂].[323]

(i) [✂].[324]

(ii) [✂].[325]

(iii) [✂].[326]

(c) [✂].[327].[328]

(d) .[329]

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[319] Company D's initial Phase 2 submission to the CMA stated that Hitachi is the only competitor to Gatan in the supply of EELS filters even though Hitachi does not supply EELS to third parties but only self-supplies EELS for its own TEMs and the functionality of its EELS is less competitive than Gatan's (paragraph 2.1). The Parties' submission on 'competition between TEM systems' also states that [✂] (p.9).
[320] [✂].
[321] [✂].
[322] [✂].
[323] [✂].
[324] [✂].
[325] [✂].
[326] [✂].
[327] [✂].
[328] [✂].
[329] [✂].

9.164 [✂].

[✂]

9.165 Thermo Fisher submited that [✂]:[330]

(a) [✂].

(b) [✂].[331] [✂].

(c) [✂].

9.166 [✂]. [✂]:

(a) Gatan submitted that [✂].[332]

(b) Gatan told us [✂].[333] [✂].

9.167 We note that internal Thermo Fisher documents indicate that [✂]:

(a) [✂].[334]

(b) [✂].[335] [✂].[336] [✂].[337]

(c) [✂].[338]

9.168 As noted in chapter 12 on Entry and Expansion, we consider that there are high barriers to entry and expansion in the supply of TEM peripherals (including filters). [✂].[339] We also consider that [✂]:

(a) [✂].[340] [✂].

(b) [✂].[341] [✂].

(c) [✂].[342] [✂]

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[330] [✂].
[331] [✂].
[332] [✂]
[333] [✂]
[334] [✂].
[335] [✂].
[336] [✂].
[337] [✂].
[338] [✂].
[339] [✂].
[340] [✂].
[341] [✂].
[342] [✂].

[✂] potential entry

9.169 [✂]:

(a) [✂].[343] [✂].[344]

(b) In a revised submission to the CMA in April 2019, after the Parties had seen our working papers, Compass Lexecon indicates that under the counterfactual scenario, [✂].[345] [✂].[346] [✂].

9.170 Thermo Fisher submitted that [✂].[347] [✂].[348]

9.171 [✂].

Competitive constraints

9.172 Gatan is currently the only non-vertically integrated supplier of filters globally, and the only manufacturer of post-column filters.

Life science filters

9.173 JEOL manufactures an in-column energy filter for use on some of its own life science TEM models but does not supply these to other TEM manufacturers. End-customers have indicated that JEOL's filter is supplied only on a small number of its TEM models and, in the life science market in which JEOL's filter is used, Gatan's filter is much more widely used. This is consistent with evidence submitted by JEOL.[349]

9.174 Gatan submitted however [✂].[350] Some end-customers have also told us that JEOL's and Gatan's life science filters are similar in terms of performance.[351]

9.175 We note however that there are mixed views as to the relative advantages and the closeness of competition between in-column and post-column filters. [✂].[352] Similarly, the customer at York University told us that they would

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[343] [✂].
[344] [✂].
[345] [✂].
[346] [✂].
[347] Email to the CMA dated 27 March 2019.
[348] Email to the CMA dated 27 March 2019.
[349] JEOL Phase 2 initial submission to the CMA.
[350] [✂].
[351] Call Summary, Birkbeck College, 1 February 2019.
[352] [✂].

prefer to avoid an in-column filter as there is no way to fully disengage the effects of the filter.[353]

Material science filters

9.176 Regarding material science filters, Company D submitted [✂].[354] Company D submitted that Gatan's spectrometer is superior to Hitachi's. Further, we have received evidence that [✂].[355]

9.177 Some end-customers have told us that Gatan was the only supplier of spectrometers available to them.[356] It is our understanding that whilst JEOL's in-column filter can (in principle) be used for material science applications, this is very rare.[357]

9.178 Finally, we note that Nion also self-supplies spectrometers. Nion is a very small player in the TEM market however, capturing approximately [✂] [0 – 5]% of global TEM revenues.[358]

Other potential entrants

9.179 CEOS submitted that it is aiming to become a supplier of energy filters and spectrometers within the next two years.[359] We understand that CEOS has already placed its filters with a small number of early adopters and has published results scientific results.[360]

9.180 CEOS stated that it expects its filters to be competitive with Gatan's products. It considers that the optics of its filters will be better, but it is behind in application software and camera integration with the TEM system.

9.181 CEOS stated that it is not producing a complete filter and will source a camera from an external supplier ([✂]).[361] As CEOS is planning to incorporate a GI camera into its filter, we consider that this product is not likely to be a close competitor to Gatan's [✂] life science filters which incorporate DD cameras.

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[353] Call Summary, York University, 12 February 2019.
[354] Company D Phase 2 initial submission to the CMA.
[355] [✂].
[356] Call Summary, Oxford University, 5 February 2019; Call Summary, Johnson Matthey, 30 January 2019.
[357] The University of Glasgow for example told us that post-column filters are intrinsically better for spectroscopy, and no one uses JEOL's filter for spectroscopy (CMA call with Glasgow University, 11 February 2019). The University of Manchester told us that the JEOL filter may be used for EELS but the Gatan filter is the market leader and most customers use a Gatan filter to perform EELS (CMA call with Manchester University, 7 February 2019). [✂]
[358] Annex 10 of Thermo Fisher Market Questionnaire response.
[359] CEOS response to CMA Questionnaire.
[360] Call Summary, CEOS, 11 March 2019 and Gatan response to additional questions from the CMA, dated 1 April 2019.
[361] CEOS response to CMA Questionnaire.

We understand that the incorporation of a DD camera is necessary for structural biology users.[362] CEOS told us that it has been in discussion with [✂] about incorporating a DD camera and considers that it could do so relatively quickly.[363]

9.182 The evidence provided to us indicates however that there is much uncertainty around the timing of the commercialisation and the likely impact of CEOS' filters. We note that:

(a) CEOS told us that its application software is still in development and it will take more than two years to complete. CEOS also told us that they have capacity limits and will not be able to produce more than 25-30 filters per year.[364]

(b) Company D stated that [✂].[365] [✂].

(c) Company D separately told us that CEOS has only developed the hardware component for its filter and [✂].[366]

9.183 We note that even if CEOS can successfully enter the market for filters, the market is highly likely to remain highly concentrated over the next 5 years. This is true in both life science and material science. Our provisional view is therefore that [✂]. This is the case whether or not CEOS is able to successfully enter as well.

Conclusion

9.184 [✂].

9.185 [✂].

9.186 [✂].

9.187 [✂].

9.188 We note that there are very few competitive constraints in the filters market. In life sciences, Gatan's principal competitor is currently JEOL, which supplies 'in-column' filters in some of its life science TEM models. Evidence from JEOL and end-customers indicates however that Gatan's sales are considerably higher in this segment than those of JEOL. In material sciences, the evidence

[362] Gatan response to CMA information request, 29 February 2019.
[363] Call Summary, CEOS, 11 March 2019.
[364] Call Summary, CEOS, 11 March 2019.
[365] [✂].
[366] [✂].

shows that Gatan currently faces very limited competitive constraint from third parties.

9.189 Based on the evidence and analysis above, we have provisionally concluded that, subject to the assessment of countervailing factors (see chapters 12 and 13), the Proposed Merger may be expected to result in a substantial lessening of competition in the market for the supply of filters for sale in the UK.

Conclusions

Horizontal TOH

GI cameras

9.190 We understand that there are currently six suppliers of GI cameras: Thermo Fisher, Gatan, AMT, TVIPS, EMSIS and JEOL. Thermo Fisher and Gatan are the two largest suppliers (in terms of revenues), respectively accounting for approximately [✂]% and [✂]% of global revenues in 2017. The third largest supplier, AMT, had approximately [✂]% of global revenue in 2017.

9.191 The evidence shows that Thermo Fisher's and Gatan's GI cameras have similar technical specifications and similar prices. However, there is a lack of evidence from internal documents or third-parties to indicate that Thermo Fisher and Gatan compete closely in the supply of GI cameras.

9.192 Based on the evidence provided to us, our provisional view is that the Proposed Merger may not be expected to result in a substantial lessening of competition in the market for the supply of GI cameras for sale in the UK.

DD cameras

9.193 Based on the evidence provided to us, our provisional view is that Thermo Fisher and Gatan are close competitors in the supply of DD cameras. This is supported by evidence from their internal documents and third-parties. We also note that Thermo Fisher and Gatan are the two largest suppliers of DD cameras.

9.194 Direct Electron is currently the only other established provider of DD cameras. Evidence from internal documents and third-parties shows that Direct Electron is a credible competitor to Thermo Fisher and Gatan but does not compete as closely as the Parties.

9.195 Company B has recently entered the DD camera market but has not (yet) achieved significant market penetration. The evidence shows that its camera

is not a close competitor to the DD cameras of Thermo Fisher and Gatan. Similarly, Dectris, a potential entrant, is also aiming to enter the market by producing cameras that are targeted at material science customers. Although Dectris is developing a camera aimed at the 100 kV life science users, this segment of the market is yet to develop and Dectris does not expect to sell life science cameras until at least 2023.

9.196 Based on the evidence provided to us and our analysis, our provisional view is therefore that, subject to the assessment of countervailing factors (see chapters 12 and 13), the Proposed Merger may be expected to result in a substantial lessening of competition in the market for the supply of DD cameras for sale in the UK.

Potential competition TOH

9.197 Gatan currently supplies life science and material science filters that are compatible with Thermo Fisher, JEOL and Hitachi TEMs. Thermo Fisher [✂].

9.198 [✂].

9.199 We note that there are very few competitive constraints in the filters market, as discussed in paragraphs 9.173 to 9.175. Our provisional view is that [✂] would result in greater competition [✂]. This is likely to be the case even if [✂] potential entrant (CEOS) successfully enters the market.

9.200 Based on the evidence provided to us and our analysis, our provisional view is therefore that, subject to the assessment of countervailing factors (see chapters 12 and 13), the Proposed Merger may be expected to result in a substantial lessening of competition in the market for the supply of filters for sale in the UK.

10. Vertical effects - foreclosure

10.1 This chapter covers the foreclosure vertical theory of harm (TOH) in respect of the proposed acquisition by Thermo Fisher of Gatan.

10.2 Vertical effects may arise when a merger involves firms at different levels of the supply chain, for example a merger between an upstream supplier and a downstream customer.[367] Vertical mergers may be competitively benign or even efficiency-enhancing,[368] but in certain circumstances can weaken rivalry.

[367] Merger Assessment Guidelines (CC2) (Revised), paragraph 5.6.2.
[368] Merger Assessment Guidelines (CC2) (Revised), paragraph 5.6.4.

The concern under a vertical theory of harm is that bringing together the merging parties creates or increases the ability and/or incentive of the merged entity to harm competition at one level of the supply chain through its behaviour at another level of the supply chain.

10.3 The TOHs raised by such mergers typically involve the merged entity harming the ability of its rivals to compete post-merger through foreclosure, for example by raising effective prices to its rivals, or by refusing to supply them completely. Such actions may harm the ability of the merged entity's rivals to provide a competitive constraint in the future.[369]

10.4 This chapter assesses the degree to which the Proposed Merger may be expected to give rise to harmful vertical effects on the basis of foreclosure. We address potential harmful vertical effects on the basis of access to commercially sensitive information in Chapter 11.

Foreclosure

10.5 Our assessment of vertical effects considers both input foreclosure which affects downstream rivals and customer foreclosure which affects upstream rivals. Our view is that customer foreclosure is not a large threat to competition and so the primary focus of our assessment in this chapter is input foreclosure.

Customer foreclosure

10.6 Customer foreclosure involves the merged entity deprioritising, or reducing the price paid for, the input products of upstream rivals for use with the final product (partial customer foreclosure) or ceasing to purchase the rivals' products altogether (total customer foreclosure), thereby diverting customers to its own products. If rival firms have significant reliance on purchases from the upstream firm, this could materially soften competition.

10.7 Our provisional view is that there is limited scope for customer foreclosure to arise as a result of the Proposed Merger as Thermo Fisher does not currently purchase any of the relevant peripherals,[370] filters,[371] DD cameras or GI

[369] Merger Assessment Guidelines (CC2) (Revised), paragraph 5.6.5.
[370] References to "peripherals" within this chapter should be read as references to filters, DD cameras and GI cameras.
[371] As outlined in paragraph 8.9 our Market Definition chapter, there are different types of filter products available which can have either life science or material science applications. The term "filter" in this chapter refers to both life science filters and material science filters unless stated otherwise.

cameras) from any of Gatan's upstream rivals. Thermo Fisher either uses its own peripherals on its TEMs or those of Gatan.

10.8 This practice appears to have developed as a result of a supply agreement entered into between Thermo Fisher and Gatan [✂] (the Basic Supply Agreement). The Basic Supply Agreement provided that [✂].[372] [✂].

10.9 We note that certain third-party camera suppliers do make a significant number of their sales in the aftermarket where their cameras are "retrofitted" onto Thermo Fisher TEMs. We consider that, if Thermo Fisher were to prevent this practice from continuing, by for example, communicating to customers that retrofitting such a product would invalidate the warranty on the Thermo Fisher TEM, a form of customer foreclosure could occur.

10.10 After the Proposed Merger the incentive to engage in such customer foreclosure will be greater as the Merged Entity would stand a greater chance of recapturing (through Gatan's offering) a proportion of the sales not made by the third parties.

10.11 However, the size of this increased incentive would be modest and while we note the possibility that an element of customer foreclosure could occur post-Proposed Merger, our current views is that it does not pose a substantial threat to competition. Therefore, we do not consider it further as part of our assessment of vertical effects.

Input foreclosure

10.12 Input foreclosure occurs when a merged entity supplies the upstream input to downstream rivals at higher prices and/or lower quality (partial input foreclosure) or stops supplying its rivals altogether (total input foreclosure).[373] This would increase the costs or reduce the quality of the offerings of rival manufacturers, thereby making them less competitive. Whilst the merged entity may lose sales of the input upstream to rivals, it may benefit from customers switching to the final product of the merged entity downstream.

10.13 Our view is that there is significant potential for the Merged Entity to engage in input foreclosure and this form of vertical harm is therefore the focus of this chapter. References to 'foreclosure' in this chapter should be read as references to input foreclosure. The term 'foreclosure' refers to either partial or total foreclosure unless stated otherwise.

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[372] [✂].
[373] Merger Assessment Guidelines (CC2) (Revised), paragraphs 5.6.9 & 5.6.13.

The Supply Agreements

10.14 After announcement of the Proposed Merger, Thermo Fisher entered into two long-term supply agreements with its downstream rivals in the supply of TEMs:

(a) [✂], Thermo Fisher and Gatan agreed a memorandum of understanding with JEOL for the supply of Gatan products to JEOL for at least [✂] years (the JEOL Supply Agreement); and

(b) [✂], Thermo Fisher and Hitachi agreed a master supply agreement for the supply of Gatan products to Hitachi for [✂] years (the Hitachi Supply Agreement).

10.15 The JEOL Supply Agreement and the Hitachi Supply Agreement are referred to collectively as the Supply Agreements.

10.16 The Supply Agreements are conditional upon the completion of the Proposed Merger. Accordingly, we have not considered the Supply Agreements as part of the counterfactual to the Proposed Merger, but we have considered the impact of the Supply Agreements in the assessment of foreclosure.

Foreclosure mechanisms considered

10.17 We commence our analysis by considering possible foreclosure strategies by the Merged Entity with regard to its downstream rivals.

10.18 As noted above, a total foreclosure strategy would entail the Merged Entity refusing to supply its rival TEM suppliers, or potential entrants with Gatan peripherals in the future.

10.19 A partial input foreclosure strategy would entail the Merged Entity adopting mechanisms – short of refusing to supply – that could weaken downstream rivals and reduce competition. We have considered whether the Merged Entity could take such steps that would disadvantage its rivals in the context of the Supply Agreements and have identified a number of potential partial foreclosure mechanisms relative to the counterfactual of the Proposed Merger as follows:

(a) pricing new Gatan peripheral products at higher prices or not reducing prices of Gatan's peripherals in line with cost reductions such that rival TEM suppliers are disadvantaged relative to Thermo Fisher;

(b) reducing the integration/interoperability of the Gatan peripherals and related software with rivals' TEMs (e.g. through hardware design or

firmware changes) or improving integration/operability more slowly or less effectively;

(c) reducing (or more slowly improving) the maintenance and service of Gatan products when used with a rival's TEM compared to a Thermo Fisher TEM;

(d) delaying the supply of new Gatan products to rivals or providing new products and innovations to rivals on terms that disadvantage their competitive offering in the supply of TEMs;

(e) incorporating Gatan's technology and innovations into Thermo Fisher peripheral products, whilst allowing Gatan products to lag; and

(f) prioritising increases in R&D spending on Thermo Fisher's products over those of Gatan.

10.20 The issues identified in chapter 11, relating to access to commercially sensitive information, illustrate further potential mechanisms through which competition could be harmed as a result of the Proposed Merger.

Framework for foreclosure assessment

10.21 Consistent with the approach in our guidelines we have assessed the potential for foreclosure by reference to the following framework:[374]

(a) Ability: Would the Merged Entity have the ability to harm rivals, for example through raising prices or refusing to supply them?

(b) Incentive: Would the Merged Entity find it profitable to do so?

(c) Effect: Would the effect of any action by the Merged Entity be sufficient to reduce competition in the affected market to the extent that, in the context of the market in question, it gives rise to an SLC?

10.22 The Parties have submitted that the Merged Entity will have no ability or incentive to foreclose its downstream rivals due to:

(a) the Supply Agreements which guarantee JEOL and Hitachi access to Gatan's products on competitive terms for the foreseeable future;

[374] Merger Assessment Guidelines (CC2) (Revised), paragraph 5.6.6.

(b) the reputational damage that would accrue to Thermo Fisher if it was seen to have foreclosed competitors and, in the case of Hitachi, the possibility that it would retaliate, and

(c) JEOL and Hitachi having the ability and incentive to protect themselves by developing alternative sources of supply.[375]

10.23 We have assessed foreclosure first by analysing the structure of the market post-Proposed Merger, excluding the potential impact of the Supply Agreements, before separately considering the extent to which the Supply Agreements address any foreclosure concerns that would otherwise arise.

10.24 We recognise that the ability and incentive of the Merged Entity to foreclose could change over time if there are significant changes to the nature and structure of the market for TEMs and TEM peripherals. Such changes could include the development of new peripheral products, potentially because of a strategic reaction of downstream rivals to any foreclosure action by the Merged Entity.

10.25 Therefore, while we primarily assess the extent to which the Merged Entity would have the ability and incentive to foreclose based on the current 'state of the world', we have also considered the extent to which this may change over time due to entry/expansion by other firms in the supply of filters, DD cameras and GI cameras.

10.26 We present our detailed consideration of entry/expansion within chapter 13 of these provisional findings. However, in light of the Parties' submissions in relation to potential foreclosure, we provide a summary of our view of the impact of entry/expansion on the ability and incentive to foreclose within this chapter.

Ability

Our assessment

10.27 In order to assess the Merged Entity's ability to foreclose rival TEM suppliers in the absence of the Supply Agreements, we have considered evidence on the following factors:[376]

[375] Parties' response to the Issues statement dated 19 February 2019, paragraph 4.1 and parties' 'Rebuttal of Working Papers on Vertical Effects and Information Sharing', paragraph 1.10.
[376] See generally Merger Assessment Guidelines (CC2) (Revised), paragraph 5.6.10.

(a) Are filters, DD cameras and GI cameras important inputs into a TEM system?

(b) To what extent can Thermo Fisher's rivals respond to an increase in prices or a reduction in the quality of Gatan's filters, DD cameras or GI cameras by switching to alternative sources of supply?

(c) Are there any impediments that would prevent the Merged Entity from foreclosing?

Importance of TEM peripherals

10.28 We have received evidence from the Parties, third parties and customers that peripherals in the form of filters, DD cameras or GI cameras are an integral part of TEM systems.

10.29 Cameras are fundamental to the way in which TEMs capture images. Almost all customers for modern TEMs consider that GI cameras are critical for the alignment and operation of the system. A DD camera and/or filter is also required by a smaller subset of customers depending on the type of TEM being used and its application.[377]

10.30 Life science TEM users typically require a DD camera if they are conducting single particle analysis (SPA) of fragile samples. Users doing tomography will also require a filter. For example:

(a) The University of York purchased a DD camera but did not purchase a filter as the SPA it carries out had no need for a filter.[378]

(b) Birkbeck College told us that its TEMs with filters are used for high end structural microscopy and the filter is used routinely for tomography work.[379]

10.31 There are only a small number of customers using a DD camera for material science applications, but material science TEM users may often require a filter.

10.32 We understand that there is no other way of achieving the level of imaging required by many users without the use of these peripherals.

10.33 Consideration of the cost of these peripherals relative to the cost of a complete TEM system provides further evidence on their importance and the

[377] Thermo Fisher response to RFI dated 26 February 2019.
[378] Summary call University of York, 12 February 2019.
[379] Summary call Birkbeck college, 1 February 2019.

Merged Entity's ability to engage in foreclosure. If filters, DD cameras and GI cameras account for only a small part of the total TEM system costs incurred by rival TEM suppliers, the Merged Entity will be less able to harm its rival supplier's ability to compete by raising prices than if they account for a greater part of the total costs.

10.34 Based on data received from the Parties, we have compared the average selling price of Gatan's filters, DD cameras and GI cameras[380] against the average cost of goods sold (COGS)[381] for Thermo Fisher's TEMs[382] (which we consider to be a reasonable proxy for the COGS of the TEMs of Thermo Fisher's rivals) sold with the corresponding peripheral.

Figure 2: [✂]

[✂]

Source: [✂]

10.35 The cost of purchasing the peripheral makes up [✂]% of the total cost of a TEM+GI camera, [✂]% of the total cost of a TEM+DD camera and [✂]% of the total cost of a TEM+filter[383,384] thereby demonstrating that filters, DD cameras and GI cameras represent a material proportion of the total cost of the TEM system.

Ability of Thermo Fisher's TEM supplier rivals to switch to alternative sources of supply

10.36 If Thermo Fisher's rivals can turn to substitutes for Gatan's peripheral products, the Merged Entity will be less able to impose a price increase or reduction in quality than if there were few substitutes available.

10.37 We have therefore considered Gatan's market power in relation to filters, DD cameras and GI cameras by examining the extent to which there are effective

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[380] Roper response to the Market Questionnaire dated 24 January 2019, Annex 057
[381] Includes the peripheral average selling price and TEM COGS related to the sale of the initial peripheral or TEM system only (i.e. excludes future servicing & maintenance costs).
[382] Thermo Fisher data provided in response to RFI dated 26 February 2019, Annex 026:
TEM+GI = TEM system sold with any GI camera products, but no DD camera products or filter (including spectrometer) products;
TEM+DD = TEM system sold with any DD camera products, but no filter (including spectrometer) products;
TEM+Filter = TEM system sold with a filter
[383] The cost of TEM systems that include a filter are significantly more expensive on average than those sold with a GI camera or DD camera primarily because filters are typically sold alongside higher-end TEM models used for more advanced applications.
[384] The data presented includes both life science and material science filters. It should be noted that there is a significant difference in the price of filters and the costs of TEM+filter systems between life science and material science customers. The material science products are significantly cheaper – especially when a spectrometer is used instead of an energy filter.

substitutes. We have also considered the extent to which Gatan may have market power in relation to the software that it provides with its peripherals.

10.38 In our assessment of horizonal effects in chapter 9 (see paragraphs 9.61 to 9.178), we provide detailed information on the competitive landscape, the extent to which peripheral products supplied by third parties are effective substitutes and the extent to which there is evidence on potential entry or expansion across filters, DD cameras and GI cameras In this chapter, we focus on the peripheral options available to Thermo Fisher's TEM supplier rivals (i.e. excluding Thermo Fisher self-supply) as this reflects the supply options available to them in the event of foreclosure by the Merged Entity. To avoid duplication, we refer back to our assessment of horizontal effects where appropriate.

10.39 We consider that market shares excluding self-supply are relevant in this context and present estimates[385] to help illustrate the extent to which alternative suppliers are active. However, the evidence provided to us shows that these are differentiated markets, and so we treat market share estimates with some caution.

Market power – Standalone DD cameras

10.40 Gatan is currently one of two significant, non-vertically integrated suppliers of DD cameras. The other is Direct Electron. Thermo Fisher manufactures DD cameras for self-supply. Company B told us that they have developed a DD camera which entered commercial production and sale in 2018. (see paragraph 9.92 of our horizontal effects chapter).

10.41 The data provided by the Parties shows that Gatan's share of supply in DD cameras worldwide has varied between [✂]%–[✂]% over the period 2015-17,[386] as outlined in Table 11. The rise in Direct Electron's 2017 share to [✂]% is primarily driven by the low level of sales for Gatan in that year £[✂].[387]

[385] These estimated market shares relate to the whole market including sales via TEM suppliers, distributors and direct to end-customers.
[386] Annex 1 to the Parties' response to CMA RFI dated 21 September 2018 ('P1, RFI2').
[387] Annex 57 in response to the CMA's Market Questionnaire.

Table 11: DD cameras market share (excluding self-supply)

Supplier	2015 Sales (GBP 000's)	2015 Share	2016 Sales (GBP 000's)	2016 Share	2017 Sales (GBP 000's)	2017 Share
Gatan	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Direct Electron	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Total	[✂]		[✂]		[✂]	

Source: Parties estimates (P1, RFI 2)

10.42 Estimates from Company D indicate that Direct Electron's share of the market (including self-supply) is only a few percentage points (See paragraph 9.91). Company B estimates that it currently accounts for less than 1% of the global DD camera market.

10.43 We outline the evidence provided to us on the DD cameras supplied by Direct Electron and Company B in paragraphs 9.130 to 9.142 of chapter 9.

10.44 Our view is that Direct Electron is the only established alternative DD camera option to Gatan for Thermo Fisher's rivals and there is evidence that Direct Electron's camera offering does not match Gatan's quality.

10.45 Our provisional view is therefore that Gatan has substantial market power in relation to DD cameras and rival TEM suppliers are likely to have limited alternatives to substitute for Gatan cameras.

Market power – life science filters

10.46 Gatan is currently the only supplier of life science (LS) filters for use on TEM systems. JEOL manufactures an in-column energy filter but only self-supplies. (See paragraph 9.157 of our chapter 9).

10.47 We outline the evidence provided to us on Gatan's and JEOL's LS filters in paragraphs 9.172 to 9.175 of chapter 9.

10.48 In addition, we note that, although JEOL is not currently reliant on Gatan's LS filter, an LS filter needs to work in tandem with a DD camera. If the Merged Entity were to foreclose JEOL by reducing its access to Gatan's market leading DD camera or supplying it on inferior terms, this may also undermine the quality of JEOL's LS filter offering.

10.49 Our provisional view is therefore that Gatan has substantial market power in relation to LS filters.

Market power – material science filters

10.50 Gatan is currently the only supplier of material science (MS) filters for use on TEM systems.

10.51 We understand that Hitachi and Nion both self-supply spectrometers, which are used for certain material science (MS) applications. JEOL's in-column filter is primarily or exclusively used for life science applications[388] and is unsuitable for use as a MS filter.

10.52 We outline the evidence provided to us on MS filters in 9.176 to 9.178 of chapter 9.

10.53 On the basis of this evidence, our provisional view is that Gatan has substantial market power in the supply of MS filters.

Market power – Standalone GI cameras

10.54 Gatan is currently one of four global, non-vertically integrated suppliers of GI cameras (Thermo Fisher and JEOL also manufacture GI cameras but only for self-supply with their TEMs). It is by far the largest, with a share of supply of GI cameras worldwide varying between [✂]% and [✂]% in recent years as seen in Table 12.[389] When TEM suppliers' self-supply is included, Gatan's share is between [✂]%–[✂]% worldwide, and the combined share of the Parties after the Proposed Merger would be between [✂]%–[✂]%.

[388] JEOL's initial Phase 2 submission to the CMA stated that Hitachi is the only competitor to Gatan in the supply of EELS filters (paragraph 2.1). The Parties' submission on 'competition between TEM systems' also states that 'we understand that JEOL's in-column filter is suitable for EFTEM but is not optimised for EELS' (p.9).
[389] Annex 1 to the Parties' response to CMA RFI dated 21 September 2018 ('P1, RFI2').

Table 12: GI cameras market share (excluding self-supply)

Supplier	2015 Sales (GBP 000's)	2015 Share	2016 Sales (GBP 000's)	2016 Share	2017 Sales (GBP 000's)	2017 Share
Gatan	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
AMT	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
TVIPS	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
EMSIS	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Direct Electron	[✂]	[✂]	[✂]	[✂]	[✂]	[✂]
Total	[✂]		[✂]		[✂]	

Source: Parties estimates (P1, RFI 2)[390]

10.55 We outline the evidence provided to us on the GI cameras supplied by AMT, TVIPS, EMSIS and Direct Electron in paragraphs 9.74 to 9.82 of our horizontal effects chapter.

10.56 There is evidence that TVIPS, EMSIS and to a lesser extent AMT compete against Gatan for at least some customers. However, all three suppliers have considerably lower market shares than Gatan and our view is that there is evidence of a substantial group of customers who view Gatan's OneView camera as superior. For example, Sussex University told us that other GI cameras were available, but the One View was considered the best for their needs as it is fast and good at both low and high magnification.[391]

10.57 It is our understanding that the widespread use of Gatan's software by material science customers[392] is an important source of competitive advantage and Company D stated that, even if customers initially purchase a camera without a filter, which is common, customers choose Gatan's GI camera given the future possibility of purchasing a filter – and the better compatibility of Gatan's camera with the filter.[393] We therefore consider that Gatan can leverage its market power in the supply of filters into the market for GI cameras.

10.58 Our provisional view is therefore that Gatan has some market power and although this is lower than for DD cameras and filters, for certain customers

[390] Parties' estimates. We understand that Direct Electron do not supply GI cameras even though one of their DD cameras may compete with GI cameras.
[391] Summary call Sussex University, 1 February 2019.
[392] [✂].
[393] Company D response to CMA Questionnaire.

rival TEM suppliers are likely to only have access to inferior alternatives to substitute for Gatan cameras.

Other restrictions on foreclosure

10.59 In the absence of the Supply Agreements, we are not aware of any existing further supply arrangements or commitments that would prevent the Merged Entity from being able to engage in input foreclosure immediately post-Proposed Merger.

10.60 The Parties submitted that foreclosure would risk retaliation by Hitachi and have a damaging reputational impact for Thermo Fisher. We consider these issues to primarily relate to the Merged Entity's incentive to foreclose rather than ability and therefore address them within our assessment of the incentive to foreclose below.

10.61 We consider in paragraphs 10.116 to 10.204 below the Parties' submissions that the terms of the Supply Agreements should be considered to prevent the risk of the Merged Entity having the ability to engage in foreclosure.

Conclusion on ability

10.62 In the absence of the Supply Agreements, our provisional conclusion is that, post-Proposed Merger, the Merged Entity would have the ability to foreclose competing TEM suppliers in relation to filters and DD cameras and, to a lesser extent, GI cameras.

Incentive to foreclose

10.63 The Merged Entity's incentive to foreclose depends on the loss of profit in the upstream peripherals market that would result from reduced sales of peripheral products to downstream competitors, relative to the potential gain in profit downstream from increased sales of TEM systems to end-customers that switch their purchases away from downstream competitors.

10.64 The calculation of these respective changes to the upstream and downstream profits which dictate the Merged Entity's incentive to foreclose is known as 'vertical arithmetic'.

10.65 We have not relied on precise vertical arithmetic calculations when considering the incentive to foreclose. The output from these calculations is only as good as the underlying assumptions and data used and, as noted by

the Parties,[394] the vertical arithmetic framework cannot be readily applied to a partial foreclosure strategy.

10.66 However, even in the absence of precise calculations, vertical arithmetic can be used to indicate the relative magnitude of what might be gained if a foreclosure strategy were to be pursued and this helps to highlight the scale of the incentive to engage in total foreclosure if mitigating factors, such as the Supply Agreements and the potential for entry/expansion in the supply of new peripheral products, were found not to be fully effective in deterring foreclosure.

The Parties' view

10.67 The Parties have recognised that the [✂].[395]

10.68 However, they have also submitted that, even if the Merged Entity did (hypothetically) have the ability to foreclose rivals, it would have no incentive to do so as the likelihood of competing entry by JEOL and Hitachi makes foreclosure unprofitable for the Merged Entity, given the Parties' assumptions on when such entry would occur.[396]

10.69 In addition, the Parties submitted that foreclosure would risk retaliation by Hitachi and have a damaging reputational impact for Thermo Fisher.

Our assessment

10.70 In line with the approach adopted in our analysis of the Merged Entity's ability to foreclose, we have first considered the Merged Entity's incentive to foreclose based on the current 'state of the world'[397] before considering the extent to which the incentive may be affected by entry/expansion in the supply of filters, DD cameras and GI cameras.

10.71 In addition, we consider the impact that the risk of possible retaliation or the cost of reputational damage to Thermo Fisher could have on the Merged Entity's incentive to foreclose.

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[394] See paragraph 3.23 of Compass Lexecon's 'Vertical issues' paper, 20 February 2019.
[395] [✂].
[396] See paragraph 3.3 of Compass Lexecon's 'Vertical issues' paper, 20 February 2019.
[397] For our incentive to foreclose calculations we have therefore assumed that the Merged Entity engages in total foreclosure of JEOL and Hitachi.

Incentive to foreclose results

10.72 The detail of our quantitative analysis is outlined in Appendix C.

10.73 The data provided by the Parties indicates that the [✂]. The gross profit downstream is on average [✂] larger than a filter, [✂] larger than a DD camera and [✂] larger than a GI camera.[398]

10.74 In addition, the importance of the peripherals for downstream TEM customers and the lack of effective substitutes available for filters, DD cameras and to a lesser extent GI cameras, (identified in our assessment of market power above) indicates that a large number of potential JEOL or Hitachi customers may switch their TEM system purchase to Thermo Fisher if access to Gatan's peripherals is restricted.

10.75 The combination of these key factors drives the result of our vertical arithmetic calculation which indicates that the Merged Entity's incentive to foreclose is large (subject to consideration of the Supply Agreements and of the impact of any potential future entry/expansion in the supply of filters, DD cameras and GI cameras). Our calculations show total foreclosure resulting in a net gross profit benefit of c.$ [✂] million per annum [399] or c.$ [✂] million on a net present value (NPV) basis.[400]

10.76 Our view is that this incentive to foreclose value is large in absolute terms and relative to the proposed acquisition price of $925 million (which reflects a [✂] earnings multiple).[401]

10.77 An incentive to foreclose is present for filters, DD cameras and GI cameras. The incentive is highest for filters where a high recapture rate is combined with a large ratio of downstream to upstream gross profit. We note that foreclosure is profitable for GI cameras despite the relatively low recapture rate due to the high ratio of downstream to upstream gross profit at stake. The quantum of the benefits for DD cameras is relatively small due to the small number of DD cameras that are sold without a filter.

Impact of entry/expansion on incentive to foreclose

10.78 The Parties have submitted that entry by JEOL, Hitachi or others in the supply of new peripherals would remove any foreclosure incentive as the Merged

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[398] We note that these figures only incorporate profits earned in relation to the initial sale and do not include ongoing profits earnt through service and maintenance.
[399] Average annual undiscounted net benefits over 10 years.
[400] Calculated on a discounted cashflow basis assuming a terminal value in year 11.
[401] Multiple on 2018E EBITDA as a standalone business.

Entity would forego upstream peripherals profits in the long term for limited upside in downstream TEM profits in the short term.

10.79 For the reasons outlined in the 'Entry and Expansion' chapter, our provisional view is that there are high barriers to entry and, while there are incentives for suppliers to enter the market, the ability to successfully enter is limited.

10.80 Our provisional view is that entry or expansion would not be timely, likely and sufficient to prevent the large incentive to foreclose.

The possibility of retaliation by the Merged Entity's downstream competitors and reputational damage

10.81 We have considered the possibility of retaliation by the Merged Entity's downstream competitors and reputational damage as a result of taking foreclosure action.

Retaliation by rivals

10.82 Thermo Fisher has submitted that its ability to foreclose Hitachi would be constrained because there are substantial volumes of cross-supply between Thermo Fisher and Hitachi.[402] In particular:

(a) Hitachi's subsidiary [✂]; and

(b) [✂].

10.83 In the event that Thermo Fisher attempted to foreclose the Hitachi EM business, Thermo Fisher told us that Hitachi would be able to take direct [✂] retaliatory action against Thermo Fisher.

10.84 If the Merged Entity or other parts of the Thermo Fisher group are [✂] reliant on Hitachi, the Merged Entity's shareholders may risk incurring wider costs from engaging in foreclosure activity because of the risk of retaliation, thereby reducing its incentive to foreclose.

10.85 We have received limited evidence on this issue beyond that provided by the Parties.[403] When we inquired about Hitachi's wider relationship with Thermo Fisher, [✂].[404]

[402] Parties' response to Issues Statement, paragraphs 7.1–7.5.
[403] Parties' response to RFI dated 26 February 2019.
[404] [✂].

10.86 Information provided by the Parties concedes that if the products supplied by Hitachi, through [✂] were no longer available, Thermo Fisher could find another supplier or self-supply. The products of a new supplier would require [✂], but Thermo Fisher has in place a supply agreement with [✂].

10.87 The [✂] products are subject to a supply agreement until [✂]. The Parties submit that they cannot be "readily" replaced by any alternative products and estimate that partnering with an alternative third party would take at least [✂].

10.88 With respect to [✂] supplied by Hitachi for Thermo Fisher's [✂], the Parties have submitted that Thermo Fisher's supply agreement expires in [✂], but Hitachi's patent is valid for [✂]. If Hitachi stopped licensing their patent to Thermo Fisher, Thermo Fisher would [✂].

10.89 In our view, this evidence supports the possibility of retaliation by Hitachi. However, many of the potential partial foreclosure strategies outlined in paragraph 10.19 of this chapter could be difficult for Hitachi to detect and substantiate which could prevent, or at least delay any potential retaliation.

10.90 In any event, Hitachi [✂] represents a [✂] proportion of Gatan's third party sales. Hitachi accounts for only [✂]% of Gatan's third party sales of cameras/filters with the other [✂]% going to JEOL[405] where no means of possible retaliation has been identified by the Parties.

10.91 Our provisional view is therefore that the risk of retaliation has a very limited impact on Thermo Fisher's overall incentive to foreclose.

Reputational damage

10.92 The Parties submitted that it would be very damaging to Thermo Fisher's reputation if it were to renege on a public commitment to customers by refusing to supply Gatan's products to other TEM suppliers or supplying them on uncompetitive terms.

10.93 Thermo Fisher told us that it has a long history of supplying products to all purchasers (even where those purchasers compete in downstream markets). Being seen to harm the businesses of JEOL and Hitachi would cause reputational damage amongst its own EM customers and across its broader business.

10.94 We accept that, were the Parties to overtly renege on a commitment to supply, this could result in some reputational damage. However, many of the

[405] Parties' response to the CMA's Issues Statement, paragraph 5.1.

potential partial foreclosure strategies outlined in paragraph 10.19 of this chapter could be difficult for JEOL, Hitachi or other market participants to detect and substantiate. In these scenarios, material reputational damage seems unlikely.

Conclusion on incentive

10.95 For the reasons set out above, our provisional conclusion is that, post-Proposed Merger, the Merged Entity may be expected to have a large incentive to foreclose competing TEM suppliers in relation to filters, DD cameras and GI cameras.

Effect of foreclosure

Impact on Thermo Fisher's rivals

10.96 Both of Thermo Fisher's current established TEM supplier rivals could be significantly impacted by foreclosure of Gatan's peripherals as could any potential new entrants that require access to Gatan's products.

10.97 We understand that Nion is already active in the TEM market. It currently has limited market share and specialises in high-end scanning transmission electron microscopes (STEMs) which it can offer with its own spectrometer. It currently does not purchase products from Gatan [✂].[406] Tescan is a potential new entrant into the TEM market but it has indicated that it did not expect to use Gatan peripherals. [✂].[407]

Impact on Hitachi

10.98 Hitachi does not currently have a cryo-EM offering. It [✂]. Any foreclosure effects for these peripherals is therefore expected to be limited in the near term.

10.99 However, [✂][408] [✂].

Impact on JEOL

10.100 JEOL is active in both the life science and material science segments of the TEM market and recently launched its cryo-EM offering.

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[406] Nion submission to the CMA dated 3 April 2019.
[407] [✂]
[408] [✂].

10.101 We understand that while JEOL's in-column filter can be used in place of Gatan's post-column LS filter, JEOL requires access to a high-quality DD camera to work alongside its filter to be able to compete effectively for high-end life science customers. JEOL [✂].[409]

10.102 [✂].

10.103 Gatan's MS filters, DD cameras and GI cameras also form an important part of JEOL's material science TEM offering. There are no MS filter substitutes available and so foreclosure by Gatan may be expected to have a substantial impact on JEOL's material science sales.

10.104 JEOL submitted that, in the event of foreclosure of Gatan's products, [✂].[410]

Wider impact on competition

10.105 Our view is that the general effect of a foreclosure strategy - whether total foreclosure or partial foreclosure through mechanisms set out in paragraph 10.19 above - whereby downstream rivals would have reduced access to the most advanced cameras and filters, or access but on less attractive terms, would be to reduce over time the competitive constraint that rival TEM suppliers pose on the downstream TEM business of the Merged Entity. A foreclosure strategy would also increase the barriers to entry in the supply of TEMs with filters, DD cameras and GI cameras.

10.106 Thermo Fisher is by far the biggest supplier of TEMs supplied with filters, DD cameras and GI cameras with market shares of [✂] respectively.[411] The cryo-EM market is a key new growth area in which Thermo Fisher currently holds a very large market share [✂][412]. JEOL has recently entered this segment of the market and is trying to gain traction. The commercial success and market acceptance of JEOL's in-column filter is still uncertain. Direct Electron told us that 'JEOL has found it difficult to demonstrate this system' and it is concerned that, if the proposed merger completes, JEOL may ultimately be forced to exit the market.[413]

10.107 We note that, in a concentrated market, and in the presence of weak competition between suppliers, even a small lessening of competition can

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[409] [✂].
[410] [✂].
[411] Market shares provided by the Parties (Thermo Fisher) in response to the CMA's Market Questionnaire (Annex 010, Q44).
[412] Parties internal document - provided as part of the First Day Response, Annex 2, 081. Roper David 20160331 v1.3
[413] Call with Direct Electron 18 Feb 2019

have a substantial impact. Such a detrimental effect is especially likely in the important cryo-EM segment of the TEM market.

10.108 A reduction in the competitive constraint in the supply of TEMs that current and potential competitors impose on Thermo Fisher could lead to an increase in the price and/or a reduction in the quality and future innovation within the TEM market (both by Thermo Fisher and its current and future competitors).

10.109 We have received mixed evidence from customers and third parties with respect to their views on how the Proposed Merger might affect competition. Some customers, including the Medical Research Council, expressed no concerns.[414] Sussex University indicated that there had been some initial concern amongst the TEM customer community when the Proposed Merger was announced but it has been reassured by the Parties that there is no issue and that Gatan would continue to supply JEOL and other TEM suppliers.[415]

10.110 However, many third-parties did raise significant concerns indicating that the Proposed Merger could seriously prejudice Thermo Fisher's rivals' ability to compete in the supply of TEMs. Several third parties noted the strong position of Thermo Fisher in the supply of TEMs and said that there was a general concern in the industry about the possibility of the Merged Entity limiting the access of its rivals to Gatan's filters, DD cameras and GI cameras. Some third parties said that the effect of this lessening of competition in the supply of TEMs downstream would be increased prices and worse services and support. For example:

(a) Oxford University told us that it has 'grave concerns' about whether the merged parties could make it difficult to obtain essential equipment that will integrate with JEOL products. It said the merged parties could give preferential treatment to Thermo Fisher customers and the maintenance and servicing of Gatan peripherals for non-Thermo Fisher customers could deteriorate.[416]

(b) Johnson Matthey told us that it considers the proposed merger is definitely anti-competitive and is a means of getting rid of competition. Whoever owns Gatan will have a huge advantage in the electron

[414] Call with Medical Research Council, 31 January 2019.
[415] Call with Sussex University, 1 February 2019.
[416] Call with Oxford University, 5 February 2019.

microscope sector as the whole package isn't available from anyone else.[417]

(c) University Hospital of Southampton told us that the proposed merger will restrict competition and it is concerned that the merger might stop innovation and increase prices. It appears to them that Thermo Fisher wants to manage all service contracts and exclude other companies leading to a single supplier.[418]

(d) Birkbeck College told us that it would be a catastrophe for the industry if JEOL was not able to access Gatan peripherals. It believes that there is not enough competition at the moment and the merger will only make it worse.[419]

(e) National Nuclear Laboratory state that the proposed merger could be very unfortunate if the merging parties do not supply JEOL.[420]

10.111 Our guidelines indicate that when considering the effect of foreclosure, it may be necessary to also take account of any stimulus to rivalry in the downstream market that may arise as a result of efficiencies from the merger.[421]

10.112 The Parties have submitted a number of efficiencies that they expect to arise as a result of the Proposed Merger. As outlined in chapter 13 on 'Efficiencies', we consider that it is unlikely that rivals would be able to respond to these efficiencies in a way that sufficiently enhances overall rivalry in the market and we therefore do not consider them further with respect to the effect of foreclosure.

Conclusion on effect

10.113 On the basis of this evidence, our provisional view is that, if Thermo Fisher's rivals were to be foreclosed, the effect would be significant harm to competition between TEM suppliers downstream.

Conclusion on ability, incentive and effect

10.114 On the basis of the above, and subject to consideration of the Supply Agreements, we have provisionally found that the Merged Entity would have

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[417] Call with Johnson Matthey, 30 January 2019.
[418] Call with University Hospital Southampton, 31 January 2019.
[419] Call with Birkbeck College, 1 February 2019.
[420] Call with National Nuclear Laboratory, 4 February 2019.
[421] Merger Assessment Guidelines, paragraph 5.6.12.

the ability and incentive to foreclose its downstream rivals in the supply of filters, DD cameras and GI cameras, and that the effect of this foreclosure would be significant harm to downstream competition between TEM suppliers.

10.115 We consider below the extent to which the Supply Agreements address these foreclosure concerns.

The Supply Agreements

10.116 The Parties have submitted that, after the Proposed Merger, Thermo Fisher will not have the ability to foreclose its rivals in the supply of TEMs as Thermo Fisher's current TEM rivals (Hitachi and JEOL) have long-term supply agreements with Thermo Fisher that guarantee access to Gatan products on competitive terms.[422]

10.117 Thermo Fisher told us that part of its rationale for entering into the Supply Agreements with JEOL and Hitachi was to pre-empt foreclosure concerns:

10.118 "[…] [✂][423] (underlining added)

10.119 We have therefore considered in detail the nature and terms of the Supply Agreements and assessed whether they are sufficient to fully address the concern identified above that Thermo Fisher will have the ability and incentive to foreclose its rivals in the supply of TEMs.

The Parties' submissions

10.120 The Parties have submitted that the only downstream rivals of Thermo Fisher in the supply of TEMs (JEOL and Hitachi) are protected against foreclosure by the Supply Agreements. The Parties have told us that:[424]

(a) [✂];

(b) [✂];

(c) [✂];

(d) [✂];

(e) [✂];

[422] Parties' response to Issues Statement, sections 4 and 5.
[423] Thermo Fisher response to CMA Phase 1, RFI 4 dated 6 November.
[424] Parties' response to the Issues Statement, section 5.

(f) [✂].

10.121 The Parties have submitted that the Supply Agreements are the outcome of a negotiation between sophisticated commercial parties that were advised by legal counsel throughout the process. [✂].

10.122 We note that the outcome of a negotiation is likely to be affected by the bargaining power held by each of the parties involved. Moreover, where input foreclosure concerns have been raised (which implies that the party raising them has limited alternative supply options), one cannot readily conclude that a negotiated outcome ensures continued access to an input on appropriate terms. We note further that JEOL told us that [✂].

10.123 The Parties have submitted in conclusion that, absent an obvious breach of contract, the Supply Agreements:

(a) make total input foreclosure highly unlikely; and

(b) contain strong protections [✂]. Therefore, the Parties concluded that the Supply Agreements also remove any material risk of Thermo Fisher adopting a partial input foreclosure strategy.

Assessment of the Supply Agreements

10.124 We have assessed whether the Supply Agreements fully address the concern identified above that Thermo Fisher will have the ability and incentive to foreclose its rival suppliers of TEMs after the Proposed Merger.

10.125 We note that contractual arrangements are, in general, unlikely to completely remove the ability to adopt a foreclosure strategy. Contractual arrangements can be renegotiated or terminated over time (even where this could only be done with bilateral consent, the bargaining power held by each of the parties could, as noted above, have a bearing on their incentives to agree to such changes). Moreover, a party may choose to waive its right to enforce a breach. As indicated by the Parties in respect of the relationship between Thermo Fisher and Hitachi (see paragraphs 10.82 to 10.83), a party to a contract may have commercial reasons arising from a wider relationship to waive a breach, decline to litigate or negotiate a change. This may be in the commercial interests of the contracting parties but not necessarily protective of competition in the market for the relevant products. In any event, the Supply Agreements do not, of course, apply to potential market entrants. Accordingly, without raising any questions about Thermo Fisher's intention to comply with the Supply Agreements (which we have no reason to doubt), we consider that as a matter of principle and practice such contractual arrangements would not serve to remove foreclosure concerns.

10.126 We have, nevertheless, also considered the specific terms of the Supply Agreements and their likely impact on the ability and incentive of the Merged Entity to pursue a foreclosure strategy and whether they fully address the concerns identified above.

10.127 The evidence provided to us indicates that the Supply Agreements would limit Thermo Fisher's ability to adopt a strategy of total foreclosure of JEOL and Hitachi by refusing to supply current products or through increasing the price of current products ([✂]), subject to the general limitations of any contractual arrangement, as described above.

10.128 However, we are concerned that there are several aspects of the Supply Agreements which mean that the concerns identified above are not fully addressed and the Merged Entity may still have the ability to adopt a foreclosure strategy. Our assessment of the terms of the Supply Agreements has identified a number of aspects liable to undermine the effectiveness of the contracts to prevent foreclosure, including:

(a) uncertainty around whether the scope, supply terms and pricing of Gatan products are (or even could be), appropriately specified, particularly as related to future innovations, and whether [✂] are specific enough to provide adequate protection against all plausible mechanisms of foreclosure;

(b) the extent to which compliance with the Supply Agreements could be monitored and enforced effectively in order to constrain Thermo Fisher's incentive to foreclose;

(c) the extent to which circumvention of the Supply Agreements is a material risk given the evidence of the large incentive for Thermo Fisher to foreclose its rivals; and

(d) the distorting effects that the Supply Agreements may have on (i) future entry and (ii) the pricing of products to JEOL and Hitachi. We also note [✂].

The supply of current and new Gatan products

10.129 We have been provided with evidence that the rate of new product innovation and development is relatively quick in the sector. For example, Gatan provided evidence that it develops products and introduces new and improved products to market [✂]:

Table 13: Table of Gatan product launches (2011–2018)

Gatan Products	Year product introduced to the market	Year product development began
Cameras		
K2 summit	2011	2008
K3	2016	2013
OneView	2014	2010
Rio	2017	2012
Filters		
Continuum	2018	2014
Quantum K2	2011	2009
Quantum LS (K2)	2013	2012
Quantum LS (K3)	2016	2013
Detectors		
Vulcan	2013	2011
STEM	2012	2012
OnPoint	2016	2014
ChromaCL2	2012	2010
Monarc	2018	2016

Source: Roper Response to Market Questionnaire.

10.130 As shown above, Gatan released a new or improved camera, filter or detector in every year (save 2015) in the last eight years. Moreover, [✂]:

Table 14: Gatan 'Analytical' and 'Imaging' product pipeline

[✂]		
[✂]	[✂]	[✂]
[✂]	[✂]	[✂]
[✂]	[✂]	[✂]
[✂]	[✂]	[✂]
[✂]	[✂]	[✂]
[✂]	[✂]	[✂]
[✂]	[✂]	[✂]
[✂]	[✂]	[✂]
[✂]		
[✂]	[✂]	[✂]
[✂]	[✂]	[✂]
[✂]	[✂]	[✂]
[✂]	[✂]	[✂]
[✂]	[✂]	[✂]
[✂]	[✂]	[✂]

Source: Roper response to CMA Phase 1 RFI, Annex 2.

10.131 We have therefore considered whether the Supply Agreements are sufficiently certain regarding the products covered, and the terms of supply of those products, to preclude the ability to foreclose rivals. This is particularly important in a market that is subject to frequent technological change or other

wide-ranging market developments, where there is a significant risk that the competitive dynamics will be materially influenced by product development.

10.132 The Supply Agreements contain an obligation on Thermo Fisher to [✂]. Specifically, the Supply Agreements provide that Thermo Fisher will [✂]:

(a) [✂];[425]

(b) [✂];[426]

10.133 The [✂] has also been negotiated and agreed as part of the Supply Agreements, [✂]:

(a) [✂].[427][✂];[428]

(b) [✂].[429]

10.134 The Supply Agreements envisage that Thermo Fisher [✂]:

(a) [✂];[430]

(b) [✂].[431]

10.135 We consider that the terms of the Supply Agreements provide a relatively high degree of certainty as to the product scope and terms of supply for *current* Gatan products being supplied to JEOL and Hitachi. There is similar, albeit more limited, certainty around the supply of improved and upgraded products and the terms of that supply, though we note there is potential for uncertainty around what constitutes improvements to and upgrades to current products that are covered by the agreement in a dynamic market where product development is important. However, the Parties have told us that the terms of the Supply Agreements [✂].[432]

10.136 We have greater concern around the extent to which the Supply Agreements limit Thermo Fisher's ability to engage in a partial foreclosure strategy in relation to new Gatan products.

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[425] JEOL Supply Agreement, Exhibit A.
[426] Hitachi Supply Agreement, Exhibit A.
[427] [✂].
[428] Hitachi Supply Agreement, Exhibit A.
[429] Hitachi Supply Agreement, Exhibit A.
[430] JEOL Supply Agreement, Exhibit A.
[431] Hitachi Supply Agreement, Exhibit A.
[432] Parties' response to Issues Statement, paragraph 5.11.

10.137 On the basis of our review of the Supply Agreements, it is unclear how and under what terms new products will be made available to JEOL and Hitachi. This is because the terms of the Supply Agreements ([✂]) only apply to new Gatan products to the extent that it is mutually agreed between Thermo Fisher, on the one hand, and JEOL or Hitachi, on the other.[433]

10.138 We note that there is also potential for disagreement as to what constitutes an upgrade to an existing product, as opposed to development of a new product, and there is no mechanism to resolve any disagreement in this regard.

10.139 We consider that, particularly in the field of cryo-electron microscopy, new product development and innovation is likely to be important and a growth area for TEM suppliers. Reduced access to new peripherals in this field – or access on worse terms – could significantly soften the competitive rivalry between Thermo Fisher and other TEM suppliers in the future.

10.140 We acknowledge the challenges in ensuring effective supply terms for products that do not yet exist and may not yet be in contemplation. Whilst the Supply Agreements attempt to address this issue [✂], this is an uncertain mechanism to guarantee future supply of new products on an appropriate basis (given the Merged Entity's large incentive to foreclose).

10.141 The Supply Agreements fail to address availability of new products released at any point post-closing of the Proposed Merger. In our view this omission means that these innovations would therefore only be available to JEOL or Hitachi as a result of a 'good faith' negotiation with Thermo Fisher – the Supply Agreements do not provide any further guarantee in this regard and the risk of foreclosure remains. Given that at least part of the rationale for the Supply Agreements was to address potential foreclosure concerns, we would have expected to see the supply of new products addressed in a more certain way.

10.142 We consider that even when parties conduct a negotiation in good faith, it is perfectly possible for parties to fail to come to an agreement on the price and terms of supply for a product. This could be particularly so in a situation where after the Proposed Merger each of the negotiating parties have changed incentives. JEOL/Hitachi would be seeking to make a purchase on reasonable terms and thus take a broad view of what constitutes a 'good faith' negotiation. Thermo Fisher would be incentivised to take a narrower view, given that, if it did not sell the peripheral, it might face weaker

[433] See terms detailed in paragraph 10.134 above.

competition downstream and make additional sales of TEMs. In such a scenario, it may be possible for Thermo Fisher to totally foreclose its rivals in the supply of future products if 'good faith' negotiations fail to reach agreement.

10.143 Even short of total foreclosure, a delay in negotiating the supply terms for new products could have a significant effect on downstream rivals in the supply of TEMs and result in partial foreclosure. For example, the Parties have told us that an important factor in gaining market traction for TEM and peripherals combination is market testing, acceptance and published scientific papers.[434]

10.144 Accordingly, a delay in agreeing the terms of supply for new Gatan products to JEOL or Hitachi could disadvantage them in the market, and grant Thermo Fisher a first mover advantage.

10.145 We also note that as there is [✂]. There is therefore uncertainty around the terms of supply and whether Thermo Fisher could foreclose its rivals through increased pricing in relation to new products.

10.146 Our provisional view is therefore that the terms of the Supply Agreements do not fully address the ability for Thermo Fisher to foreclose its rivals, particularly in relation to new products.

Excluded products

10.147 As noted above, the Supply Agreements cover [✂]. However, the Supply Agreements do not [✂].[435]

10.148 [✂].

10.149 Evidence we have received from end customers, and all other suppliers of TEMs and TEM peripherals, is that Gatan is the only supplier of such a filter, which is an important product for cryo-electron microscopy.

10.150 JEOL told us that [✂].[436]

10.151 JEOL also told us that the inclusion of the filter was not material to their business as its new high-end cryo-EMs came with the JEOL "in-column" filter as standard. The Gatan post-column filter would not be used with these EMs.[437] Therefore, only customers who were purchasing the entry cryo-EM –

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[434] [✂].
[435] [✂].
[436] JEOL written submission.
[437] JEOL call summary.

the F200 TEM – were likely to be interested in purchasing the Gatan post-column filter [✂].

10.152 Hitachi does not currently offer a TEM for use with cryo-electron microscopy, and so has limited use for the filter. Hitachi did not submit any evidence or views that it would require supply of this product in the future.

10.153 [✂]. The Parties told us that they would be willing to [✂].[438]

10.154 In view of the above, we have limited evidence to indicate a material concern with the [✂]. However, given the importance of [✂], we do not exclude the potential for Thermo Fisher to foreclose its rivals in the supply of TEMs for cryo-electron microscopy applications in the future by [✂] or degrading the product offering to JEOL and Hitachi in some way.

Non-discrimination

10.155 The Supply Agreements contain obligations on [✂].

10.156 The Parties have submitted that [✂].[439] The Supply Agreements provide that:

(a) [✂]:

(i) [✂];

(ii) [✂];

(iii) [✂];

(iv) [✂];

(v) [✂];

(b) [✂].

10.157 The Parties have submitted that these terms not only protect the quality of the product being provided to JEOL and Hitachi, but also prevent Thermo Fisher 'slowing down' the development of the Gatan products being provided to JEOL and Hitachi in favour of its own Thermo Fisher (or FEI) branded products.

[438] [✂].
[439] [✂].

10.158 We have reservations about the extent to which these terms prevent Thermo Fisher adopting a partial foreclosure strategy.

10.159 It is difficult for the Supply Agreements to exclude all possible means by which Thermo Fisher could introduce 'soft biases' to disadvantage its rivals or skew the development, interoperability, software interfaces and related maintenance services to favour Thermo Fisher's TEMs over TEMs produced by other manufactures.

10.160 Thermo Fisher told us that the [✂] provisions agreed with JEOL (see paragraph 10.156 above) provide sufficient protection against such behaviour. However, we have concerns that such incremental changes could be difficult to detect or prove in a timely manner (as we discuss further in relation to enforceability of the Supply Agreements below).

10.161 Direct Electron provided an example of types of small changes that could be made to alter the interaction of a TEM and a peripheral. Direct Electron told us that Thermo Fisher had previously changed its software interfaces, which made an essential feature – controlling the shutter – inoperable from the camera software unless a software interface package was purchased from Thermo Fisher.[440]

10.162 Direct Electron also told us that an effective strategy for Thermo Fisher to disadvantage its rivals would be to 'go slow' on carrying out repairs to Gatan peripherals when fitted to a rivals TEM – this would mean that TEMs are not being as productive as they could be and a customer's funding could be put at risk as a result.[441]

10.163 Certain customers told us that an effective way to disadvantage rivals could be to slow down service times or deteriorate software compatibility. The National Nuclear Laboratory told us that minimising TEM downtime was vital, and that it would typically expect a repair to take about two days to fix.[442] Oxford University told us that it believed the Merged Entity could give preferential treatment to its own customers, and that therefore the maintenance and servicing of Gatan peripherals for non-Thermo Fisher customers could deteriorate. Oxford University also told us that the Proposed Merger could result in an increase in software incompatibilities between Gatan and non-Thermo Fisher software and that improvements to spectrometers

[440] Call with Direct Electron, 18 February 2019.
[441] Call with Direct Electron, 18 February 2019.
[442] Call with National Nuclear Laboratory, 4 February 2019.

(filters) could be limited to Thermo Fisher products, which would lock out other manufactures.[443]

10.164 Certain partial foreclosure mechanisms (e.g. slower service times for non-Thermo Fisher TEMs with Gatan peripherals) may not be the result of a deliberate strategy to foreclose rivals by Thermo Fisher but could nevertheless have a significant effect on rivalry. Whilst the Supply Agreements would prevent an outright 'slow down' of servicing provision, for example. It is conceivable that given the incentive to foreclose, an incremental strategy to disadvantage rivals over time could be implemented. As we note further below, such action may be difficult for rivals to detect.

10.165 In this regard, we also note that the JEOL Supply Agreement explicitly recognises that the [✂]. This may mean that there is limited (or less than there otherwise would have been) investment into service and product improvements to non-Thermo Fisher TEMs and as a result the product offering to other TEM suppliers will be worse.

10.166 Whilst such action could be implemented immediately after closing of the Proposed Merger in relation to current products, given the dynamic nature of the markets, minor disadvantages to Thermo Fisher's rivals could increase over time and, alone or in combination, have the effect of partial foreclosure. As innovation continues, we have concerns that Thermo Fisher's rivals may be disadvantaged due to Gatan's peripherals increasingly focusing on achieving effective integration with Thermo Fisher's TEMs (which is part of the rationale of the Proposed Merger) with less focus on integration with rivals' TEMs than would be the case in the counterfactual.

10.167 We consider such actions would likely involve a series of incremental changes over time and that these methods of foreclosure may not always be readily identifiable to market participants, or not identifiable before they begin to have an impact on Thermo Fisher's rivals. Such behaviour would be less likely to prompt any form of retaliation or cause significant damage to Thermo Fisher's business, but could, nonetheless, have a substantial impact on the ability of Thermo Fisher's rivals to compete. Even if the behaviour constituted a possible breach of the Supply Agreements, the lack of transparency would make timely enforcement difficult.

10.168 Further, Thermo Fisher may over time have an incentive to focus investment and research and development budgets on new products or upgrades which are only compatible, or which work best, with Thermo

[443] Call with Oxford University, 5 February 2019.

Fisher's TEMs, driving TEMs sales in the downstream market towards Thermo Fisher. This could be achieved, for example, by maintaining the Gatan brand and current investment levels ([✂]),[444] but nonetheless incorporating the Gatan technological advantages ([✂]) into the Thermo Fisher branded products and focus on significantly improving the Thermo Fisher brand as opposed to the Gatan brand. [✂].

10.169 The Parties told us that the Merged Entity would not have the incentive to discriminate in such a way because:

(a) any slowdown in the development of Gatan peripherals would harm Thermo Fisher [✂]; and

(b) notwithstanding the [✂], Thermo Fisher would itself suffer harm by not improving the Gatan products due to their market acceptance and the need [✂].[445]

10.170 However, we consider that once Thermo Fisher can freely use the Gatan technology in its own branded peripherals and achieve the integration benefits it seeks from the Proposed Merger, it is entirely possible that the market perception of Gatan peripherals could fall relative to the new Thermo Fisher products that are better integrated and easier to use. If so, the development of the Gatan products could conceivably lag the Thermo Fisher products and Thermo Fisher would not suffer the harm that it claims disincentivises such a strategy today.

10.171 As there are [✂] in the Supply Agreements for Thermo Fisher to [✂].

10.172 Our provisional view is therefore that the Supply Agreements do not sufficiently prevent the supply of new Gatan branded peripheral products and upgrades to JEOL and Hitachi being degraded over time relative to the products supplied to Thermo Fisher.

Compliance monitoring and enforceability

10.173 For the Supply Agreements to fully address a foreclosure concern, effective compliance monitoring and enforcement risk needs to be addressed. The threat of effective enforcement is important if the Supply Agreements are to constrain Thermo Fisher's incentive to foreclose its rivals.

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[444] [✂].
[445] Parties' response to Issues Statement, paragraph 5.12.

10.174 The JEOL Supply Agreement provides for [✂]:

(a) [✂];[446]

(b) [✂].[447]

10.175 [✂].[448]

10.176 We understand that the [✂].

10.177 JEOL has [✂].[449]

10.178 No equivalent provision is provided in the Hitachi Supply Agreement. The Parties told us that [✂].

10.179 Given our concerns about the effectiveness of the Supply Agreements to prevent a foreclosure strategy – and particularly the concern that foreclosure could be effected by a slow skewing of product development and service levels that could advantage Thermo Fisher – we are concerned about the lack of clarity around [✂]. In particular, we do not see [✂] as being sufficient to ensure compliance with the terms of the JEOL Supply Agreement.

10.180 We are also concerned about the enforceability of the Supply Agreements more generally as an effective tool to prevent Thermo Fisher adopting a foreclosure strategy.

10.181 The volume and complexity of the information is likely to be such that, [✂], the terms may go unenforced. For example, asymmetry in information between Thermo Fisher, [✂]and JEOL/Hitachi (e.g.in relation to internal costs and pricing, service level KPIs, technical product specifications, or interoperability issues) is likely to undermine the effective enforcement of the non-discrimination obligations.

10.182 Further, other than [✂]. There is therefore a risk that even if non-compliance is alleged, the costs and the long timescale required for challenge and enforcement through the courts or arbitration tribunals relative to a fast-moving market may mean that the Supply Agreements do not constitute a sufficient mechanism to constrain Thermo Fisher's incentive to foreclose.

10.183 Thermo Fisher submitted that it has a long history of supplying products to all purchasers (even where those purchasers compete in

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[446] [✂].
[447] [✂].
[448] [✂].
[449] [✂].

downstream markets) and that being seen to harm the businesses of JEOL and Hitachi would cause significant reputational damage amongst its own EM customers and across its broader business.

10.184 We accept that this may be the case in certain circumstances, however, this is no substitute for an effective enforcement mechanism and, as noted above, we consider that any partial foreclosure strategy is likely to be as result of small or hard to detect changes that are made incrementally over a period of time. In this context, a partial foreclosure strategy is likely to be more difficult for market participants to detect, and thus may limit or negate the impact of the disincentive flowing from reputational damage that Thermo Fisher faces.

10.185 Our provisional view is, therefore, that the compliance and enforcement mechanisms in the Supply Agreements are not sufficiently strong as to remove the ability of Thermo Fisher to pursue a foreclosure strategy. This is particularly so given the large incentive that we have identified for Thermo Fisher to pursue a foreclosure strategy.

The Supply Agreements may distort competition

10.186 We have considered the potential negative impacts of the Supply Agreements on the future competitiveness of the TEM market, primarily in relation to the effect on potential entry but also the effect that the pricing and other unequal terms may have on the competitiveness of JEOL and Hitachi.

- *Potential Entry*

10.187 The Supply Agreements have been concluded between Thermo Fisher and the only two other downstream suppliers of TEMs that currently rely on Gatan peripherals. The Supply Agreements therefore do not (and could not by their nature) extend to, or provide protection for, future potential customers of Gatan or future entrants to the TEM markets.

10.188 Nion has very limited market share in the TEM market and currently does not purchase products from Gatan but has submitted that it would like to do so in the long run and is concerned that Thermo Fisher would try to impose restrictions on the supply of components to suppliers such as itself.[450] There

[450] Nion submission to the CMA dated 3 April 2019.

is currently one known potential TEM entrant, Tescan.[451] The Parties told us that [✂]. [✂].[452]

10.189 We note that there is limited other evidence of future potential entrants or current suppliers that may require access to Gatan products in the future. However, given the importance of Gatan peripherals as part of a TEM system sale, not being able to obtain as beneficial supply terms as JEOL and Hitachi under the Supply Agreements would likely have the effect of deterring future entry or disadvantaging suppliers that require access to Gatan's peripherals in the future.

10.190 We also consider that, where potential entrants fear they would not able to source Gatan's peripherals at a price that is competitive with the prices obtained by JEOL and Hitachi under the Supply Agreements, market entry would be restricted.

10.191 Our provisional view is therefore that the Supply Agreements may be expected to have some distorting effect on the nature of competition in the supply of TEMs with regard to future demand for Gatan's products and potential entry.

- *Pricing*

10.192 As noted above, the Supply Agreements provide JEOL and Hitachi with [✂].

10.193 The [✂] in the JEOL Supply Agreement provide that [✂].[453] It is unclear how this clause is intended to operate, given that we understand that [✂] and, post-Proposed Merger, we understand that Thermo Fisher [✂].

10.194 In any event, we consider [✂] would likely have the effect of creating a price floor for Gatan products below which JEOL or Hitachi will not be able to obtain cheaper product regardless of volume or other price movements.

10.195 It would of course be open to JEOL and Hitachi to seek to re-negotiate the price of the product being supplied under the Supply Agreements themselves. However, given the large incentive that we have identified for Thermo Fisher to foreclose its rivals, and the degree of market power that Gatan has in relation to these products, our view is that reliance on successful

[451] Thermo Fisher response to Phase 1 Issues Letter, paragraphs 7.4–7.5.
[452] [✂].
[453] [✂].

re-negotiation is not a sufficiently certain protection against the foreclosure risk.

10.196 We consider that over time the pricing agreed under the terms of the Supply Agreements would likely put Thermo Fisher's rivals at a competitive disadvantage and have the effect of distorting pricing in the market. For example, [✂].[454] If this was to happen, it is likely that Hitachi and Hitachi's TEM customers' demand for DD cameras (required for cryo-electron microscopy applications) from the likes of Gatan would increase significantly compared to historic levels.

10.197 There are no mechanisms in the Supply Agreements to [✂].

- *Unequal supply terms*

10.198 Finally, [✂].[455]

10.199 Commercial negotiations will invariably reflect, to some degree, the relative bargaining power of the counter-parties. For the purposes of assessing the extent to which the Supply Agreements address our provisional concerns in respect of foreclosure, we place less weight on the fact that differences in these agreements are the product of commercial negotiations. We do not therefore consider it necessary to assess each agreement to compare the exact terms.

Conclusion on the Supply Agreements

10.200 Our provisional conclusion is that the Supply Agreements are not sufficient to fully address the concern that the Merged Entity will have the ability and incentive to pursue a foreclosure strategy with regard to its rivals in the supply of TEMs.

10.201 Whereas the Supply Agreements provide a level of certainty over the supply terms of current Gatan products, there is much more uncertainty around the supply and terms of supply of new products.

10.202 Moreover, we are concerned that in a dynamic and fast-moving sector, 'soft biases' or minor developments and practices could be adopted by Thermo Fisher that, alone or in combination, could easily skew Gatan's products (current and future) towards the TEM business of Thermo Fisher to the disadvantage of its rivals. We consider that such actions are likely to take

[454] Parties' rebuttal to Horizontal Working Paper, paragraph 2.16.
[455] Parties' response to Phase 1 CMA RFI 4.

place over a period of time; however, certain biases or actions (e.g. slower servicing, provision of software updates) could take place immediately after closing of the Proposed Merger.

10.203 We have concerns that the Merged Entity could take actions which would be difficult to detect at all, or in time to avoid adverse consequences, and that attempting to enforce the Supply Agreements to counter this behaviour would be difficult and take a long time, particularly as they contain no clear dispute resolution mechanism. In the context where the Merged Entity has an incentive to foreclose its rivals, we consider that it may have greater incentive to take such action in order to disadvantage rivals, particularly in light of the absence of a certain and timely enforcement mechanism.

10.204 Finally, we consider that there are inherent limits in bilateral contractual arrangements between parties being capable of fully addressing foreclosure concerns. Such arrangements address bilateral concerns, not competition concerns across the relevant market. In addition, any bilateral agreement is potentially subject to termination, re-negotiation, or interpretation as to the scope of its terms and is to some degree a result of the relative negotiating strength, and wider commercial incentives, of each party. Moreover, a party may choose to waive its right to enforce a breach of contract.

Conclusions on vertical effects

10.205 The evidence provided to us indicates that the Merged Entity would have the ability and incentive to foreclose its rival TEM suppliers which is likely to cause significant harm to competition in the supply of TEMs.

10.206 The Supply Agreements are not sufficiently certain, robust or enforceable so as to fully address these concerns.

10.207 In addition, we are currently unconvinced by the Parties' submission that foreclosure would result in reactionary competing entry/expansion which would remove the Merged Entity's incentive to foreclose. Our provisional view is that foreclosure is likely to deliver significant benefits to the Merged Entity.

10.208 We have therefore provisionally concluded that, subject to the assessment of all countervailing factors (see chapters 12 and 13), the Proposed Merger may be expected to result in a substantial lessening of competition as a result of vertical effects arising from foreclosure in the markets for the supply of respectively filters, DD cameras and GI cameras to TEM suppliers for sale in the UK.

11. Vertical effects – Information sharing

Information sharing

11.1 In addition to our assessment of vertical foreclosure effects, we have considered potential vertical effects related to the sharing of commercially sensitive information (CSI) with Thermo Fisher.[456]

11.2 Under this theory of harm, a concern would arise if Thermo Fisher's integration with an upstream supplier (Gatan) would enable it to gain access to CSI about the activities of its rivals in the supply of TEMs.

11.3 Access to CSI could be used by Thermo Fisher to compete less aggressively in the supply of TEMs (including TEMs with peripherals) or otherwise put its rivals at a competitive disadvantage in the downstream supply of TEMs,[457] for example, by one or more of the following:

(a) submitting a more competitive bid, in price terms, than Thermo Fisher's rivals' bids but less competitive than Thermo Fisher otherwise would have done;

(b) bidding with a product specification that is only marginally better than Thermo Fisher's rivals and somewhat lower than Thermo Fisher otherwise would have bid;

(c) producing less innovative products that are only marginally better than Thermo Fisher's rivals' products and somewhat lower than Thermo Fisher otherwise would have been.

11.4 In order for this theory of harm to manifest itself:

(a) the upstream supplier (Gatan) needs to possess CSI about the activities of the downstream TEM suppliers (JEOL and Hitachi);

(b) Thermo Fisher would not have access to the CSI absent the Proposed Merger; and

(c) Thermo Fisher would be able to access the CSI after the Proposed Merger and such access must enable it to compete less aggressively

[456] For the purposes of the analysis of the information sharing issue, in this chapter we refer to Thermo Fisher (rather than the Merged Entity) in the post-Proposed Merger scenario because prior to and after the Proposed Merger Gatan has and will have access to the CSI in question.
[457] Merger Assessment Guidelines, paragraph 5.6.13, Commercially sensitive information paragraph.

and/or otherwise put its TEM rivals at a competitive disadvantage (see the examples (a) to (c) in the preceding paragraph);

(d) Thermo Fisher would have the incentive to use the CSI to compete less aggressively and/or otherwise put its TEM rivals at a competitive disadvantage (see the examples (a) to (c) in the preceding paragraph).

11.5 We are concerned that, after the Proposed Merger and in the absence of the Supply Agreements, Thermo Fisher would have access to two types of CSI concerning rival TEM suppliers:

(a) CSI related to sales and bids; and

(b) CSI related to technical product specification and product innovation plans.

11.6 We have undertaken qualitative analysis to understand whether, before the Proposed Merger, Gatan had (and Thermo Fisher did not have) access to CSI of TEM suppliers and whether, after the Proposed Merger, Thermo Fisher would be able to access this information through its ownership of Gatan.

11.7 We have considered whether access by Thermo Fisher to such CSI would enable it to compete less aggressively in the supply of TEMs and/or otherwise to put its TEM rivals at a competitive disadvantage.

11.8 We have taken into account evidence from the Parties, third-party competitors in the supply of TEMs and TEM peripherals, and the Parties' customers.

11.9 We have provisionally found (in chapter 10) that Thermo Fisher would have a large incentive to foreclose. In our view, the same considerations apply in respect of its access to CSI. Therefore, our provisional view is that Thermo Fisher would have a large incentive to use CSI to compete less aggressively in the supply of TEMs and/or otherwise to put its TEM rivals at a competitive disadvantage and thereby harm competition. This chapter thus focuses on the elements of our theory of harm set out in paragraph 11.4(a) to 11.4(c).

Commercially sensitive information related to sales and bids

Theory of Harm

11.10 Gatan currently supplies peripherals to all TEM suppliers. When a TEM supplier bids for a tender issued by a customer, it will often approach Gatan (or an alternative peripheral supplier) and provide details to Gatan about the tender. Information received will often include the TEM model that is being proposed in the tender response, the customer's details, the customer's

specifications and the end-use application. As a natural consequence of the contact, Gatan will know that a TEM supplier is in negotiation with a customer for the supply of a TEM and/or that the supplier intends to respond to a customer's tender with a bid.

11.11 CSI in relation to sales and bids will include pricing (including the pricing of the TEM) and the TEM and peripheral model being offered. Knowledge of the TEM and peripheral model being offered by its rivals could allow Thermo Fisher to prepare a weaker competitive response (given that it has certainty about what it has to compete against) than would be the case absent the Proposed Merger.

11.12 There will be some tenders that are not public, and, for such tenders, information, including the customer and the budget, are more likely to be CSI. If Thermo Fisher was able to access this information in advance it could prepare a weaker competitive response (given that it would know the budget) than would be the case absent the Proposed Merger.

11.13 After the Proposed Merger, if Thermo Fisher can access CSI related to sales and bids it may be able to use the information to weaken competition in one or more of the following ways:

(a) by deducing the total price that its rivals are likely to be submitting, based on the combination of the TEM model and peripherals that have been discussed with Gatan ahead of bid submission. This could allow Thermo Fisher to alter its bid accordingly, e.g. by submitting a more competitive bid than its rivals but less competitive than Thermo Fisher otherwise would have done;

(b) by bidding with a product specification that is only marginally better than its rivals and somewhat lower than it otherwise would have offered;

(c) by altering its bid behaviour based on the knowledge, or increased certainty, of the number and identity of rival bid participants and products in a given tender.

11.14 Even if Thermo Fisher does not have access to CSI related to sales and bids, it may, at the very least, obtain knowledge (which it would not otherwise have absent the Proposed Merger) of which of its rivals are bidding for a given tender and this could enable it to learn about its rivals' behaviour and structure its own bidding behaviour accordingly.

The Parties' submissions and evidence

11.15 The Parties told us that, after the Proposed Merger, JEOL and Hitachi will continue to be able to withhold most, or all, of their CSI from Gatan. They stated that there will be no need in most cases for JEOL and Hitachi to disclose information to Gatan relating to their TEM system pricing or bidding behaviour.[458]

11.16 Gatan said that it was generally not involved in tender processes.[459] Gatan told us [✂].[460]

11.17 Thermo Fisher told us that it will typically only provide the peripheral supplier with:

(a) [✂]; and

(b) [✂].[461]

11.18 Thermo Fisher said that it [✂].[462] Thermo Fisher told us that it generally does not provide peripheral suppliers with an [✂]. However, [✂]. In such cases, Thermo Fisher will share more detailed information.[463]

11.19 The Parties also told us that Thermo Fisher is likely to already know which of its rivals are bidding for a given tender. This is due to the limited number of TEM suppliers, the prevalence of public bids and that information regarding who is bidding for a given tender is usually publicly available depending on the end customer and the country of purchase. Therefore, access to such information after the Proposed Merger would not grant an advantage to Thermo Fisher or disadvantage its rivals.[464]

11.20 In any event, the Parties submitted that, after the Proposed Merger, information provided to Gatan will be strictly protected under the terms of the Supply Agreements entered between Thermo Fisher and each of JEOL and Hitachi. We consider the Supply Agreements further below.

11.21 Internal documents provided to us by Roper indicate that Gatan sometimes has access to [✂] high level and often generic [✂] information [✂] from potential end-user customers and the TEM manufacturers; it does not amount

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[458] Response to Issues Statement, section 9.
[459] Response to Q27 of Gatan's Market Questionnaire, 4 February 2019.
[460] [✂].
[461] Response to Q37 of Thermo Fisher's Market Questionnaire, 3 February 2019.
[462] Response to Q37 of Thermo Fisher's Market Questionnaire, 3 February 2019.
[463] Response to Q8 of Thermo Fisher's RFI response, 4 March 2019.
[464] Parties' response to working papers on vertical effects and information sharing, 1 April 2019.

to CSI, being outside the scope of any confidentiality agreements between the end-user and the TEM manufacturer. Roper submitted a large volume of internal sales tracking and customer relationship monitoring documents.[465] Evidence in these documents includes:

(a) [✂];[466]

(b) [✂];[467]

(c) [✂];[468]

(d) [✂];[469]

(e) [✂],[470] *and*

(f) [✂].[471]

11.22 The above quotes indicate that Gatan, on occasions, acquires CSI related to sales and bids of TEM suppliers. Access to this information would allow Thermo Fisher to put its TEM rivals at a competitive disadvantage and thereby harm competition.

Third-party submissions and evidence

11.23 Third-parties submitted varied evidence on the level and sensitivity of information that is available to peripheral suppliers.

11.24 Third-parties told us that the extent of information regarding the tender that the peripherals supplier will have access to will vary from sale-to-sale. Several third-party rivals in the supply of TEMs and TEM peripherals supported the Parties' submission that peripheral suppliers such as Gatan are unlikely to have detailed information on the end price of the TEM system or the peripherals being offered to the customer.[472]

11.25 In other cases, where a customer has specific requirements and a more bespoke end-use, Gatan is more likely to be involved and work closely with the TEM supplier to develop an appropriate package and therefore it will tend to know a lot more about the tender such as (i) the model of TEM, (ii)

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[465] [✂].
[466] [✂]
[467] [✂]
[468] [✂].
[469] [✂].
[470] [✂].
[471] [✂].
[472] Call Summaries, Direct Electron, 18 February 2019, and Company C, 27 February 2019.

customer specific requirements, and (iii) the customer's budget. Several third-parties supported this:

(a) Direct Electron told us that they were often provided with information about the tender, including the model of TEM that the TEM supplier is intending to include in the tender and the identity of the purchaser. However, Direct Electron would not be aware of the price that the TEM supplier provides for the final package;[473]

(b) Company C told us that the peripheral supplier would be told the customer specification requirement, the TEM model being submitted in the tender and the peripheral price but would not know the final price of the TEM package;[474]

(c) Company D told us that in some cases they do marketing activity with Gatan during the early stages of negotiation. Gatan would be aware of what TEM model would be sold. In many cases, Gatan would not know the final bidding price in the industry area (but would know this in the government sector), but in rare cases they might end up knowing the price even in the industry area;[475]

(d) EMSIS told us that it would know what TEM was being offered to the customer and what the customer's required specification was. EMSIS also noted that there was always a negotiation between the peripheral supplier and the TEM supplier, so some level of information sharing was involved, and it was unlikely that a TEM supplier would want to do this with a direct competitor;[476]

11.26 In cases where the TEM model being offered is shared with the peripheral supplier for the purpose of developing the most appropriate package it is likely that this information would still need to be shared post the Proposed Merger to ensure the competitiveness of the package offered. If the Merged Entity's rivals withheld this information going forward, they might only be able to offer less competitive packages resulting in reduced competition.

11.27 Customers also provided evidence that they sometimes have direct contact with peripheral suppliers. One customer also told us that it was a tool available to a procurement professional to have discussions with the TEM

[473] Call Summary, Direct Electron, 18 February 2019.
[474] Call Summary, Company C, 27 February 2019.
[475] Call Summary, Company D, 4 March 2019.
[476] Call Summary, EMSIS, 20 February 2019.

suppliers and/or the peripheral suppliers before the formal tender is issued, to scope the specification for the tender.[477]

Conclusion on CSI related to sales and bids

11.28 Evidence from the Parties, third-party competitors and customers indicates that the degree and type of information that a peripheral supplier will have access to varies and is often determined by the type of tender.

11.29 In a tender where a standard peripheral is requested, peripheral suppliers do not generally have access to CSI related to sales and bids and so our view is that the severity of the consequences of the access to this information by Thermo Fisher would be limited.

11.30 In cases where there are more bespoke or unique tender requirements, Gatan has greater access to CSI related to sales and bids. Our view is that, in these cases, access by Thermo Fisher to this information would allow it to unilaterally compete less aggressively in bids and/or otherwise put its rivals at a competitive disadvantage. For example, knowledge of the TEM and peripheral model being offered by its rivals would allow Thermo Fisher to prepare a competitive response which is worse than it would have been absent the Proposed Merger.

11.31 In all cases where a Gatan peripheral is required as part of the tender, Gatan will know a TEM supplier has the intention of submitting a bid. Our view is that access by Thermo Fisher to such information through Gatan would not provide it with an advantage as it is usually publicly available in any event.

11.32 However, in some of these cases Gatan will also know the TEM model that is being offered to a customer. Our view is that access by Thermo Fisher to such information would allow it to bid less aggressively against its rivals and/or behave in a way that could otherwise disadvantage a rival compared to the situation absent the Proposed Merger.

11.33 Further, evidence in Gatan's [✂] documents highlighted above indicates that [✂]. Additionally, there is evidence that occasionally a TEM supplier [✂].[478] This indicates that Gatan will sometimes have awareness of TEM rivals pricing intentions. It is not clear from the evidence that Gatan's access to such CSI related to sales and bids only relates where customers have bespoke requirements.

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[477] Call Summary, University of Leicester, 28 February 2019.
[478] The internal documents [✂].

11.34 Based on the evidence provided to us to date, our provisional view is that:

(a) Gatan often possesses CSI related to sales and bids of its TEM rivals. Whilst the type, and extent, of information received by Gatan varies by tender (e.g. it receives more detailed information where a customer's requirements are more bespoke), there is evidence that in some tenders where a Gatan peripheral is required Gatan will at least have knowledge of the TEM supplier's bidding intention;

(b) Thermo Fisher would not have access to some of this information absent the Proposed Merger;

(c) access to such information would enable Thermo Fisher to compete less aggressively and/or otherwise put its TEM rivals at a competitive disadvantage; and

(d) given that we have provisionally found that the Merged Entity would have a large incentive to foreclose in chapter 10, the access to CSI related to sales and bids would provide further scope for it to disadvantage its competitors and harm competition.

11.35 Our provisional conclusion is therefore that, access by Thermo Fisher to CSI related to sales and bids after the Proposed Merger, would enable it to bid less aggressively against its rivals and/or otherwise put its TEM rivals at a competitive disadvantage compared to the situation absent the Proposed Merger.

Commercially sensitive information related to technical product specification and product innovation plans

Theory of harm

11.36 Currently Gatan must work closely with TEM suppliers to ensure compatibility of its peripherals with various TEMs. As part of this process, the TEM suppliers provide Gatan with [✂]. Gatan also often receives [✂].[479]

11.37 If Thermo Fisher were to gain access to this type of information following the Proposed Merger, we have assessed whether it would be possible for Thermo Fisher to worsen competition in the following ways:

(a) Thermo Fisher using the CSI related to pipeline product innovation plans to respond more rapidly with its own product improvements to counter a

[479] [✂].

rival's moves. This may be expected to reduce competition as the rival's incentive to innovate would be reduced as its first mover advantage is lost or deteriorated. The effect could be particularly acute if JEOL and Hitachi have concerns that their CSI is accessible by Thermo Fisher; and/or

(b) Thermo Fisher offering less competitive and innovative products as it is more informed about a rival's products and need be only marginally better than these products. This may be expected to lead to lower quality products being produced than would otherwise have been the case absent the Proposed Merger.

The Parties' submissions

11.38 The Parties submitted that technical and product information is shared between TEM suppliers and the peripheral supplier to enable the peripheral product to be 'embedded' in the TEM system.[480] Thermo Fisher uses the term "embedded" to refer to a peripheral that is mounted, functional and tested on a Thermo Fisher TEM but not fully integrated.

11.39 Gatan told us that TEM suppliers will only proactively share information with Gatan if they believe their customers will want to purchase Gatan peripherals.[481] Information is shared to ensure that Gatan peripherals will be compatible with the TEM. In such instances, Gatan told us that TEM suppliers will typically provide them with:

(a) [✂];

(b) [✂];

(c) [✂]; and

(d) [✂].

11.40 In relation to pipeline products, where a TEM supplier wants to ensure compatibility with a peripheral, Gatan would typically receive information [✂].[482]

11.41 Thermo Fisher supported this and told us that it will share the basic technical information with any relevant peripheral suppliers, most commonly:[483]

[480] See response to Q9 of Thermo Fisher's RFI response, 4 March 2019.
[481] [✂].
[482] See response to Q8 of Gatan's RFI response, 4 March 2019.
[483] See response to Q9 of Thermo Fisher's RFI response, 4 March 2019.

(a) [✂];

(b) [✂]; and

(c) [✂].

11.42 This level of information is adequate to embed a peripheral into its TEM system but not detailed enough to fully integrate it which would enable the peripheral to operate seamlessly as part of the TEM system.[484] [✂].[485]

Third-party submissions

11.43 Third-parties submitted mixed evidence on the level and sensitivity of technical product specification information that is available to peripheral suppliers.

11.44 Company D told us that it has historically shared confidential information with Gatan to facilitate sales and product collaboration, including:[486]

(a) [✂];

(b) [✂];

(c) [✂]; and

(d) [✂].

11.45 [✂].[487]

11.46 Company C told us that there are three main types of information that are required, and that it has previously shared, with camera and filter suppliers for their equipment to fully integrate with Company C's TEMs. These are:[488]

(a) Information (communication) protocol;

(b) Mechanical drawings; and

(c) Electronical specification.

11.47 [✂], Company C also told us that to ensure compatibility, new product specifications will be shared with the camera/filter supplier between 6–12

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[484] See response to Q9 of Thermo Fisher's RFI response, 4 March 2019.
[485] [✂].
[486] [✂].
[487] See response to Q15 of Company D's competitor questionnaire, [✂].
[488] Call Summary, Company C, 27 February 2019.

months prior to a new product becoming public knowledge. Source code or application programming interface (API) information are also sometimes required to integrate the system into the TEM.[489]

11.48 [✂] have expressed concern about their confidential information being accessed by Thermo Fisher following the Proposed Merger. [✂] noted that this was the reason for including [✂].

11.49 Other third-parties, including other suppliers of TEM peripherals told us that the information that peripheral suppliers need to physically integrate their cameras with TEMs is somewhat "public" but could be changed by manufacturers at any time. For example:

(a) Direct Electron told us that in general they have not experienced any issues with physically interfacing their systems with the TEM suppliers' systems as not a huge amount of software information is required for operation of the camera and suppliers hardware has become 'standardised' around the Gatan interface;[490]

(b) EMSIS told us the most important technical information that is required was the geometry of the TEM that the peripheral was to be fitted to and the information is somewhat public;[491]

11.50 Some customers were concerned that, following the Proposed Merger, if CSI reached Thermo Fisher through Gatan, that would prevent Thermo Fisher's rivals collaborating as closely with Gatan in the future and that therefore the compatibility of Gatan peripherals with non-Thermo Fisher TEMs may suffer. For example:

(c) National Nuclear Laboratory told us that, even if Thermo Fisher did agree to supply JEOL, there would be some important questions around IP and information exchange required to ensure that Gatan filters are compatible with JEOL and Hitachi TEMs. JEOL and Hitachi may not be willing to share this.[492]

(d) Glasgow university indicated that there would be a concern over whether JEOL would trust Gatan not to leak competitor information and that the technical data Gatan would need from JEOL could be a competitive advantage.[493]

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[489] Call Summary, Company C, 27 February 2019.
[490] Direct Electron call summary, 18 February 2019.
[491] EMSIS call summary, 20 February 2019.
[492] National Nuclear Laboratory call summary, 4 February 2019.
[493] Glasgow university call summary, 11 February 2019.

Conclusion on CSI related to technical product specification and product innovation plans

11.51 Evidence from [✂], as well as third-party calls, shows that, to ensure the compatibility of peripherals with new TEMs, TEM suppliers must share CSI related to technical product specification and product innovation with the peripheral supplier. The Parties have provided supporting evidence that technical product information and product innovation plans is shared, however they do not regard it as commercially sensitive.

11.52 We have been provided with evidence that, in some cases, such information is shared with the TEM peripheral supplier up to one year before the TEM product is made public.[494] It is also conceivable that potential new entrants will need to discuss the supply of peripherals with the Merged Entity prior to entering the market, thereby allowing the Thermo Fisher to potentially prepare its competitive response.

11.53 Evidence from [✂], as well as third-party calls, shows that it is unlikely that rivals of Thermo Fisher such as JEOL and Hitachi would be able to withhold CSI related to technical product specification and product innovation from Gatan after the Proposed Merger if:

(a) they want to continue producing high quality products; and

(b) they have no other alternatives of peripheral supplier.

11.54 Based on the evidence provided to us to date, our provisional view is that:

(a) Gatan will often possess CSI related to technical information about the products of TEM suppliers. There is uncertainty over the sensitivity of such information and the extent to which it is already public; however, [✂] told us that it was concerned about CSI being accessed by Thermo Fisher after the Proposed Merger and some customers also expressed a concern that the fear of CSI being passed to Thermo Fisher could dampen future collaboration efforts between JEOL/Hitachi and Gatan;

(b) Gatan will sometimes receive CSI related to TEM suppliers' pipeline product innovation plans that would not usually be available to Thermo Fisher or its rivals, [✂]; and

(c) access to CSI related to TEM suppliers' product innovation plans would enable Thermo Fisher to compete less aggressively in the market. For example, Thermo Fisher could produce less competitive or innovative

[494] Call Summary, Company C, 27 February 2019. [✂].

products where its products are already surpassing its rivals or it could respond more rapidly with its own product developments and thus remove a rival's first mover advantage. This may be expected to lead to a loss of competition where, anticipating this, a rival's ability or incentives to innovate are reduced where they cooperate less with Gatan on future innovations to prevent the risk of information sharing.

(d) given that we found that the Merged Entity would have a large incentive to foreclose in chapter 10, the access to CSI would provide further scope for it to disadvantage its competitors and harm competition.

11.55 Our provisional conclusion is therefore that, access by Thermo Fisher to CSI related to technical product specification information and product innovation plans after the Proposed Merger, would enable it to compete less aggressively against its rivals and/or otherwise put its TEM rivals at a competitive disadvantage compared to the situation absent the Proposed Merger.

The Supply Agreements

11.56 The Parties submitted that, even if Gatan had access to CSI of JEOL or Hitachi, the Supply Agreements with JEOL and Hitachi contain contractual safeguards to ensure that any confidential information received by Gatan is protected and cannot be used by Thermo Fisher in a way that could harm competition.[495]

11.57 We have assessed the Supply Agreements to determine whether they fully address Thermo Fisher's ability to gain access to the CSI of its downstream rivals.

11.58 The Parties have submitted that the Supply Agreements are the outcome of a negotiation between sophisticated commercial parties that were advised by external legal counsel throughout the process. The Parties told us that [✂].

11.59 We note that the outcome of a negotiation is likely to be affected by the bargaining power held by each of the parties involved. Moreover, where input foreclosure concerns have been raised (which implies that the party raising them has limited alternative supply options), one cannot readily conclude that a negotiated outcome ensures continued access to an input on appropriate terms. We note further that [✂].

[495] The Parties' response to the Issues Statement, section 9.

The JEOL Supply Agreement

11.60 The JEOL Supply Agreement contains [✂].[496] [✂].[497] [✂].

11.61 [✂].[498] [✂].[499]

11.62 We set out the terms of the confidentiality provisions in the JEOL Supply Agreement in Appendix D.

11.63 The Parties have submitted that any potential concern over the CSI of JEOL being used to lessen competition in the supply of TEMs is prevented by the terms of the JEOL Supply Agreement detailed above.

11.64 In addition, the Parties have noted that the provision for [✂].[500]

11.65 [✂].

11.66 [✂].

11.67 We have seen the draft JEOL Supply Agreement exchanged between Thermo Fisher and JEOL during the negotiation period and provided to us by Thermo Fisher during our investigation. The draft shows that JEOL had [✂].[501] The final agreement however [✂]. JEOL has told us [✂].[502]

The Hitachi Supply Agreement

11.68 The Hitachi Supply Agreement contains [✂].[503]

11.69 [✂].[504]

11.70 The confidentiality provisions in the Hitachi agreement are in Appendix E.

11.71 [✂].[505]

Assessment of the Supply Agreements

11.72 We have assessed whether the Supply Agreements fully address the concern identified above that Thermo Fisher will have the ability and incentive to use

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[496] [✂].
[497] [✂].
[498] [✂].
[499] [✂].
[500] The Parties response to the Issues Statement, and [✂].
[501] [✂].
[502] [✂].
[503] [✂].
[504] [✂].
[505] [✂].

the CSI of its rival TEM suppliers to compete less aggressively and/or otherwise put its TEM rivals at a competitive disadvantage after the Proposed Merger.

11.73 We note that contractual arrangements are, in general, unlikely to completely remove the ability of Gatan to share CSI of Thermo Fisher's TEM supplier rivals with Thermo Fisher. Contractual arrangements can be renegotiated or terminated over time (and even where this could only be done with bilateral consent, the bargaining power held by each of the parties and wider commercial considerations could, as noted above, have a bearing on their incentives to agree to such changes). Moreover, a party may choose to waive its right to enforce a breach. Accordingly, without raising any questions about Thermo Fisher's intention to comply with the Supply Agreements (which we have no reason to doubt), we consider that as a matter of principle, and in practice, such contractual arrangements would not serve to remove information sharing concerns.

11.74 We have, nevertheless, considered the specific terms of the Supply Agreements. The evidence provided to us regarding the development of the contractual negotiations between Thermo Fisher and JEOL indicates that [✂].

11.75 This resulted in the inclusion of [✂] in the case of JEOL to provide [✂] in the case of [✂]. In neither case is the term defined in the Supply Agreement in question.

11.76 During the investigation, Thermo Fisher told us that, despite this concern, mechanisms were indeed ready to be put in place to ensure that CSI would not be shared between Gatan and Thermo Fisher. Thermo Fisher told us [✂].[506]

11.77 However, these forms of detailed protection mechanisms are not provided for in the Supply Agreements and we have no certainty or clarity around the robustness of such mechanisms.

11.78 We note that the confidentiality provisions are time limited – [✂].

11.79 We also note that the provision for a [✂].

11.80 Moreover, the disclosure of such information to Thermo Fisher may be difficult to detect or prove by JEOL or Hitachi themselves. Even if detection were possible, the Supply Agreements do not provide a clear mechanism by which the confidentiality provisions are to be enforced (e.g. what would happen and

[506] [✂].

what actions would be taken if confidential information were to flow to Thermo Fisher). Enforcement would fall to contract law which may not provide a sufficiently timely mechanism for redress, let alone a sufficient mechanism to prevent harm to competition.

Conclusions on the Supply Agreements

11.81 Our provisional conclusion is that the Supply Agreements are not sufficiently certain, robust or enforceable so as to address our concern that Thermo Fisher can gain access to the CSI of its rival TEM suppliers and that it will have the incentive to use this information to compete less aggressively in the supply of TEMs and/or otherwise to put its TEM rivals at a competitive disadvantage thereby harming competition.

Conclusions on vertical effects – Information sharing

11.82 We have provisionally concluded that, subject to the assessment of countervailing factors (see chapters 12 and 13), the Proposed Merger may be expected to result in a substantial lessening of competition due to vertical competition concerns with regard to information sharing, in the markets for respectively the supply of GI cameras, DD cameras and filters to TEM suppliers for sale in the UK.

12. Countervailing Factors: entry and expansion

12.1 Any analysis of a potential SLC requires consideration of the competitive responses of others to the Proposed Merger. In assessing whether entry or expansion might prevent an SLC arising from the Proposed Merger, we have considered whether such entry or expansion would be timely, likely and sufficient.[507] Where entry barriers are low, the merged firm is more likely to be constrained by entry; conversely, this is less likely where barriers are high.[508]

12.2 Our assessment is based on the views and evidence submitted by the Parties, internal documents and evidence from third parties.

Barriers to entry and expansion for the provision of TEMs

12.3 Thermo Fisher submitted[509] that there are three main manufacturers of TEMs globally (Thermo Fisher, JEOL, Hitachi) and to some extent Nion.[510]

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[507] Merger Assessment Guidelines, paragraph 5.8.3.
[508] Merger Assessment Guidelines, paragraph 5.8.4.
[509] Thermo Fisher Response to Market Questionnaire paragraph 48.1
[510] Thermo Fisher submit that Nion's TEM is not a conventional TEM.

According to Thermo Fisher apart from Nion, these are long established companies.

12.4 Thermo Fisher told us that in order 'to develop a TEM, a company would need:

(a) Access to electron microscopy optics know-how.

(b) To devote considerable financial resources and time.

(c) To establish market acceptance for its products given the expense and complexity of the instruments (e.g. by demonstrating performance and unique or new capabilities).

(d) To establish a high-quality servicing organisation before ramping up manufacturing in a controlled way.'

12.5 Company D submitted that entry into the TEM market would cost, '[✂]'.[511]

12.6 Thermo Fisher's internal documents[512] highlight key characteristics of the global market for electron microscopes. According to Thermo Fisher the market is

(a) [✂]; and

(b) [✂].

12.7 Thermo Fisher's internal documents[513] indicate that the market for electron microscopes is [✂]. This view is supported by evidence from Direct Electron who draw reference to the importance of an integrated system.[514]

12.8 [✂]. [✂].[515]

12.9 Company C told us its strategic plan for the next five years is to expand its TEM business.[516] We have not been provided with evidence to indicate that such expansion would be a sufficient constraint on the Merged Entity.

12.10 We have no evidence of any other new entrants into the TEM market or expansion plans by existing suppliers.

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[511] [✂].
[512] [✂]
[513] Thermo Fisher: Project Pasteur, Management Presentation, 13 Feb 2018, Page 11
[514] Call Summary, Direct Electron, 18 February 2019
[515] [✂].
[516] Call Summary Company C, 27 Feb 2019, Paragraph 9

12.11 Based on the evidence as outlined above, our view is that barriers to entry within the TEM market are high, and the incentives for new entry are low.

12.12 Barriers are likely to become even higher without access to competitive and integrated peripherals and software. We note that, even if new entrants were able to enter the TEM market, their ability to pose a sufficient constraint on the Merged Entity largely depends on access and integration of peripherals and software. Similarly, expansion by existing suppliers would also largely depend on access and integration of peripherals.

12.13 We provisionally conclude that entry or expansion in the TEM market would not be timely, likely and sufficient to prevent the SLCs we have provisionally found.

Barriers to entry and expansion for the provision of DD Cameras

Parties' submissions

12.14 Thermo Fisher told us that, to produce a camera, companies need to have either the internal know-how, or access to sensor design scintillators, fibre optics or optical lenses and high-speed design. It said that all TEM manufacturers are likely to have these attributes and that third-party suppliers are available to supply components related to these activities. It told us that time and entry costs are low.[517]

12.15 Roper submitted that an entrant into the supply of DD cameras would require the following, all of which are available from third parties:[518]

(a) [✂];

(b) [✂]; and

(c) [✂].

12.16 The Parties' told us that, based on their experience, it would [✂] of investment for a new entrant to develop a DD camera.[519]

[517] Thermo Fisher: Response to Market Questionnaire paragraph 48.2.
[518] Roper response to Market Questionnaire, paragraph 45.3
[519] Parties response to Issues Statement, 19 Feb 2019, Table 6.1

Third party views

12.17 We explored entry plans and time and cost estimates for DD cameras with several suppliers of TEMs and TEM peripherals.

12.18 [✂].[520]

12.19 [✂].'[521] [✂].[522]

12.20 Company D told us the idea of financing a new entrant camera manufacturer was a good one in principle [✂].[523]

12.21 [✂].[524]

12.22 Company C told us that it could not estimate the time it would take to develop a DD camera and it did not currently have the expertise and capability to do so.[525]

12.23 Direct Electron (a supplier of DD cameras) told us that it took many years and investment of several million pounds to develop its DD cameras. The development of a new DD camera takes about 4 years. Direct Electron told us that it is very difficult to attack an entrenched incumbent and to enter the market as a new entrant.[526]

12.24 Direct Electron also told us that even though it was the first to establish the DD camera technology, its experience of entering the market has been difficult. There is now so much integration required with the electron microscope manufacturers (in terms of software, servicing and applications) that it is difficult to be a successful new entrant. This is because the camera technology is becoming less important, and what matters is the level of software integration and automation, which is very difficult to achieve without access to the TEMs and support from TEM manufacturers.[527]

12.25 Direct Electron told us it is looking to further develop its range of cameras and is researching [✂]. It has two new cameras in advanced development. One is

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[520] [✂].
[521] [✂].
[522] [✂].
[523] [✂].
[524] [✂].
[525] Call Summary, Company C, 27 Feb 2019
[526] Call Summary, Direct Electron, 18 February 2019
[527] Call Summary, Direct Electron, 18 February 2019.

due to enter the [✂] market [✂] shortly and the second by the end of the year. [528]

12.26 Direct Electron also told us it is reluctant to commit significant resources to R&D in the light of the Proposed Merger, and that the Proposed Merger may result in Direct Electron having to seek strategic alternatives.[529]

12.27 TVIPS (a supplier of GI cameras) estimated that it would take three to four years for it to develop a camera that could compete with the Gatan K3 and cost around $4m. TVIPS told us that, to compete in the DD camera field, it would need to offer something really new and that this is very challenging for a small company with limited resources.[530]

12.28 TVIPS told us that its main focus over the next two years is to optimise its new chip and work on the electron counting capabilities. TVIPS also noted that the Falcon and K2 cameras were developed partly using public money, which is not available to TVIPS.[531]

12.29 EMSIS (a supplier of GI cameras) told us that it would be very difficult to develop a DD camera and that, to enter the market, they would need to develop something very new. The main barriers would be the need to find a sensor manufacturer and develop new sensor technology – this would cost between $1.5–$5m and may not even be possible. There are no current plans to develop a DD camera as EMSIS believes intellectual property patents would prevent this. [532]

12.30 We have also gathered evidence from third parties who have been involved in the development of DD cameras.

12.31 The Medical Research Council (MRC) has been involved in detector development for over 30 years and has worked with Thermo Fisher in developing a camera. The MRC told us that detectors take between five and ten years to develop and nearly all innovation for detectors starts off in academic research institutions. The MRC told us that [✂].[533]

12.32 The Rutherford Appleton Laboratory is active in developing the technology for DD cameras and has worked with Thermo Fisher. Rutherford Appleton told us that it would be ‘incredibly difficult’ for a new supplier of DD cameras to enter

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[528] Call Summary, Direct Electron, 18 February 2019.
[529] Call Summary, Direct Electron, 18 February 2019.
[530] Call Summary, TVIPS, 19 February 2019.
[531] Call Summary, TVIPS, 19 February 2019.
[532] Call Summary, EMSIS, 20 February 2019.
[533] Call Summary, Medical Research Council, 19 January 2019.

the market because it is difficult to obtain the knowledge needed to build a detector that works well in an electron microscope. The estimated cost would be in the region of £2 million and take a new entrant three to four years.[534]

12.33 Rutherford Appleton told us it is working in developing a [✂] and the total time of development would be about [✂].[535]

12.34 We have gathered evidence from two new entrants into the DD camera market.

12.35 Dectris told us that it is planning to enter the market and launch a DD camera in August 2019 with potentially three more models by the end of the year. Dectris told us that its DD camera:[536]

(a) uses different technology from the Falcon and K3 and will be targeted at the material science market;

(b) will not be a direct substitute to either Thermo Fisher's or Gatan's cameras as it will be optimised for use at lower voltage (80kV-120kV) whereas the Falcon and K3 camera primarily operate in the 200-300kV range;

(c) uses bigger pixels and is therefore not suitable for the cryo-EM life science market. However, it has early stage plans to develop a life science camera which it says is unlikely to be commercialised until at least 2023.

12.36 Dectris told us for a new entrant to develop a DD camera would take a minimum of five years and cost around £3 million. Dectris was able to develop its camera quicker as it had some of the underlying technology.[537]

12.37 Company B [✂]:

(a) smaller [✂].[538]

(b) [✂].[539]

(c) mostly used for niche applications within material science.

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[534] Call Summary, Rutherford Appleton, 6 Feb 2019.
[535] Call Summary, Rutherford Appleton, 6 Feb 2019.
[536] Call Summary, Dectris, 22 February 2019.
[537] Call Summary, Dectris, 22 February 2019.
[538] [✂].
[539] [✂].

12.38 Company B [✂].

12.39 Company B [✂].[540]

12.40 Company B told us that the market is aware of the risk of Gatan revoking access rights to its operating software. Company B said that Gatan is the leading provider of operating software in the material science market and customers and competitors are working on alternatives to the Gatan software.[541]

Assessment of barriers to entry and expansion into the provision of DD Cameras

12.41 The Parties submitted that it would take a new entrant [✂] to develop a DD camera. We note however that this is not supported by the evidence provided by third parties which indicates that this is more likely to take between three and ten years.

12.42 We note that some of the evidence of estimates are provided by companies who have not produced a DD camera and we give more weight to the companies who have experience in DD camera development. We therefore place more weight on the estimates provided by Rutherford Appleton (three to four years) and the MRC (five to ten years) as both have been active partners with Thermo Fisher in developing DD cameras. Additionally, the evidence from a potential new entrant Dectris indicates a time frame of five years.

12.43 Furthermore, a distinction should be drawn between estimates of developing a DD camera and developing a DD camera which is competitive and comparable with other cameras on the market. We note the submission by the MRC who indicated that [✂].[542] Similarly, Rutherford Appleton have submitted that the development of a new version of Thermo Fisher's camera would take as much as six years.[543] Based on the evidence provided to us, our view is that new entrants would take longer than the [✂] submitted by the Parties, and possibly up to eight years to develop a competing and comparable DD camera.

12.44 In terms of cost estimates most third-party estimates are within a $5 million range with two outliers suggesting much higher costs of $5 to $25 million and $30 to $50 million.[544]

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[540] [✂].
[541] Call Summary, Company B, 6 March 2019.
[542] Call summary, Medical Research Council, 31 Jan 2019.
[543] Call Summary, Rutherford Appleton Laboratory, 6 February 2019.
[544] The two outliers are submissions made by [✂] and [✂].

12.45 The evidence we have from Thermo Fisher's business plan[545] [✂][546] [✂]. Similarly, Gatan submitted the cost of producing its latest K3 DD camera was $[✂].[547]

12.46 On the basis of the evidence provided to us our view is that new entrants would also likely incur costs in excess of $5 million to produce a DD camera that is competitive and comparable to the DD cameras on the market.

12.47 We have found that this is a differentiated market and the evidence provided to us indicates that there are considerable complexity and challenges in producing a competitive DD camera. For example, despite having a first mover advantage, Direct Electron has been unable to gain substantial market share or develop a DD camera which is as fast as Gatan's. Thermo Fisher has similarly not been successful in this regard.

12.48 Although [✂] would likely give competitors a strong incentive to develop a competing camera, entry and expansion has been limited. This would imply that the ability of new entrants and existing suppliers to produce a competing camera is limited.

12.49 This is further emphasised by evidence from third parties[548] which indicates that access to expertise, trade secrets and IP is a key barrier to entry.

12.50 Thermo Fisher's internal documents[549] on the rationale for the Proposed Merger also highlight the importance of IP and unique technical expertise at Gatan. [✂].[550]

12.51 We also note that customers are generally risk-averse when purchasing TEM and TEM peripherals.[551] This implies that new products require significant market acceptance testing[552] before they gain any traction. Given this dynamic of the market, the Parties' established product leadership acts as a further barrier to entry.[553]

12.52 The Merger Assessment Guidelines state that, in order to be considered a competitive constraint, entry and expansion should be of sufficient scope to

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[545] Attachment 62 to Thermo Fisher First Day Letter: [✂].
[546] [✂]. Our view is that new entrants would also likely incur similar costs to develop a competing product.
[547] Roper Response to Market Questionnaire, Attachment 60, Copy of R-D Costs
[548] Call Summary, EMSIS, 20 February 2019, [✂].
[549] Project Pasteur: Maximize growth in Life Science and Materials Science EM together, Management Presentation, February 13, 2018, slide 15
[550] We note the Parties have submitted there are no foundational patents relevant to DD cameras or filters, but we consider the threat of litigation and the existence of trade secrets to be a barrier to entry.
[551] Call Summary, Medical Research Council, 31 Jan 2019, Paragraph 17-18, [✂].
[552] Call summary, CEOS, 11 March 2019
[553] Call Summary, Direct Electron, 18 Feb 2019

deter or defeat any attempt by the merged firm to exploit any lessening of competition resulting from the merger. Small-scale entry by a producer of differentiated products may be insufficient, even when the entry may be the basis for later expansion.[554]

12.53 We acknowledge the market is dynamic and innovation has the potential for disruption. The evidence provided to us regarding the potential new entrant Dectris is that its DD camera is focused on a niche segment of the market and while entry for a camera targeted at the material science sector is timely, the likelihood of market acceptance is uncertain. Furthermore, the likelihood and timeliness of developing a camera that is sufficiently capable for the life science sector is uncertain.

12.54 We also note that while Company B has recently entered the camera peripherals market, [✂].

12.55 We have not identified any other new entrants into the DD camera market or expansion plans by existing TEM and TEM peripheral suppliers.

Provisional conclusion

12.56 Based on the evidence provided to us by the Parties and third parties on entry and expansion in DD cameras, we have provisionally concluded that entry or expansion by existing suppliers would not be timely, likely and sufficient to prevent the SLCs we have provisionally found.

Barriers to entry and expansion for the provision of Filters

Parties' submissions

12.57 Thermo Fisher submitted that:

(a) TEM manufacturers already have the relevant know-how to produce a filter. JEOL would be particularly well-placed to further develop its filters given that it already has very effective filter technology, and Hitachi also has existing filter technology in-house.

(b) Collaboration (development and/or manufacturing) can facilitate faster entry, for example, Thermo Fisher told us that Hitachi could partner with an expert third party (such as new entrant CEOS) to more rapidly develop a filter product. [555]

[554] Merger Assessment Guidelines, paragraph 5.8.10.
[555] Thermo Fisher Response to Market Questionnaire paragraph 48.4.

12.58 Roper submitted that a new entrant would require the following in order to enter into the supply of filters:

(a) [✂]);

(b) [✂];

(c) [✂]; and

(d) [✂].[556]

Third party views

12.59 Company D told us that at present, only Gatan supplies filters/EELS on a commercial basis to third parties. [✂].[557]

12.60 Company D submit that CEOS recently announced that it would develop hardware elements of EELS / filters. [✂].[558]

12.61 Company C told us that it could not estimate the time it would take to develop a post column filter and it did not currently have the expertise and capability to do so.[559]

12.62 CEOS submitted that it is aiming to become a supplier of energy filters and spectrometers within the next two years, with commercial sales from 2021. CEOS submitted it has over ten years prior knowledge of the technology required to develop a filter and it took around three years to produce. It took the decision to develop a filter [✂] in 2016 with the first results published in January 2019.

12.63 CEOS told us it is working with five or so early adopters in total with the hope of supplying these at a lower price to show that the filter produces good results and gains market traction.

12.64 CEOS stated that it is not producing a complete filter and will source a GI camera from an external supplier.[560] CEOS could incorporate a DD camera relatively quickly but has not tested it yet. CEOS said it had discussions with [✂] and is in the process of approaching [✂] to launch discussions but doubts its camera would be as competitive as [✂]'s K3. CEOS stated that it expects its filters to be competitive with [✂]'s products. It considers that the

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[556] [✂].
[557] [✂].
[558] [✂].
[559] Call Summary, Company C 27 Feb 2019.
[560] CEOS response to CMA Questionnaire.

optics of its filters will be better, but it is behind in other technical elements, application software and camera integration with the TEM system.

12.65 CEOS told us the software it currently has will be enough to satisfy the early adopters who are more scientific customers, but industrial customers will expect software more like Gatan's. To design comparable application software would take CEOS around two to three years. CEOS also told us that it has capacity limits and will only be able to produce 25-30 filters per year[561] compared to the worldwide market of 100-120 filters per year. CEOS does not intend to expand beyond this.

12.66 CEOS also flagged a possible risk (although at present it sees no indication it could happen) as a result of the Proposed Merger. [✂].[562]

Assessment of barriers to entry and expansion into the provision of filters

12.67 We have been provided with limited evidence from third parties regarding the time and cost estimates for developing a post-column filter and camera combination. [✂].

12.68 Thermo Fisher submitted that it would take [✂].[563] [✂][564] [✂].

12.69 However, evidence from Thermo Fisher's internal documents[565] [✂][566] [✂].[567] [✂].

12.70 We have also considered evidence from a potential new entrant CEOS which submitted it took the initial decision to develop a filter in 2016. CEOS told us that despite having ten years of prior knowledge into the technology that goes into the filter it still took three years to develop and only expects commercial sales in 2021.[568] This implies a development period of five years until commercialisation. The evidence from [✂] CEOS implies it would take longer than the [✂] submitted by the Parties to develop a filter and bring it to market.

12.71 Additionally, we note that [✂]IP. The evidence provided to us indicates that a new entrant would require integration with both in order to commercialise a post column filter. Accordingly, this would represent a further barrier to entry

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[561] Call Summary CEOS, 11 March 2019.
[562] CEOS response to CMA Questionnaire.
[563] Parties response to Issues Statement, 19 Feb 2019, Table 6.1
[564] [✂].
[565] [✂].
[566] [✂].
[567] [✂].
[568] Call Summary, CEOS, 11 March 2019.

and likely result in a longer development period due to the need for collaboration and integration with third-party camera and TEM manufacturers.

12.72 In assessing cost estimates we draw attention to [✂],[569] [✂][570] [✂].

12.73 [✂]:[571] [✂]. A new entrant would also likely face [✂] barriers with regards to market acceptance given the established position and high technical specifications of Gatan's filters.

12.74 The threat of litigation is an additional barrier that may deter entry into the filter market. We note that [✂]. New entrants are also likely to be concerned about intellectual property rights when considering entry.

12.75 The Parties have submitted that Hitachi and JEOL are well placed to develop filter peripherals, and CEOS and Nion are entering the filter market.[572]

12.76 The evidence provided to us by [✂] indicates that its filter technology is different to Gatan's post column filters and that it does not have current plans, expertise or capability to develop post-column filters.[573]

12.77 We have been provided with limited evidence by Nion, but we understand that its filter technology is used exclusively on its own microscope. We have no evidence of expansion plans by Nion to develop post-column filters for use on third party TEMs.

12.78 We note that JEOL has responded to the new and developing cryo-EM field by producing an in-column filter. However as noted in paragraph 9.175 there are mixed views on the closeness of competition between in column and post column filters. [✂].[574] [✂].[575]

12.79 We have considered the planned entry of CEOS into the filter market. CEOS told us its filter can be used for both life and material science. CEOS is currently working with an external supplier to incorporate a GI camera that will be targeted at the material science sector. CEOS expects the first commercial sale to take place by 2021. We note that while this filter and camera combination may be technically comparable to the Gatan post column filter for material science, the need to create competing software and integrate with a microscope creates uncertainty on the market acceptance of the filter.

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[569] [✂].
[570] [✂].
[571] [✂].
[572] Termo Fisher, Rebuttal of Working Paper on Entry and Expansion, Paragraph 4.8.
[573] [✂].
[574] [✂].
[575] [✂].

Furthermore, the capacity constraints identified by CEOS create further uncertainly on the likely impact within the materiel science sector.

12.80 Additionally, we note that while CEOS can incorporate a DD camera from a third-party supplier in order to enter the life science sector, there are limited options in sourcing a DD camera. [✂]. Based on the evidence provided to us, our view is that entry into the life science sector by CEOS would not be timely, likely and sufficient to constrain the Merged Entity.

12.81 We have not identified any other new entrants or expansion plans by existing TEM and TEM peripheral suppliers.

12.82 Based on the evidence provided to us, we have provisionally concluded that entry or expansion would not be timely, likely and sufficient to prevent the SLCs we have provisionally found.

Provisional conclusions on entry and expansion for DD cameras and filters

12.83 Our provisional view is that the cost, time and uncertainty of peripheral development are high and may be higher than the Parties' submissions indicate.

12.84 We consider that there is a significant level of risk associated with developing peripheral products. It takes several years for a product to gain market acceptance even after it has been developed. Access to expertise, trade secrets and intellectual property is crucial in being able to enter or expand. Additionally, there is a need to collaborate on research projects with third parties and academic institutions to develop competitive products.

12.85 The existing market share, established product leadership and leading position of Gatan's software[576] particularly within material science serve to deter entry or expansion from other firms.

12.86 We note that the Parties earn high profit margins and yet there has been minimal entry or expansion for peripherals that compete directly with the Parties' products. This implies that, while there may be incentives for suppliers to enter the market, their ability to do so is limited.

12.87 Thermo Fisher's internal documents highlight [✂].[577] We understand from the Parties' submissions the importance of having integrated TEM peripherals.

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[576] Call Summary, EMSIS, 20 Feb 2019; Call Summary, Rutherford Appleton Laboratory, 6 Feb 2019; Call Summary, National Nuclear Laboratory, 4 Feb 2019
[577] [✂].

This implies that any new peripheral entrants would have a further barrier to overcome to be competitive, such as sharing IP and trade secrets with a TEM manufacturer to achieve the level of integration of the Merged Entity.[578]

12.88 Based on the evidence and analysis set out above we have provisionally concluded that entry or expansion would not be timely, likely and sufficient to prevent the SLCs we have provisionally found.

13. Efficiencies

Overview

13.1 The Merger Assessment Guidelines (Guidelines) state that, whilst mergers can harm competition, they can also give rise to efficiencies.[579] Efficiencies arising from a merger may enhance rivalry, with the result that the merger does not give rise to an SLC.[580]

13.2 The Parties have submitted a number of efficiencies that they expect to arise as a result of the Proposed Merger.[581] The Parties stated that each of these efficiencies should be considered as rivalry enhancing. The Parties have submitted that if the CMA does not consider these efficiencies to be rivalry enhancing, then it would be appropriate to consider them as relevant customer benefits (RCBs). We note that, for the purposes of the statutory test in a phase 2 merger investigation, RCBs are relevant only if remedies are being considered in the event that we were to find an SLC.[582]

13.3 In this chapter we assess whether the efficiencies submitted by the Parties are 'rivalry enhancing efficiencies', following the framework set out in our Guidelines.

Merger Assessment Guidelines

13.4 The Guidelines state that:[583]

Efficiencies arising from the merger may enhance rivalry, with the result that the merger does not give rise to an SLC. For example, a merger of two of the

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[578] Roper Hearing Transcript 19 March 2019, Page 48, Line 4.
[579] *Merger Assessment Guidelines*, paragraph 5.7.1.
[580] *Merger Assessment Guidelines*, paragraph 5.7.2.
[581] Parties' submission to the CMA entitled 'efficiencies and customer benefits', dated 8 February 2019; Parties' response to the Efficiencies Working Paper.
[582] Sections 30 and 36(4) of the Act.
[583] *Merger Assessment Guidelines*, paragraph 5.7.2.

smaller firms in a market resulting in efficiency gains might allow the merged entity to compete more effectively with the larger firms.

13.5 To form a view that any claimed efficiencies will enhance rivalry, such that a merger does not result in an SLC, the Guidelines state that the CMA must expect that the following criteria will be met:[584]

(a) the efficiencies must be timely, likely and sufficient to prevent an SLC from arising (having regard to the effect on rivalry that would otherwise result from the merger); and

(b) the efficiencies must be merger-specific, i.e. a direct consequence of the merger, judged relative to what would happen without it.

13.6 The Guidelines state that efficiency claims can be difficult to verify because most of the information concerning efficiencies is held by the merging firms. The CMA therefore encourages the merging firms to provide evidence to support any efficiency claims whether as part of the SLC analysis or the consideration of RCBs.[585]

13.7 The Guidelines distinguish between supply-side efficiencies and demand-side efficiencies.[586] Supply-side efficiencies arise if the merged entity can supply its products at lower cost as a result of the merger. Such efficiencies include the removal of 'double marginalisation' and cost reductions due to economies of scale and scope. Demand-side efficiencies arise if the attractiveness to customers of the Merged Entity's products increases as a result of the merger. Such efficiencies may arise due to network effects, pricing effects and 'one-stop shopping'.

Assessing rivalry enhancing efficiencies

13.8 In assessing whether the Parties' claimed efficiencies are rivalry enhancing, we follow the criteria set out in paragraph 13.5 above. That is, the claimed efficiencies must be timely, likely and sufficient to prevent an SLC from arising, and must be merger-specific.

13.9 The Parties have submitted that [✂].[587] They stated for example that [✂].[588]

13.10 In assessing each claimed efficiency, we consider whether it will be timely, likely and sufficient (in terms of the claimed ensuing competitive response by

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[584] *Merger Assessment Guidelines*, paragraph 5.7.4.
[585] *Merger Assessment Guidelines*, paragraph 5.7.5.
[586] *Merger Assessment Guidelines*, paragraphs 5.7.6 to 5.7.18.
[587] Parties' response to the Efficiencies Working Paper, paragraphs 3.7 to 3.11.
[588] Parties' response to the Efficiencies Working Paper, paragraphs 3.8 and 3.10.

rivals) to prevent an SLC from arising, in light of the competition concerns that we have provisionally found in our competitive assessment. As part of that assessment, we consider (among other matters) the extent to which the Parties have an incentive to pass on any benefits to end-customers, in light of changes to the competitive landscape that might result from these competition concerns. We also consider whether the efficiencies are merger-specific, that is whether they are a direct consequence of the Proposed Merger, judged relative to what would happen without it.

13.11 Further, as noted in the Guidelines, efficiency claims can be difficult for the CMA to verify because most of the information concerning efficiencies is held by the merging firms.[589] We therefore expect the Parties to provide sufficient evidence to demonstrate that rivalry enhancing efficiencies will arise as a result of the Proposed Merger. In that connection, we have found that Thermo Fisher is the largest supplier of TEMs, and Gatan is the largest supplier of cameras and filters (excluding Thermo Fisher itself). In view of that and given that we have provisionally found that these firms have the ability and incentive to foreclose smaller rivals, the claimed efficiencies would need to be particularly strong in order to lead to enhanced rivalry from other, smaller firms so as to prevent an SLC arising.

Efficiencies submitted by the Parties

13.12 The Parties submitted that the following efficiencies arise from the Proposed Merger:[590]

(a) **Elimination of double marginalisation (EDM)**. Gatan currently sells peripherals to Thermo Fisher [✂].[591] Post-Proposed Merger, Thermo Fisher will acquire these products at cost. The Parties have submitted that if these cost savings are at least partially passed on to consumers, this will result in lower prices for TEM systems.

(b) **Better integration of peripherals, and reductions in the total costs of ownership (TCO)**. The Parties have submitted that Thermo Fisher [✂]. Greater integration will enable Thermo Fisher to produce better products and reduce TCO for Gatan filter users. [✂].[592]

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[589] *Merger Assessment Guidelines*, paragraph 5.7.5.
[590] Parties' submission to the CMA entitled 'efficiencies and customer benefits', dated 8 February 2019, paragraph 1.5.
[591] The Parties state that the use of a [✂]% pass-through rate is reasonably conservative. See Parties' response to the Efficiencies Working Paper, paragraphs 4.4 to 4.10
[592] [✂].

(c) **Improved maintenance and support**. The Parties have submitted that Gatan customers will benefit from Thermo Fisher's extensive and faster maintenance and service support. Customers will also benefit from a single point of contact and having engineers that are trained on both systems.

(d) **Product repositioning and greater choice**. The Parties have submitted that Thermo Fisher will have incentives to reposition Gatan and Thermo Fisher peripherals, which will improve the variety of products available to customers. [✂].[593] [✂].

(e) **Sales expansion**. The Parties submit that the impact of the above efficiencies will enable Thermo Fisher to offer cheaper and more accessible microscopes. This will result in the sale of more microscopes than would be likely absent the Proposed Merger. [✂].

Survey evidence submitted by the Parties

13.13 Thermo Fisher commissioned a survey to gather evidence on the demand for TEMs in the UK for use in cryo-EM applications. DJS Research completed interviews with 11 potential customers.[594] The Parties have submitted that the results of the survey provide 'robust evidence that the benefits identified by the Parties arising from the merger would be valued by customers'.[595]

13.14 We consider the survey evidence for each of the Parties' claimed efficiencies below. We note upfront that whilst the interviews provide some indication as to potential future demand, the sample was limited to a relatively small and varied set of potential customers.[596] We consider that this evidence is too limited to draw any broad conclusions regarding the set of potential TEM customers but we take account of the views where appropriate.

Assessment of efficiencies

13.15 In this section we consider each of the efficiencies submitted by the Parties.

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[593] [✂].
[594] Compass Lexecon submission entitled 'introduction to interview summaries', dated 26 March 2019.
[595] Parties' response to the Efficiencies Working Paper, paragraph 2.1.
[596] In total DJS Research conducted interviews with 11 institutions. We understand that [✂]. Given the potential for their responses to be influenced by [✂], we consider that limited weight should be placed on their responses.

Elimination of double marginalisation

Parties' submission

13.16 The Parties submitted that Gatan makes [✂] margins on the peripherals it sells to Thermo Fisher. Gatan will earn a gross margin of [✂]% on its [✂] filters it sells to Thermo Fisher, and [✂]% on [✂] filters.[597] Post-Proposed Merger, Thermo Fisher will have access to these products at cost.

13.17 The Parties have submitted that the resulting benefit to end-customers depends on the proportion of the 'eliminated double margin' that is passed through to consumers.[598] As noted by Compass Lexecon, economic theory does not provide clear predictions regarding the likely extent of cost pass-through. However, a standard result is that a monopolist facing linear demand will pass through 50% of cost reductions. The Parties have submitted that a rate of 50% pass-through in this case is 'reasonably conservative'.[599]

13.18 The Parties have submitted that Thermo Fisher's updated business plan [✂].[600] It is stated that Thermo Fisher [✂].[601] [✂].[602]

13.19 The updated business plan indicates [✂].[603]

CMA assessment

13.20 We recognise that post-Proposed Merger, Thermo Fisher will have access to Gatan's products at a [✂] lower cost. A key question is therefore the extent to which these cost reductions are likely to be passed on to end-customers.

13.21 As submitted by the Parties, [✂].[604] [✂].[605]

13.22 The Parties submit that Thermo Fisher's updated business plan demonstrates [✂].[606] We note however that in the case of the BioContinuum K3 filter, the reduction in double marginalisation does not result in any additional sales

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[597] Compass Lexecon submission on 'quantitative evaluation of efficiencies and customer benefits', table 5.
[598] Compass Lexecon submission on 'quantitative evaluation of efficiencies and customer benefits', paragraph 5.6.
[599] Parties' response to the Efficiencies Working Paper, paragraph 4.10.
[600] [✂].
[601] [✂].
[602] [✂].
[603] [✂].
[604] [✂].
[605] [✂].
[606] We note that this business plan was submitted during the course of the proceedings and is not binding on the Parties.

relative to the counterfactual.[607] It is therefore is not clear why Thermo Fisher would have an incentive to pass-through these cost savings on the BioContinuum.

13.23 By contrast, the updated business plan indicates that the Proposed Merger would have a substantial impact on sales of the [✂]). Compass Lexecon states that these expanded sales are 'due to lower pricing and integration benefits'.[608] It is not clear however why lower pricing would have a substantial impact on [✂] sales, but [✂]. Further, as noted in paragraph 13.52 below, it is unclear why this expansion of sales is merger-specific.

13.24 In our view, the updated business plan therefore does not provide sufficient evidence that Thermo Fisher has an incentive to pass-through cost savings to customers. In particular, the business plan provides little evidence of the likely impact of such a cost reduction on sales expansion efforts.

13.25 We consider that the extent of competition downstream and the price sensitivity of customers are two important factors in determining Thermo Fisher's incentives to pass-through cost savings to customers. Both pieces of evidence indicate that Thermo Fisher would have limited incentive to pass-through a substantial proportion of cost savings to end-customers:

(a) In terms of downstream competition, we note that Thermo Fisher is the largest supplier, has very high market shares in important customer segments such as life science (and cryo-EM in particular) and there are high barriers to entry in the supply of TEMs (see chapter 12).

(b) In terms of price sensitivity, [✂].[609] This reduces the competitive pressure on Thermo Fisher to lower its prices.

13.26 Based on the evidence provided to us, our provisional view is therefore that Thermo Fisher would not have a strong incentive to pass through a large share of cost savings to end-customers. We consider that the competition concerns that we have provisionally found in our competitive assessment, in terms of both the impact of such issues on downstream rivals and the reduction in horizontal competition, would further reduce (or remove entirely) Thermo Fisher's incentive to pass-on a significant share of cost savings to end-customers.

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[607] Compass Lexecon submission entitled 'quantitative evaluation of efficiencies and customer benefits: update based on TFS business plan', table 2.
[608] Compass Lexecon submission entitled 'quantitative evaluation of efficiencies and customer benefits: update based on TFS business plan', paragraph 1.4.
[609] See chapter 9 on the Horizontal TOH for details.

Better integration of peripherals, and reductions in the total costs of ownership

Parties' submission

13.27 Thermo Fisher submits that it is [✂].[610]

13.28 Thermo Fisher estimates that within [✂] of the Proposed Merger taking place, it will be able to achieve the following:[611]

(a) [✂].

(b) [✂].

13.29 Over a period of around [✂], Thermo Fisher expects to [✂].[612] [✂].

13.30 Thermo Fisher has submitted that [✂].[613] The Parties estimate that [✂].[614]

13.31 In addition to improving the overall quality of the TEM system, Thermo Fisher has submitted that [✂]:[615]

(a) [✂].

(b) [✂].[616] [✂].

(c) [✂].

13.32 [✂].[617]

13.33 Thermo Fisher estimates that [✂].[618] [✂].

13.34 The Parties have submitted that their customer survey indicates that the most important impediments to purchasing a TEM are [✂].[619] The Parties also submitted that their survey shows that customers attach importance to other [✂].[620]

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[610] [✂].
[611] Parties' submission to the CMA entitled 'efficiencies and customer benefits', paragraph 3.5.
[612] Parties' submission to the CMA entitled 'efficiencies and customer benefits', paragraph 3.7.
[613] Parties' response to the Efficiencies Working Paper, table 5.
[614] [✂].
[615] Compass Lexecon submission entitled 'quantitative evaluation of efficiencies and customer benefits', paragraphs 6.10 to 6.34.
[616] Parties' response to the Efficiencies Working Paper, paragraph 5.10.
[617] Parties' submission to the CMA entitled 'efficiencies and customer benefits', paragraph 5.3.
[618] Compass Lexecon submission entitled 'quantitative evaluation of efficiencies and customer benefits', table 11.
[619] Parties' response to the Efficiencies Working Paper, paragraph 2.2.
[620] Parties' response to the Efficiencies Working Paper, paragraph 2.2.

CMA assessment

13.35 We recognise that some customers would value greater automation of the TEM system and closer integration of the peripherals with the TEM column. This is consistent with evidence from several end-customers, as noted by the Parties.[621] This is also reflected to some extent in the Parties' customer survey, although we consider that the evidence from the survey is mixed on this point.[622]

13.36 We also note that there is evidence from Thermo Fisher's merger rationale documents that [✂]. One internal document for example mentions that part of the strategic rationale for the Proposed Merger is to [✂].[623]

13.37 In light of the competition concerns that we have provisionally found, we consider that it is unlikely that rivals would be able to respond in a way that sufficiently enhances overall rivalry in the market. In particular, Company D told us that if it could not procure Gatan's DD cameras in a non-discriminatory manner as compared to Thermo Fisher, it would be unable to expand its presence in the cryo-EM market (in which Thermo Fisher is already dominant).[624] Company D also said that Gatan filters and cameras are used by all types of customers, [✂]. [✂].[625]

13.38 [✂].[626] Company D also stated that if there were issues over the price or quality at which it can access Gatan's cameras and peripherals, its TEM sales could fall by [✂]%.[627]

13.39 Further, based on the changes to the competitive environment that would likely result from the competition concerns that we have provisionally found, we do not consider that Thermo Fisher would have strong incentives to pass-on price reductions or quality improvements to end-customers. To the extent that quality improvements are realised as a result of the Proposed Merger, we consider that the reduction in rivalry (as a result of the competition concerns we have provisionally found) would likely enable Thermo Fisher to charge higher prices (or maintain prices) for its products.

13.40 Finally, we note that Thermo Fisher produces its own GI cameras and DD cameras, [✂]. We therefore consider that to the extent that greater integration

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[621] Examples are provided in the Parties' response to the Efficiencies Working Paper, paragraph 6.7.
[622] For example, [✂]stated that [✂] and only [✂] percent of customers said that [✂]
[623] Annex D9 to the Consolidated Merger Notice, slide 6.
[624] Call Summary, Company D, 4 March 2019.
[625] Call Summary, Company D, 4 March 2019.
[626] [✂].
[627] Call Summary, Company D, 4 March 2019.

and automation of TEM systems is possible, it is able to achieve many of the benefits even in the absence of the Proposed Merger.

Improved maintenance and support

Parties' submission

13.41 The Parties estimate that the Proposed Merger will dramatically improve the quality and response times of the servicing that Gatan customers receive.[628]

13.42 The Parties submitted evidence that Thermo Fisher's average response time is [✂]. Gatan's average response times are [✂]. The Parties stated that Gatan is a small organisation, with limited ability to offer service support.[629]

13.43 Post-Proposed Merger, it is stated that end-customers will benefit from Thermo Fisher's extensive support network, and Thermo Fisher will be responsible for all integrated componentry. Service personnel will therefore be able to address problems affecting the whole of the microscope, avoiding the potential for the TEM manufacturer and peripheral supplier to dispute responsibility.

CMA assessment

13.44 We recognise that Gatan's customers could benefit from improved maintenance and support. As noted by the Parties, there is also evidence that end-customers would value an integrated service and maintenance offering.[630]

13.45 However, our provisional view is that this potential benefit is not likely to be rivalry enhancing. We note that downstream competitors such as JEOL and Hitachi are dependent on external suppliers (including Gatan) for their cameras and filters. If this benefit is merger specific – i.e. Thermo Fisher can achieve this benefit only as a result of the Proposed Merger – it is not clear how competitors would be able to respond.

13.46 In our view, however, there is insufficient evidence that this benefit is merger-specific: there are limited constraints to Gatan improving its maintenance and servicing even in the absence of the Proposed Merger. Its incentive to do so

[628] Potential reductions in the costs of servicing are addressed in the section on 'better integration of peripherals, and reductions in the total costs of ownership'.
[629] Parties' submission to the CMA entitled 'efficiencies and customer benefits', paragraphs 6.1 to 6.8.
[630] Parties' response to the Efficiencies Working Paper, paragraph 7.15.

is greater in the absence of the Proposed Merger as in that situation there will be a greater degree of competition for the peripherals that it supplies.

13.47 Finally, we consider that given the limited scope of this potential benefit, it is unlikely to be sufficient to offset the competition concerns that we have provisionally found (even if the benefit is merger-specific).

Product repositioning and greater choice

Parties' submission

13.48 Thermo Fisher has submitted that, post-Proposed Merger, [✂].

13.49 Thermo Fisher submitted that it intends to [✂]. It is stated that [✂].[631]

13.50 Thermo Fisher has subsequently submitted that it intends to [✂].[632] [✂].

13.51 Thermo Fisher has further stated that [✂].[633]

CMA assessment

13.52 In our view, this claimed efficiency is not timely, likely or sufficient to prevent the SLC we have identified from arising. We note for example that any repositioning of Thermo Fisher's peripheral products away from Gatan's products would exacerbate (rather than offset) the concerns that we have found with respect to the horizontal and potential TOH.[634] We consider that competition is a strong mechanism for identifying and catering for gaps in the market.

13.53 In our provisional view there is also insufficient evidence that any benefits resulting from product repositioning are merger-specific. Thermo Fisher's updated business plan submitted to the CMA for example indicates that [✂] could stimulate a significant sales expansion.[635] If demand [✂], it is not clear why [✂].[636]

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[631] Parties' submission entitled 'efficiencies and customer benefits', paragraph 7.9.
[632] Parties' response to the Efficiencies Working Paper, paragraph 6.10.
[633] Parties' response to the Efficiencies Working Paper, paragraphs 1.1 and 6.11.
[634] The Parties' submission entitled 'efficiencies and customer benefits' for example stated that (post-Proposed Merger) Thermo Fisher intends to [✂] (paragraphs 7.8 to 7.11).
[635] See Parties' response to the Efficiencies Working Paper.
[636] We note that Thermo Fisher's updated business plan indicates almost no cannibalization of [✂] sales as a result of the [✂].

Sales expansion

Parties' submission

13.54 The Parties submit that the efficiencies presented above will increase overall sales of TEM systems:

(a) The Parties have submitted that TEM systems which include Gatan filters will be sold more cheaply post-Proposed Merger than in the counterfactual [✂].[637] Under its revised business plan submitted to the CMA, [✂].[638]

(b) The Parties have submitted that TEM systems [✂].[639]

13.55 Thermo Fisher submitted that its internal documents indicate that it is a clear strategic priority [✂].[640]

13.56 The Parties stated that their customer survey shows that demand for cryo-EM is [✂], with [✂] of the 11 respondents saying that cryo-EM will [✂] in the next two to five years.[641] The Parties further submitted that the survey provides strong evidence that potential customers would be [✂] to consider purchasing a cryo-EM system if [✂].[642]

CMA assessment

13.57 In our view, the Parties have not submitted sufficient evidence at this stage to demonstrate that the Proposed Merger would result in a substantial expansion of TEM sales. We note in particular that the sales figures included in Thermo Fisher's updated business plan are [✂] from those included in previous submissions to the CMA.[643] In particular:

(a) Under a previous submission, Thermo Fisher expected the Proposed Merger to [✂].

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[637] Parties' submission entitled 'efficiencies and customer benefits', paragraph 8.3 (i).
[638] [✂].
[639] [✂]
[640] [✂].
[641] Parties' response to the Efficiencies Working Paper, paragraph 7.8.
[642] [✂].
[643] See Compass Lexecon's submission entitled 'quantitative evaluation of efficiencies and customer benefits', dated 20 February 2019, and the updated paper dated 27 March 2019.

(b) Under the updated business plan, in contrast, Thermo Fisher expects the Proposed Merger to result in [✂], and only [✂]. This is despite Thermo Fisher telling us at the Hearing that [✂].[644]

13.58 In our view, this demonstrates that the likely impact of the Proposed Merger on future sales is highly uncertain. We also note that, under the updated business plan, Thermo Fisher expects [✂], although the same benefits appear to have little or no impact on [✂].[645] This raises doubts over the likely impact of the Proposed Merger on future sales: it is not clear how or why customers are likely to respond to reductions in price or improvements in quality.

13.59 As noted in paragraph 13.52, we also consider that there is insufficient evidence that the [✂], is merger-specific.

13.60 We also consider that the Parties' customer survey provides [✂]regarding sales expansion.[646] Whilst [✂] respondents stated that cryo-EM could be [✂] over the next 2 to 5 years, [✂] stated that they are [✂] to purchase a cryo-TEM over this period ([✂]).

13.61 Further, whilst [✂] respondents mention that [✂]is a likely impediment to purchasing a cryo-TEM, the necessary [✂] varies considerably across respondents. [✂] respondents for example state that a realistic price point for them would be in the range of [✂]. This figure is considerably lower than [✂], which we understand drives [✂] under the updated business plan.

13.62 We therefore consider that the Parties have submitted insufficient evidence at this stage regarding the likely impact of the Proposed Merger on sales expansion.

13.63 Further, in light of the competition concerns that we have provisionally found, we consider that it is unlikely that rivals would be able to respond in a way that sufficiently enhances overall rivalry in the market. As noted in paragraph 13.37 for example, Company D told us that if it could not procure Gatan's DD cameras in a non-discriminatory manner as compared to Thermo Fisher, it would be unable to expand its presence in the cryo-EM market (in which Thermo Fisher is already dominant).[647] Conversely, Company D stated that if there were issues over the price or quality at which it can access Gatan's

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[644] CMA Hearing with Thermo Fisher, 27 March 2019.
[645] Compass Lexecon's submission entitled 'quantitative evaluation of efficiencies and customer benefits: updated based on TFS business plan', dated 27 March 2019.
[646] The figures stated here draw on Compass Lexecon's submission entitled 'introduction to interview summaries', dated 26 March 2019.
[647] Company D's initial submission to the CMA, p.3.

cameras and peripherals, its TEM sales could fall by 50%. Company D also told us that even assuming that after the consummation of the Proposed Merger Company D would be able to continue to purchase Gatan's cameras and peripherals subject to the terms and conditions in the MoU, [✂].[648]

Conclusions

13.64 Based on the evidence we have received, and the analysis of that evidence presented above, it is our provisional view that the Parties' claimed efficiencies are not timely, likely and sufficient to prevent an SLC from arising.[649] Further, it is our provisional view that there is a lack of evidence to demonstrate that some of the claimed efficiencies (particularly improved maintenance and support; product repositioning and greater choice; and sales expansion) are merger-specific.[650]

13.65 It is therefore our provisional view that the Parties' claimed efficiencies will not enhance rivalry such that the Proposed Merger does not result in an SLC.

14. The provisional decision

14.1 We have provisionally concluded that the anticipated acquisition by Thermo Fisher of Gatan will result in the creation of a relevant merger situation.

14.2 We have provisionally concluded that the Proposed Merger may be expected to result in an SLC due to:

(a) Horizontal competition concerns in the market for the supply of DD cameras for sale in the UK;

(b) Potential competition concerns in the market for the supply of filters for sale in the UK;

(c) Vertical competition concerns, both with regard to foreclosure and information sharing in the markets for respectively the supply of GI cameras, DD cameras and filters to TEM suppliers for sale in the UK.

[648] Call Summary, Company D, 4 March 2019. Company D's responses dated 18 February 2019 to CMA's RFI dated 30 January 2019.
[649] *Merger Assessment Guidelines*, paragraph 5.7.4.
[650] *Merger Assessment Guidelines*, paragraph 5.7.4.