

Procuring a consolidated tape provider

A report for the FCA

June 2023

Contents

| | |
|---|----|
| 1 Introduction..... | 1 |
| 1.1 Scope and background..... | 1 |
| 1.2 International progress on CTPs | 1 |
| 1.3 UK setting..... | 4 |
| 2 Why has no CTP emerged? | 6 |
| 2.1 Data access issues | 6 |
| 2.2 Demand uncertainty | 11 |
| 2.3 Implications | 13 |
| 3 Intervention on data access | 15 |
| 3.1 Selective intervention..... | 15 |
| 3.2 Pricing | 15 |
| 3.3 Standardisation | 16 |
| 3.4 Incentive issues for data providers..... | 17 |
| 3.5 Is a data obligation alone enough? | 20 |
| 4 Design of the CTP concession | 23 |
| 4.1 What must be provided?..... | 23 |
| 4.2 Licence terms | 24 |
| 4.3 Would an exclusive CTP have market power? | 27 |
| 4.4 Regulatory models for CT pricing..... | 28 |
| 4.5 Treatment of value-added services..... | 39 |
| 4.6 Conflicts of interest..... | 41 |
| 4.7 Duration of term | 43 |
| 4.8 Re-award of an exclusive concession | 44 |
| 5 Auction design issues..... | 46 |
| 5.1 Outline process | 46 |
| 5.2 Quality requirements..... | 46 |
| 5.3 Auction formats..... | 47 |
| 5.4 Auction design..... | 52 |
| 5.5 Reserve price..... | 53 |

5.6 Qualification criteria.....54
Annex A Glossary56
Annex B Issues for consultation.....58

Executive Summary

Encouraging CTP entry

The FCA is committed to having a framework in place by 2024 to support emergence of a consolidated tape (CT) in the UK. A CT would aggregate data from all trading venues (TVs) and approved publication arrangements (APAs), providing an authoritative source of market data. A CT for bonds would likely come first, followed by a CT for equities.

Obligations on TVs and APAs

To date, no CT provider (CTP) has entered UK or EU markets. This appears to be primarily due to problems with data access. Absent mandated access to upstream data, for a CTP subject to a full coverage obligation, each individual TV and APA would be an essential counterparty. Individual data suppliers would likely be able to exert market power against a CTP, despite current obligations to make data available on commercial terms. Thus, intervention on the price of data supplied by TVs and APAs appears necessary. Standardisation across disparate data sources would also assist operation of a CT.

Given the apparent fragility of a CTP's business case, a zero price for a CTP's data in-feeds appears most appropriate. This is reasonable as TVs and APAs are likely to have low *incremental* costs of disseminating pre-existing data *additionally* to CTPs (despite there being fixed costs of creating the data in the first place).

Exclusive concessions

In principle, access to TVs and APAs data on mandated terms could be allowed for *any* qualifying CTP, potentially leading to the entry of one or more CTPs within an asset class. However, given concerns about lack of entry so far, it may be more effective to create an exclusive concession to operate a CTP within an asset class for some limited period (say 5 years). In addition, exclusivity might have some benefit through providing a single authoritative data source referred to by all users.

Under this exclusive model, no competing CTP would be licenced for the exclusive period within the same asset class. However, this does not preclude allowing the possibility of competing CTPs once this period of exclusivity ends, if this were indicated by a subsequent assessment by the FCA.

Need for multiple licence types for a CT

Demand for a CT is uncertain and is likely to derive from various user segments. To meet the diverse needs of users, whilst allowing efficient recovery of a CTP's fixed costs, multiple

licence types will be needed. In broad terms, there appears to be scope for:

- a licence allowing CT data to be re-used to create derived services; and
- one or more licences for direct use without such a re-use right.

Licences for direct use would likely need to be differentiated according to usage intensity, for example through “per seat” licensing. The pricing structure could potentially include some quantity discounting to drive take-up.

Further sub-dividing a re-use licence by intensity or use or other characteristics does not make much sense, as it is not obvious how to measure this. Also, we need to be careful that innovative value-added re-use – which by its nature is difficult to anticipate – is not excluded by licence terms designed around existing uses.

We suggest this licence structure as a ‘strawman’ to stimulate debate and provide a concrete illustration of how a procurement process might be structured. However, further input from potential users and potential CTPs will be needed to identify the range of appropriate licensing models.

Obligation to supply core services

To define the obligation on the CTP, a set of these ‘core’ licences needs to be identified. These core licences should be sufficient to meet the needs of most users. The CTP would be obliged to offer each of these core licences on a standalone basis, rather tied to other services. Because of the exclusivity granted to the CTP, these core services should be price controlled. The CTP could optionally offer value-added services, which would not be price controlled, in addition to these core services.

Price control

The price control could use a simple form of tariff basket constraint, capping some weighted average of:

- the price of the licence allowing data re-use; and
- a maximum ‘per seat’ price applying to all direct use licences.

This approach avoids having to create a tariff-basket (with weights) including many different direct use licences intended for organisations of different sizes. The price structure and detailed implementation of ‘per seat’ licensing could be delegated to the CTP within the maximum ‘per seat’ price constraint. For example, the provider could implement quantity discounting on ‘per seat’ licences if it choose.

| | |
|---|---|
| | <p>The price control should be indexed over time to allow for inflation, otherwise the CTPs will price in this risk, leading to users paying more initially than necessary.</p> |
| <p><i>Auction to determine the price control</i></p> | <p>As the price control regime only needs one key parameter to be specified – the maximum weighted average price that the CTP can set –this parameter could be determined by bids made by potential CTPs within a simple auction.</p> |
| <p><i>Quality aspects</i></p> | <p>The auction process would purely set this price cap. Any quality issues would be dealt with by setting minimum standards for the CT services and appropriate financial penalties for failing to meet them. Additionally, various pass/fail criteria (such as access to adequate financial resources) could be included as qualification conditions for participating in an auction of the exclusive concession.</p> <p>We strongly recommend against a complex multifactorial evaluation process involving both price and quality aspects of the CT service being traded off, not least as it extremely difficult to see how these different aspects might be compared and weighted.</p> |
| <p><i>Open auction to procure an exclusive CTP concession</i></p> | <p>There is a high level of uncertainty about potential take-up of a CT. Also, because bids would be in the form of an average user price, it would be up to potential CTPs to forecast demand for a CT to determine a bid level that allows recovery of their fixed costs with adequate probability. Given these common uncertainties, which are similar for all potential providers, we consider that there is a strong case for using a multiple round (open) auction process. This allows pooling of information regarding these common uncertainties, leading to more efficient outcomes and greater competition.</p> |
| <p><i>Auction formats</i></p> | <p>We propose two simple auction formats that could be used to determine the price cap: a clock auction and an Anglo-Dutch Hybrid auction.</p> |
| <p><i>Clock auction</i></p> | <p>In the clock auction, a price is announced, and bidders are invited to accept this as a price cap. If two or more bidders accept, a somewhat lower price is announced and bidders are asked again. The process continues until just one bidder is left, who then becomes the concessionaire. The price at which this single bidder remains sets its price cap.</p> <p>The possibility of multiple bidders dropping out simultaneously in the clock auction can be managed through exit bids. These are last and final offers made by a bidder who is unwilling to accept the next price announced by the auctioneer, specifying a</p> |

price chosen by the bidder between the current price and the last round price.

Anglo-Dutch Hybrid

The Anglo-Dutch Hybrid is a slight variation on the clock auction, where the rounds are stopped when there are two bidders remaining. The auction then proceeds to a sealed bid, where the two remaining bids make their best and final offers. The lower offer is selected. The winning bid determines the CTP's price cap as before. This approach may have some benefit in creating more competition in the situation where bidders are highly asymmetric, with one party strongly advantaged in the procurement by virtue of its existing assets or operations.

Auction implementation

Both auction formats would be uncomplicated to run as online auctions. One might envisage running two to four rounds per day and the process completing in a week or so.

Incumbency advantages

When granting an exclusive concession, it is essential that thought be given to what happens at the end of the concession period. There are two possibilities:

- a further time-limited exclusive concession might be auctioned; or
- if conditions indicate, exclusivity might be removed, allowing any qualifying CTP to access TVs and APAs on mandated terms.

In either case, it is important that standards for data both ingested and provided by the CTP, and any algorithms or business processes essential to operation of the CT are not proprietary and so subject to IPRs over which the incumbent can assert ownership. This can be avoided by setting appropriate open standards in advance of appointing a CTP or by including an obligation on the successful bidder to make available any such standards that it develops.

1 Introduction

1.1 Scope and background

DotEcon has been commissioned by the Financial Conduct Authority (FCA) to provide advice on structuring a tender process to select a consolidated tape provider (CTP).

Plans for a CTP by 2024

The FCA is committed to having a framework in place by 2024 to support the emergence of a consolidated tape (CT) in the UK. It is envisaged that a single CTP will be tendered for in each asset class (bonds and equities), although providers in one class would not be restricted from bidding for another. Market research has emphasised the necessity to prioritise a bond CT first, as the current market for data in relation to bonds is more fragmented.

Lack of entry to date

Despite legislation that would permit any number of CTPs to exist in the market, no firms have sought authorisation to date. Therefore, our starting point is to consider reasons behind the lack of entry to date and what might encourage future entry, especially in terms of access to data from trading venues (TVs) and other approved publication arrangements (APAs, where post-trade data is published on behalf of investment firms).

Appointing an exclusive CTP does not preclude subsequent competition

There are no compelling reasons to expect that the provision of a CT is subject to natural monopoly conditions. Nevertheless, in an environment where entry of a CTP has not occurred so far, it may be that creating a single CTP for a limited period, and allocating this exclusive concession through an appropriate auction process, could reduce uncertainty and encourage entry. This does not preclude subsequent entry of other CTPs after the term of exclusivity lapses. Therefore, whilst we develop proposals for an auction of a concession for a single CTP in each asset class, this does not imply any view on the eventual viability of multiple CTPs.

1.2 International progress on CTPs

EU proposals for a CTP

In 2018, MiFID II (Markets in Financial Instruments Directive) took effect as a legislative framework in the EU for regulating financial markets and improving protection for investors. The

provisions were also intended to promote pre- and post-trade transparency. Regulators had hoped the changes would encourage firms to seek authorisation as CTPs under the framework provided. However, to date, no firm has applied for authorisation as a CTP in the UK or the EU. As investors continue to grapple with data fragmentation and quality issues, the European Commission (EC) has proposed legislation requiring the European Securities and Markets Authority (ESMA) to launch a public procurement process to select a viable CTP.¹ The legislative process for determining the procurement process is ongoing.

Reasons for lack of entry given by stakeholders

Market Structure Partners have undertaken a comprehensive study² for the EC into the creation of a CT for both pre- and post-trade data in the equity and bond markets in the EU.³ They engaged with 200 stakeholders across the industry. The study found high prices and poor quality of data to be impediments to the entry of a CTP:

- The study found that TVs and APAs can price their data as they wish, due to the monopolistic power that each entity enjoys in relation to its own particular data. An aggregator needs data from all TVs and APAs, so each one is an essential counterparty. Major TVs and APAs often price their data as if it represented the entire market. As some users use one venue's data in such a way, such pricing squeezes a consolidator who must collect data from all venues.
- Stakeholders also blamed poor data quality and complexity, which takes significant effort to collect and compile, as a reason for the failure of a CT to emerge. This problem originates in the lack of a centralised rule enforcement, with National Competent Authorities (NCAs) overseeing TVs and APAs in their home markets, which often collect subsets of data from participants in other markets. These frictions produce undetected errors and significant time lags, conflicting with the real-time data outputs that users seek to purchase. There is no requirement or penalty mechanism

¹ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021PC0727>

² <https://marketstructure.co.uk/our-work/eu-consolidated-tape/>

³ Our scope is somewhat different, as we are only concerned in this report with post-trade data.

for poor data submissions, and no current agreement on how this could be remedied.

*Recommendations
for an exclusive
CTP*

The Market Structure Partners study recommended that a single exclusive consolidated tape provider (ECTP) be created across both bonds and equities. To lower barriers to entry, data aggregators would be mandated to provide pre-, post-trade and end-of-day data to the ECTP for free. A revenue sharing mechanism would be in place to fairly share revenue generated by the consolidator amongst data contributors based on the value of the contributions. The ECTP would have the power to enforce standards, rules and regulations, including imposing penalties. The study draws heavily on the US model for equities, where self-regulation and revenue sharing are prioritised.

US experience

In the US, three data aggregators (so-called Security Information Processors - SIPS) already exist. However, they are exclusively responsible for consolidating different datasets and do not compete to aggregate the same data. Nasdaq and NYSE run the technical aggregation of distinct sets of listed securities' pre- and post-trade data into one official dataset. FINRA⁴ aggregates and cleans off-venue post-trade data, and consolidates on-venue data.

The equities tape operates on a revenue sharing model, whereby exchanges are mandated to provide data to the consolidator in return for a share of the revenue generated. In the bond market, participants are paid to report trades without taking a share in revenue. Off-exchange data aggregation is run and self-regulated by FINRA and on-exchange is by the self-regulating organisations ICE, NYSE and NASDAQ. This process is overseen by the Consolidated Tape Association (CTA), which is ultimately answerable to the Securities and Exchange Commission (SEC).

In 2020 the SEC made amendments to its Regulation National Market System with the aim of replacing the current model of three SIPs each with exclusivity (for distinct sets of securities) with competing consolidators.⁵ These consolidators would not be subject to any coverage obligation, on the assumption that competition would provide incentives to meet consumers'

⁴ The Financial Industry Regulatory Authority (FINRA) is a private American corporation that acts as a self-regulatory organization regulating member brokerage firms and exchanges.

⁵ SEC Release No 34-90620 available at <https://www.sec.gov/rules/final/2020/34-90610.pdf>. See also <https://www.sec.gov/news/press-release/2020-311>.

needs. However, in response to perceived delays in moving forward with these changes, NASDAQ has recently announced its own proposals for a single CT provider.⁶

1.3 UK setting

The Edinburgh Reforms

In December of 2022, the Chancellor of the Exchequer announced the Edinburgh reforms⁷, highlighting the importance of the financial sector in the UK's growth strategy. The package introduces 30 policy initiatives designed to take advantage of the UK's position outside the EU, to "*maintain and build the UK's attractive and internationally respected ecosystem for financial services regulation.*" One of these initiatives is to have a regime in place for a CT by 2024.

Wholesale markets review

Prior to this, HM Treasury conducted a wholesale markets review consultation, which reported in March 2022.⁸ The responses overwhelmingly supported the introduction of a CT in the UK, identifying a more pressing case for a CT in the fixed income market than for equities.

Proposals following from the wholesale markets review

The UK Government is now considering implementing some legislative changes to facilitate the emergence of the CT, detailed in the wholesale markets review. It was proposed in the response to consultation that TVs and APAs be mandated to provide data to CTPs, although the price of this data has yet to be determined.

Initial proposals were for CTPs to provide 100% coverage of equity and 80% coverage for fixed income trading activity.⁹ The relaxed requirement for the bond market coverage was intended to encourage CTP entry, but it was noted that 100% coverage might be possible depending on how the mandated supply of data to CTPs is organised. It was also proposed that the current requirement for CTPs (as distinct from the similar obligation on TVs and APAs) to provide data streams for free after 15 minutes would be removed. Simplifying and

⁶ <https://www.nasdaq.com/articles/a-blueprint-for-sip-modernization>

⁷ <https://www.gov.uk/government/collections/financial-services-the-edinburgh-reforms>

⁸ <https://www.gov.uk/government/consultations/uk-wholesale-markets-review-a-consultation>

⁹ "Wholesale Markets Review: Consultation Response", HM Treasury, 1 March 2022, §7.10. Available at <https://www.gov.uk/government/consultations/uk-wholesale-markets-review-a-consultation>

standardising the fixed income deferrals regime and introducing new governance requirements were also suggested.

2 Why has no CTP emerged?

In this section, we consider the reasons why no CTP has emerged in the UK or EU to date and what significance should be drawn from this for the design of a procurement process for a concession to operate an exclusive CTP.

We acknowledge that there are existing data aggregators who already combine data feeds.¹⁰ However, they would not meet the likely requirements on a CTP:

- First, they would not provide systematic coverage across all (or at least the large majority) of TVs and APAs.
- Second, they may bundle aggregated data along with other services, in contrast to a CT being available on a stand-alone basis.

2.1 Data access issues

CTs have universal or near-universal coverage

The defining characteristic of a CT is its universal (or near-universal) coverage of data from TVs and APAs. This means that a CT can provide a comprehensive and authoritative view of trading conditions. If a CTP were given preferential access to data from TVs and APAs through regulatory action (which we discuss below), then the CTP would need to meet data coverage requirements as a condition of that preferential access, irrespective of whether that CTP was exclusive.

Data providers are essential counterparties

Therefore, from the perspective of a CTP with a universal coverage requirement, every individual TV and APA is an unavoidable counterparty. Although different TVs and APAs may report trades of the same financial instruments, it is not the case that data from one source is a substitute for data from a different source. Therefore, each TV and APA has potential market power in the supply of data to a CTP.¹¹

¹⁰ Refinitiv and Bloomberg offer market data feed packages and fintech companies such as Finbourne, Propellant Digital, Glimpse and BMLL offer similar products.

¹¹ There is a strong analogy to regulation of mobile call termination. Each mobile phone operator charges other operators for delivery of calls to its subscribers (so-called termination). Termination on each individual network has been found to be a relevant market in its own regard, as terminating a call on a different operator's network is clearly not a substitute service. As a result, call termination rates have been subject to price regulation.

*The role of
coverage
obligations*

Whilst a coverage obligation on a CTP is essential to achieving the policy objective of obtaining a comprehensive, unified view of trading in financial instruments, it also means that each TV and APA becomes an essential counterparty. Even if a TV or APA is providing data directly to other users, some of whom might be price sensitive, this does not constrain the price it could set for CTPs.

Relaxing the coverage obligation on a CTP potentially allows it to avoid some smaller data providers and so may improve the CTP's bargaining power relative to TVs and APAs. Therefore, a lighter coverage obligation might make a CTP's business case more attractive as it offers additional flexibility.¹²

We understand that this is the rationale for the 80% coverage obligation for bonds suggested in the Wholesale Market Review. However, the desirability of such a relaxation from universal coverage depends on what other measures are taken to encourage entry by a CTP, especially in relation to the price of data from TVs and APAs. If data is made available for free and an exclusive CTP appointed, then relaxation of the coverage obligation to further encourage entry may be unnecessary. With such interventions, a universal coverage obligation¹³ may be compatible with a CTP having a viable business case.

However, both bond and equity data sources in the UK are quite concentrated, with single venues accounting for significant shares of the overall available data.¹⁴ Therefore, in practice, it may be that even with a relaxation of coverage obligations some major data sources would continue to be unavoidable counterparties for a CTP.¹⁵ In such circumstances, relaxing the coverage obligation would be of limited commercial benefit to the CTP, yet still risk undermining the objective of a CT in providing a consolidated view of trading.

¹² Of course, a CTP with a lower coverage obligation might choose to surpass this, as otherwise the CT might not be sufficiently attractive to users.

¹³ Universal coverage would require provisions to deal with newly authorised TVs and APAs, with some phasing of the obligation on CTPs to ingest data from these venues likely to be needed.

¹⁴ See FCA, "Trade Data Review – Findings Report", March 2023, §2.23 and following. Available at <https://www.fca.org.uk/publication/corporate/wholesale-trade-data-review-findings-report.pdf>.

¹⁵ We have had sight of confidential FCA data, not reported here, that confirms this conclusion.

Limits on market power are weak

TVs and APAs are under an obligation to provide data to users, including potential CTPs on a reasonable commercial basis.¹⁶ In practice, the main constraint on pricing is the threat of users raising complaints. However, complaints are costly to bring and need to have sufficient chance of success, which is difficult to judge for two main reasons:

- Data users are at a significant informational disadvantage, as they do not know what costs data sources are incurring. Therefore, it is difficult to judge whether data sources may be over-recovering costs;
- Claims by CTPs of undue discrimination by data providers are difficult to judge.

With regard to the second point above, it is common for data to be sold through differentiated contracts with different prices in order to reach different user groups. Indeed, it is economically efficient to use such pricing structures.¹⁷ Such price discrimination is economically efficient, but it is difficult to draw a clear line between efficient price discrimination and undue discrimination.

Individual data sources arguably have dominant positions in the supply of their data, as other data sources are not effective substitutes. This could allow them to act largely independently of any competitors and their consumers. Therefore, data users might have competition law sanctions available against abusive behaviour arising from a dominant position. This could include setting abusive prices under Chapter I of the 1998 Competition Act. A CTP might also have a claim for undue discrimination

¹⁶ The obligation on TVs arises from Article 13 (1) of Regulation of (EU) No 600/2014 of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments and amending Regulation (EU) No 648/2012, found at <https://www.legislation.gov.uk/eur/2014/600/contents#>. The obligation of APAs arises from Article 14(10) of the Data Reporting Services Regulations (2017), found at <https://www.legislation.gov.uk/uksi/2017/699/contents>

Regulation of (EU) No 600/2014 of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments and amending Regulation (EU) No 648/2012, Article 13(1) <https://www.legislation.gov.uk/eur/2014/600/contents#>

¹⁷ We discuss this issue subsequently when considering licence terms. Creating data typically involves some fixed cost but disseminating it – especially electronically – has low marginal cost. Price discrimination across users means that higher value users can make a greater contribution to fixed cost recovery and prices can be kept down for lower value users who might otherwise be priced off.

under Chapter II of 1998 Competition Act if treated differently from other data users without good cause.

However, such use of competition sanctions is legally untested and would hinge on identification of a relevant market comprising supply of data by each individual market. This leads to each data source being a *de facto* monopolist.¹⁸ For data users to pursue such an action would be costly and uncertain.

Therefore, in summary, an obligation to supply data on a reasonable commercial basis should prevent egregious over-recovery of costs by TVs and APAs. However, it is ineffective in preventing the exercise of at least some market power by TVs and APAs.

Pricing of data

The FCA found in its trade data review¹⁹ that prices have been increasing:

- total revenue from trade data increased from £203m to £232m between 2017 and 2021;
- 77% of data users questioned reported increased expenditure over this period, with median expenditure increasing by at least 30%;
- some data subscription prices increased by up to 40% over that period, with price increases suspected to be a major cause of expenditure increases.

Clearly some of this increase in expenditure could be related to greater take-up of licences by users, but the FCA found evidence of users keeping tight control on the numbers of licences used.²⁰ Broadly consistent with the FCA's findings, AFME report that the spend on fixed income market data on the sell side increased by 50% between 2017-2021 and 25% for sell

¹⁸ Market definition in this situation is a not a simple question. Some users already use data from large venues as a proxy view of the whole market in a financial instrument. For such users, it might be possible to use a different venue in a similar manner, in which case data from different venues may be substitutes. However, this is less possible for financial instruments that are less liquid. Once a CTP is under obligation to cover all TVs and APAs, such flexibility to switch between data sources is lost. The existence of other data users with some flexibility may do nothing to constraint the price that could be charged to a CTP absent regulation on TVs and APAs.

¹⁹ FCA, "Trade Data Review – Findings Report", March 2023, §2.51f. Available at <https://www.fca.org.uk/publication/corporate/wholesale-trade-data-review-findings-report.pdf>

²⁰ [ibid] §2.58

side market data more generally.²¹ Over this period, inflation was low and one might expect underlying costs to have been primarily IT-related, which should have been falling due to technological improvements. These trends are not conclusively proof of excessive pricing, but are suggestive given that there is reason to think costs are unlikely to give rise to such an extent as prices.

*Data
standardisation*

Whilst the price of data is likely the primary concern of a potential CTP, it would face a further barrier from lack of standardisation in the data provided by different sources. A requirement on TVs and APAs to provide data on a reasonable commercial basis does not imply any requirement for standardisation.

Standardisation of inputs is a much more significant issue for a CTP ingesting data from all (or most) venues, as opposed to a data aggregator who might be taking data selectively from only some, primarily large, venues. The Market Structure Partners report for the EC found that TVs and APAs in the EU often have bespoke data standards and that there were concerns that complex and low-quality data could require significant effort to clean and compile.²² A CTP would need to deal with these issues for all TVs and APAs whose data it ingests, although the disparities across UK venues may be smaller than in the EU. Costs of normalising data would not obviously be much smaller for data taken from small venues (as such costs are driven by setting up processes to account for differences in standards and formats, rather than volumes of data processed).

We would caution against thinking of standardisation as being purely a matter of data formats and data exchange. There also needs to be processes in place for dealing with outages in data feeds and updates to correct data errors. These are operational issues that need to be explored with potential CTPs and data providers.

*Penalties for poor
data*

Data quality needs to be supported by appropriate mechanisms for penalising TVs or APAs who supply poor data (e.g. incorrect or late data). In typical commercial transactions one would expect this to be resolved by negotiation. The provider of data may want to signal that its data is high quality by taking on penalty terms within the supply contract, that then allows the

²¹ <https://www.afme.eu/publications/reports/details/the-rising-cost-of-european-fixed-income-market-data>

²² <https://marketstructure.co.uk/our-work/eu-consolidated-tape/> (Executive summary, Chapter 6)

provider to charge more for a high-quality product. However, in a situation in which there is highly asymmetric bargaining power between a CTP and data providers, there may be inadequate incentives to reach such agreement.

Poor incentives for efficient vertical relationships

More generally, where a CT might expand the demand for data by bringing in new customers, there should be scope for mutually profitable arrangements to be struck between TVs/APAs and the CTP. However, many parties are involved here. To the extent that a CT would expand demand for data and boost revenues, individual TVs and APAs, especially larger ones, have an incentive to try to capture these benefits.²³ TVs and APAs may make incompatible demands on the profits available from the CTP and efficient arrangements may then fail to form.

Incentives of TVs and APAs

There is some evidence to support the view that a CTP's interests may not wholly align with those of TVs and APAs. In particular, the FCA's recent wholesale market review²⁴ found that some venues (especially larger ones) are earning material revenues from data feeds (especially for equity data). Larger venues have the advantage that, in the absence of a CT, they might provide a proxy for a comprehensive market overview (for at least some instruments). Given this, it is reasonable to be concerned that TVs and APAs, especially those that are relatively large, may have an incentive to frustrate entry of a CTP. This is because a CTP may cannibalise margins that TVs and APAs are currently earning on data they sell directly.

2.2 Demand uncertainty

Sensitivity of business case to demand assumptions

The other main impediment to entry of a CTP is uncertainty about the demand for a CT. It is reasonable to expect that much of a CTP's cost base is fixed rather than related to the number of users served. Therefore, a potential CTP's business case will be sensitive to assumptions about demand for CT services.

²³ There is a free-rider problem between the TVs and APAs, because individual venues seeking to gain a greater share of the benefits of demand expansion caused by a CT may then lead to costs of data for the CTP becoming too high and entry not occurring. In effect we have a "tragedy of the commons" where TV/APAs collectively demand too much and the opportunity to expand the market for data through a CT does not occur.

²⁴ FCA, "Trade Data Review – Findings Report", March 2023.

Furthermore, much of the cost of a CTP will be related to setting up systems and processes for ingesting, transforming and disseminating data. Many of these costs will be sunk and irrecoverable if demand for CT services proves insufficient to allow profitable operation.

Market Structures Partners' report estimates that "tens of thousands" of professional participants and many more retail investors would use CT data (across both bond and equity markets) if it were to become readily available in the EU market. However, the scale of this demand expansion is untested and likely to depend on the pricing and other characteristics of the CT offer as well as the competitive response from data providers.

User segmentation

Much of the complication comes from there being multiple CT user segments. Differentiated licences (and pricing) are likely to be needed to serve all of these segments adequately. Indeed, the FCA's trade data review finds a multiplicity of licences in use (though users also report problems with the complexity of licences that may limit competition and with the proliferation of new licence types)²⁵.

At present, some data users buy data feeds directly from TVs and APAs. Some of these will continue to do so, even if a CT is available, as they require low latency data to enable trading on these platforms. This is probably most important for equity data. The additional delays from a CTP having to ingest data from TVs/APAs and format and export consolidated data may rule out use of a CT for these purposes. However, other existing users may switch to a CT to benefit from the more comprehensive view.

It is expected that there would be take-up of a CT from retail investors, which would constitute entirely new demand for the underlying data. Brokers may use a CT to provide services to retail investors through portals.

Differentiated licences

Because of the variety of different potential users of a CT, differentiated licence terms would likely be required to maximise take-up whilst ensuring that the CTP can cover its costs. As marginal costs of disseminating data are fairly low, the pricing structure is primarily an exercise in recovering the fixed costs of data ingestion and reformatting in an efficient manner. Otherwise, as discussed above, there is a danger that without appropriate differentiation, lower-value users might be priced

²⁵ FCA, "Trade Data Review – Findings Report", March 2023, §2.72f.

off by terms targeting high-value users, or that fixed costs would not be covered by lowering prices across the board to attract more lower value users.

Coming up with an appropriate set of differentiated licence terms is likely to be one of the key challenges in preparing a CTP's business case. We cannot expect to anticipate how licence terms might be structured at this point, and it will be important to allow a CTP to determine the most appropriate mix of licences using its knowledge of the likely demand for its services. This will require an evaluation of different user segments, including the size of these segments and the relative sensitivity of their demand for CT data to price. However, we can appreciate that the following aspects of differentiation are likely to be important:

- direct consumption of CT data without a right to reformat or redistribute versus a right to create a further services (e.g. a broker's portal); and
- intensity of use of CT data, possibly measured by frequency of access, number of datapoints accessed and so on.

We will return to the question of what core services a CTP might be obliged to offer below in Section 4, but for now we note that designing of a mix of licences that serves different users is not straightforward.

2.3 Implications

What implications should we draw from the lack of entry of a CTP to date in both the UK and the EU? At minimum, this indicates that a CTP's business case is fragile.

We have seen above that a structure with multiple TVs and APAs feeding data into CTP, for whom each is an essential counterparty, is unlikely to result in entry of a CTP through commercial negotiation, even if the data providers are required to offer data on commercial terms. Each data provider cannot be compensated with the marginal value of its contribution to the CTP. In the US, where there has been some success with CTPs emerging organically, they do not have full coverage, which is likely to lessen these incentive problems.

We understand that the UK Government's policy objective²⁶ is best met by a CTP having a high level of coverage of TVs and APAs., otherwise the CTP will not act as an authoritative record of transactions for the market as whole.²⁷ Therefore, whilst there are some reasons to think that a CT with less coverage might be easier to achieve, this would not be compatible with the UK Government's ambitions for a CT.

In summary, there are sound reasons for expecting that, absent intervention on the terms of access to data from TVs and APAs, it may be difficult for CTPs with full (or mostly full) coverage to emerge.

²⁶ For example, in the Wholesale Markets Review Consultation, HM Treasury comments at §7.4 that "[g]iven the important role that market data plays in helping markets to function efficiently, the government is keen to improve the quality and usability of market data to enhance the effectiveness and attractiveness of UK markets".

²⁷ Note that this objective is not interlinked with there being an exclusive CTP. Even with multiple CTPs, a high level of coverage of TVs/APAs could be made a condition of being licenced as a CTP (by the FCA) and so receiving preferential access to TV/APA data feeds.

3 Intervention on data access

We now turn to the question of what form an intervention to encourage CTP entry might take.

3.1 Selective intervention

An intervention on the price of data obtained from TVs and APAs would be selective, in that only those qualifying as a CTP would be able to access these data feeds at a preferential rate. Given the preferential treatment of some (and potentially only one) entity, there is a need to define what obligations a CTP must meet in return. We consider the requirements on a CTP in the following Section 4. Clearly if there is an exclusive CTP with a concession that is awarded to a provider, this issue of who can access data on preferred terms becomes trivial.

Preferential access to data for CTPs would be framed as an obligation on TVs and APAs to provide data to a qualifying CTP (or CTPs) on certain terms. TVs and APAs are licensed by the FCA and we understand that the FCA has power to impose such obligations via licence terms. A breach of those terms exposes a TV or APA to the risk of supervisory or enforcement action by the FCA.

3.2 Pricing

Uncertainty

Detailed information about the likely costs and revenues of a CTP is not available. Indeed, potential providers will have greater knowledge of potential demand and deployment costs and would be better placed to make such an assessment. Therefore, given these uncertainties, we cannot realistically expect to characterise a precise price threshold for data supplied by TVs and APAs that is just sufficient to induce CTP entry. Therefore, a prudent approach would be to set price for CTP data access sufficiently low, potentially even at zero, to maximise the chances of CTP viability.

Supplier costs

For data suppliers, the TVs and APAs, the *incremental* cost of supplying data to a CTP is limited to the cost of disseminating data, which are primarily the IT costs of providing appropriate feeds. Therefore, it is reasonable to expect the incremental cost of data supply to additional users to be close to zero.

The *incremental* cost of supplying data to CTPs is the relevant measure of cost to TVs and APAs because we would expect venues to continue to offer data directly to users with low latency requirements as a premium service. Creation of this data by TVs is a by-product of their trading services, so it is unlikely there is a significant fixed cost of data creation that can no longer be recovered if data access were free for CTPs, as sales to other users would remain. However, clearly this conclusion rests on any standards imposed on TVs and APAs regarding their supply of data to the CTP not being onerous, as otherwise there could be significant costs of reformatting data specifically for a CTP.

We understand from the FCA that leading UK trade associations, representing a range of data providers and data users, have recommended that free access to feed data should be a feature of the CTP framework. Market Structure Partners also suggest that all pre-, post-trade, end-of-day and historical data should be made available for free to the CTP established in the EU, at the same speed as proprietary offerings.²⁸

Impacts on TVs and APAs, in terms of their ability to cover fixed costs of creating data and cross-subsidising marginal costs of providing a CTP data feed, are matters that the FCA may wish explore in its forthcoming consultation.

3.3 Standardisation

As discussed in Section 2, concerns have been expressed about lack of standardisation of data feeds from TVs and APAs to a CTP. Lack of standardisation will raise costs for a CTP which, given concerns about the marginal viability of a CTP, could raise risks that no CTP is forthcoming.

Details for standardisation will require industry input from both potential CTPs and TVs/APAs. The issues go beyond data formats and would need to cover procedures for dealing with data outages and rectification of errors. There would need to be requirements for maximum latency of feeds.

Whilst potential CTPs will have useful input in defining standards for data feeds, we strongly suggest that a CTP is not simply able to define its own requirements once appointed. There are two issues that would arise:

²⁸ <https://marketstructure.co.uk/our-work/eu-consolidated-tape/>

- The CTP should not be able to use the force of essentially regulatory requirements to impose terms on TVs and APAs, as these might be too onerous and expose TVs and APAs to excessive cost. This would be unreasonable if TVs and APAs were providing data to a CTP for free. Rather a balance of interests needs to be struck, as would result if the FCA set broad requirements in the light of consultation requirements.
- If an exclusive CTP were appointed, then thought must be given to what happens once the concession to operate ends. There might be reappointment of a single CTP or relaxation of exclusivity to allow other CTPs to enter (each of which would be able to access data on preferential terms provided that the requirements for being a CTP were met). In either case, it would be important that data standards were appropriate not just for the incumbent CTP, but also for any replacement or additional CTPs. In particular, standards for data should not become IPRs of the incumbent CTP.

Furthermore, in terms of practical implementation, standardisation requirements would become part of the obligations on TVs and APAs in supplying data to qualifying CTPs. Therefore, in any case this is a matter for FCA to define.

3.4 Incentive issues for data providers

As we have discussed in Section 2.1, TVs and APAs may be making significant margins on providing data, some of which would be eroded if a CTP can access data feeds for free. Some, but not all, of TVs and APAs direct customers for data would switch to the CTP.

This raises the question of whether data providers have sufficient interest in the success of a CTP. This is likely to be a more significant issue for equities than bonds, as margins earned by TVs and APAs on data provision are larger for equities.

Penalties

A specific concern is that larger data providers (with a greater stake in providing data now and more ability to offer their data as a whole market proxy) who are essential inputs for a CTP could seek to frustrate a CTP. Therefore, there need to be penalties that can be imposed on TVs and APAs if they do not meet their obligations to CTPs. These penalties should be large

enough, potentially up to the scale of lost margins from data supply by TVs/APAs due to the CTP's entry.

Incompletely specified obligations

The obligations on data providers cannot realistically be completely specified. Therefore, there may be some latitude for actions that are within the letter of obligations on data providers, but which harm the CTP. For example, data might be supplied on time, but degraded with errors. It is not obvious how serious this risk is. However, if obligations of data suppliers cannot be framed tightly enough, this raises the question of which TVs and APAs should be given some stake in the success of a CTP to better align incentives.

Aligning incentives

Simply paying a non-zero price for data supplied by TVs or APAs (which might be a fixed price or a price per data point) is not sufficient to create a better alignment of incentives. This is because TVs and APAs revenue would not increase as the CTP's user base grew. Rather, some form of revenue-sharing or profit-sharing arrangement would be required if this were a significant issue.

No particular evidence of incentive misalignments

Interestingly, in a submission to the FCA, a major UK trade association has argued *against* a revenue sharing mechanism, even for an equity CT, given that TVs and APAs are under a mandatory obligation to provide data and it should ensure an affordable CT for investors. Firms who rely on low latency data would likely still purchase directly from TVs, therefore the creation of a CT would not "*unduly disrupt the revenue generated by TVs*". Therefore, it is quite possible that these theoretical concerns have limited practical importance if cannibalisation of existing data revenues of TVs and APAs is limited and there is significant new demand for data brought on by the CTP. Nevertheless, it would be helpful to understand the views of potential CTPs on this issue and we suggest that the FCA seeks feedback in its consultation.

Self-resolution of incentive issues seems unlikely

If, contrary to expectations, it proved that there were serious incentive problems regarding data quality from TVs and APAs, to what extent could the parties themselves collectively resolve these? At least in principle, they could try to agree some efficient arrangement amongst themselves, as often happens in vertically related industries.²⁹ By increasing demand for data from end users, both the CTP and upstream data suppliers could potentially benefit. However, such bargained outcomes

²⁹ For example, this might involve some mixture of rewards and penalties for data sources according to measurable aspects of data quality than affect demand for the CT and/or some revenue or profit sharing by the CTP.

are likely to be frustrated by there being many upstream data providers involved, with each one being essential to a CTP with a coverage obligation. Bargained solutions may fail due to incompatible demands being made for the additional profitability that the CTP and upstream data providers could collectively enjoy if incentives were better aligned; even a single TV could unilaterally block an agreement to hold out for a larger share of any efficiency gains. Therefore, it seems unlikely that an efficient vertical arrangement could readily emerge, not least because of the strong position of TVs and APAs once the CTP is subject to a coverage obligation.

*Unilateral action
by the CTP to
improve data
supply incentives*

Nevertheless, if incentive problems were sufficiently serious, even if achieving a full efficient outcome through bargaining with data providers were infeasible, could a CTP simply make a *unilateral* decision to share revenue or profit with upstream providers in an attempt to secure better data quality at some cost to itself? Whilst this possibility creates a backstop against grossly inefficient arrangements, it is also greatly limited by there being multiple data providers. If the CTP hypothetically rewarded data providers with some profit or revenue share to incentivise data quality, this share needs to be split across many data providers. Further, the quality of each individual data supplier only has a limited impact on the overall quality of the CT and hence the profitability and revenue of the CTP. Therefore, even if the CTP were to pass a large share of profits back to upstream data providers, the incentive effect on each data provider to improve its own data quality is weak. Therefore, we are doubtful that a general profit or revenue sharing arrangement would have much force.

As an alternative to profit or revenue sharing, the CTP could create incentives for specific behaviour by data sources, such as paying bonuses for low error rates or low rates of outage in data feeds. However, if such quality aspects of data feeds are measurable and important to the success of the CTP, then they would be presumably included as licence requirements on TVs and APAs in any case.

*Measurable quality
attributes*

In summary, there is a distinction between:

- data quality that can be *measured* (e.g. time lost due to outages or latency), where minimum standards can be set for TVs and APAs in their supply of data to the CTP, with the potential for enforcement action by the FCA if these are not met;
- difficult to measure or unanticipated quality attributes, where TVs and APAs have some room to degrade data, but

it is difficult to define safeguards against this and so incentive problems could potentially arise.

Importance of minimum data quality standards

Our assumption is that data quality issues can largely be addressed through minimum requirements on TVs and APAs. However, if there are incentive problems, it is difficult to see how simple profit or revenue sharing arrangements could have sufficient force to correct this. Each data provider's choices about non-measurable aspects of the data it supplies would have only a small impact on what revenue it receives back through such a sharing arrangement. Given this general limitation, the focus should be on defining reasonable minimum data quality standards for TVs and APAs supplying CTPs.

3.5 Is a data obligation alone enough?

Free entry model

One possible approach to encouraging entry of a CTP is to create an obligation on TVs and APAs to provide data to a CTP if one emerges and then see what happens. The obligation to supply standardised data at a zero price only applies where the CTP meets the necessary requirements to be a CTP (which we discuss in Section 4). This approach does not require any procurement exercise to appoint an exclusive CTP. In its simplest version, one or more CTPs simply decide to enter and make use of preferential access to TVs' and APAs' data.

Natural monopoly

Under this approach, if it turned out that providing a CT was a natural monopoly, with revenues only sufficient to support one provider given the fixed costs of operating, then we would expect entry of just one CTP. Further entry would not occur. As a result, there would be a race to become the CTP, as the first entrant would establish a position that could not be readily contested subsequently.

Allocating an exclusive concession

If CT provision were indeed a natural monopoly, then it is unattractive to have a single provider with a position that may be difficult to contest. In this case, it may be more appropriate to create a time-limited concession to operate as an exclusive CTP and then tender this concession, as we discuss in Section 5. There are two main benefits from this more formalised process:

- it might eliminate uncertainties about success in a race for a natural monopoly position that might hold entry back; and
- it becomes possible to impose some price controls and so avoid the welfare losses that come from exploiting a

monopoly position (including higher prices and worse quality).

With regard to the first point, if natural monopoly conditions do apply and the business case for a CTP is fragile, then it may be that auctioning an exclusive CTP concession in a formalised auction process could be more successful than simply allowing the firstcomer to take the market. This is because it would be possible to use a dynamic auction for procuring an exclusive concession in which bidders would pool information about the valuation of the concession as the auction progressed. This is the issue of *common value* uncertainty, which we discuss in Section 5. This risk reduction, especially in the context of significant uncertainty about demand for a CT, may be helpful both for encouraging entry and efficient selection of an exclusive CTP.

On the second point, if there is a reasonable likelihood that entry of a CTP might occur, but not any further entry, then we would have a CTP with a monopoly position (though exploiting this may be somewhat constrained by the possibility of taking data directly from TVs and APAs). By creating an exclusive concession, it becomes possible to add price controls on the CTP, as we will explore in Section 4.

Multiple CTPs

If costs and revenue conditions were such that CT provision were not a natural monopoly, then multiple CTPs could operate in the same asset class. Therefore, the approach of simply setting an obligation on TVs and APAs is potentially attractive if we think that multiple entry is possible. However, it is difficult to be certain about this. Therefore, the more prudent approach might be to initially allocate a time-limited exclusive CTP concession, with provisions to ensure that its pricing for users is reasonable, and then maintain the option to open up competitive provision of CTs once this initial concession has ended if circumstances indicate.

We understand that the FCA considers there could be some benefit to having a single CT for an asset class, as this ensures there is an authoritative and undisputable source of data. This might simplify some uses of the CT (e.g. writing contracts on CT data, or reproducing historical analysis). It is difficult to assess how substantial this benefit might be, but we would expect it to be related primarily to the initial introduction of a CT. Once in place, if a subsequent CTP entered (after the end of any exclusive phase), then we would expect it to conform to similar standards for its outputs as the incumbent CTP, both due to the requirements on the CTP and because CT users would have

become familiar with data in particular formats. Therefore, the argument for a single, authoritative CTP would carry less weight beyond the limited period of any exclusive concession.

4 Design of the CTP concession

In this section, we consider what requirements a data aggregator must meet to be considered at CTP. A clear definition is needed, as meeting these requirements would entitle preferential access to data from TVs and APAs. We also consider the question of whether an exclusive CTP would need to be subject to price controls and what form these might take.

4.1 What must be provided?

For the government's objectives for a CT to be met, it should have certain characteristics:

- It must have adequate coverage of TVs and APAs to provide a unitary and authoritative view of the market. This will typically need coverage of the large majority, if not all, TVs and APAs. We understand that the FCA's current intention is to set a 100% coverage requirement both for bonds and equities, with some adjustment period in the case of a new TV/APA entering the market.
- The data outputs need to be sufficiently reliable. In practice, that means up-time requirements for data feeds to customers and target times for (i) recovery from outages in data in-feeds and (ii) propagation of corrections to previous data.
- Data should be provided in a timely manner. There will always be a latency penalty associated with aggregation of data through the CTP, but this should be kept within acceptable limits for general users. Appropriate requirements may differ by asset class.
- An appropriate variety of licences should be offered for the CT data to attract a wide range of potential users. Expanding the overall market for data by appealing to retail investors and brokers (who are likely to be main sources of new data users) would be a key priority. Again, details may depend on the asset class.
- The CT service needs to be available on a standalone basis, rather than bundled with other services. This does not preclude a CTP offering additional value-added services but a 'plain vanilla' CT service (or services if necessary to serve different customer groups) should always be available.
- Data should be provided in formats appropriate for users. This will certainly include computer-readable feeds, but

web interfaces to allow manual queries are also likely to be needed by some users (e.g. retail investors).

- Historical data should be available. Although third parties could in principle store data received from the CT to provide a history, an obligation on the CTP to provide this would assist in the CTP providing an authoritative view of market.

Understanding users

Ultimately these requirements derive from users' needs. Therefore, the guiding principle in setting these requirements is that user needs are met to a sufficient degree that the policy objectives for a CT are achieved. Therefore, it may be useful to gain more understanding of specific user requirements through the forthcoming consultation exercise. However, users are differentiated, and some segments may be more difficult to engage with than others (e.g. retail investors).

Cost implications

Excessively onerous obligations on the CTP could raise the CTP's cost without achieving a sufficient countervailing benefit to users. Given concerns about the viability of a CTP's business case, we need to be careful about unnecessarily raising the CTP's costs.

Uptime and latency requirements are likely to be particularly important drivers of the cost of the IT platform needed to deliver the CT service.

- If uptime requirements are set too strictly, it may be difficult to meet them using portfolios of off-the-shelf cloud computing services. In turn, this may raise costs and even restrict the field of potential providers.
- Shorter latency requirements will require more computing resources within the CTP's platform for a given size of user base, with incremental benefits being limited by the fact that users with low latency requirements would be likely to continue to take direct feeds from venues in any case.

It would be useful to engage with potential CTPs to understand at what point obligations on uptime and latency would become onerous and trigger significant additional platform costs. We note that obligations might in principle be different for different asset classes depending on both the reliability of data feeds from TVs and APAs, and users needs for reliability and latency.

4.2 Licence terms

Design of licences

One of the most difficult questions is the design of user licence terms for the CT. We would expect a single licence type to be inadequate given the various different user segments likely to make use of a CT. At minimum, licences would likely be differentiated according to whether the licensee is:

- taking CT data for direct use without any right to resell the data or sell services derived from data (a **no-reuse licence**);
- using the CT data as input into derived services (e.g. brokers' portals), including re-sale, re-formatting and embedding within other services (a **re-use licence**).

Flat rate charging

The simplest pricing scheme for either type of licence is a flat charge per period for access regardless of the volume of data consumed. This would probably be adequate for licences allowing re-use, as it is hard to see how licence terms could be differentiated further according to the nature of the re-use. Creating complex alternative licences for different types of re-use is difficult without making assumptions about derived services that might use CT data. These could range from simple indices, through to complex analysis of historic data, bundled advice and trade execution services.

Usage-based charging

For no-reuse licences, it is unlikely that simple flat charging would be efficient, as users could range from individual retail investors to large corporate users. The fixed costs of the CTP platform would be more efficiently recovered, leading to greater overall use of the CT, if larger users were to contribute a greater share of fixed costs. Simple flat charges do not have this feature.

Differentiated direct use licences

Further differentiation of no-reuse licences according to some notion of the volume of data used may be appropriate. There are many possible models, but considering analogies in data and software licensing, two common approaches are "per seat" licensing and some form of usage metric.

Per seat licensing

Taking per seat licensing first, an organisation would declare the number of distinct users making use of the CT service. The simplest approach is a linear schedule (i.e. a constant price per seat), which entails larger organisations paying more. However, it is common to see quantity discounts in per seat software licences, where the price per seat falls as more seats are taken. This provides an incentive for an organisation to increase the number of registered users, as marginal prices fall with more users. Expanding demand benefits other users as they need to contribute less to recover the CTP's fixed costs. Often such quantity discounts are implemented coarsely through tiered

licences (i.e. a fixed charge between some minimum or maximum number of seats, with a number of such ranges).

Usage metrics

Another good analogy is licensing of hosted databases and backend application software accessed over the Internet by frontend software interacting with end users. An example would be a mobile app calling a search service or accessing some real time information resource (for example, train scheduling and movement databases). A common pricing model is to create tiered licences according to some usage metric, such as the number of API calls or database queries run over some period (say a month).

Strawman licence types

In summary, a possible 'strawman' model for differentiated licences that might reasonably meet the needs of a wide variety of different users could be:

- A single-user licence allowing web access and some limited number of queries for computer readable data, but with **no reuse right**;
- Above this, a number of further tiers of **no-reuse licence** increasing price with the number of seats, but applying a quantity discount and allowing corresponding greater numbers of queries for computer readable data;
- A **re-use licence** allowing access to computer readable data for re-use, re-formatting and creation of derive services.

This is only intended to be an example to illustrate the issues of disseminating CT data to a wide variety of different users. Again, input from potential users and potential CTPs may help in understanding what models for differentiated licensing would be useful to expand demand for CT services. It is also possible that the needs of users will differ by asset class, leading to somewhat different licences.

Arbitrage across licence types

We note in passing that arbitrage by users could place limitations on the possible pricing structures for these strawman licences:

- First, if steep quantity discounts are used for no re-use licences, then there will be incentives for users to aggregate their requirements, where possible, to enjoy a lower unit price. This can largely be addressed by appropriate legal definitions. (For example, what is the entity holding the licence and how are seats counted within the entity?) Very similar issues arise commonly in software licensing and this is unlikely to be a significant limitation.

- Second, very large users might choose a licence with a re-use right to re-distribute CT data without limitation *within* an organisation, as this is cheaper than paying for many seats on a volume-related direct use licence. This might be the case even though the CT data is not being used to create a derived service to be sold on. It seems difficult to avoid this possibility, so it might be helpful to consider a licence with re-use rights as in essence setting the highest total price that volume-related licences can achieve for the largest users.

What flexibility should a CTP have to set licence terms?

Whilst it would be useful to provide some flexibility for a CTP to determine its licensing model after appointment, and possibly to flex it subsequently as the nature of demand for a CT becomes clearer over time, we also need to ensure that the CTP actually provides services that will benefit users and meet the policy objectives of the intervention. This suggests defining at least some basic categories of 'core' licences must be offered by the CTP. However, before considering this issue in more depth below, we turn first to the issue of whether a CTP would have market power.

4.3 Would an exclusive CTP have market power?

Suppose that we were to allocate a concession for an exclusive CTP and that the CTP can preferentially access data from TVs and APAs for free. Would the CTP have any market power in providing the CT in this scenario?

Pricing constraints on a CT

There are likely to be some limitations on the ability of the CTP to raise price³⁰:

- Certain users may consider obtaining data directly from TVs and APAs to be a reasonable alternative if faced by a (hypothetical) high price for a CT. Some users may be able to obtain an adequate view of the overall market through data from a small number of larger data sources. For other users, going directly to some venues may not be a reasonable substitute, as such data might be insufficiently

³⁰ Here we are thinking about a *hypothetical monopolist* test commonly used in market definition. We pose the hypothetical question of whether a significant, non-transitory increase in the price of the CT service would lead to a sufficient loss of customers to alternatives to make such an increase unprofitable.

comprehensive, or not meet requirements for being an authoritative record. These possibilities may vary by asset class.

- New user segments may be price sensitive and some of these might simply cease to buy CT data if the price were too high. For example, it is expected that a CT would be taken up by some retail investors who are currently not consuming data directly from TVs and APAs and who would have a limited willingness to pay for a CT.

Prudential need to limit prices of an exclusive CTP

Therefore, whilst there are some constraints on CTP's prices, we have little certainty these would be adequate to stop the exercise of market power by the CTP. It would be concerning if we created a *de jure* monopoly through intervention. Such an outcome would not achieve maximal benefits from the CT, as there would be potential users who have been inefficiently priced off due to the exercise of market power.

We conclude that awarding an exclusive concession for a CTP would need to come with some means of limiting the prices that such a CTP could charge. We discuss potential approaches to limiting prices in the following section.

Appointing an exclusive CTP for reasons of maximising the potential for entry does not mean that providing a CT is necessarily an enduring natural monopoly. There is no inconsistency between appointing an exclusive CTP in the first instance to maximise the chances of potential providers coming forward, then, once that initial period of exclusivity has passed, opening up the possibility of any party who qualifies as a CTP having access to data from TVs and APAs on preferential terms.

4.4 Regulatory models for CT pricing

We have seen above that are good reasons why, if an exclusive CTP were appointed, it would be prudent to include some form of price control to ensure that the CTP could not set excessive prices and undermine achieving the benefits of the intervention. How might such a control work?

A pre-determined price control

Using competition for the concession to set price control parameters

One simple approach would be to set a price control of some form, pre-determining the parameters of that control. The details of the price control would be announced to interested parties who then factor them into their business cases for becoming the CTP. An auction is then run where potential providers compete by offering payments for the exclusive concession, whose overall profitability they need to estimate. Whoever offered most would win.

The difficulty with this simple model is that, to the extent that the price control was imperfect, the concessionaire would earn some economic rents, which would be reflected in its bid to win the concession. Any price control would very likely be imperfect as the FCA is at a severe informational disadvantage in terms of knowing the likely costs of a CTP.

Furthermore, the FCA would need to set a weak price control to avoid the risk of the concession being unprofitable and no potential providers coming forward.

Using an auction to set a price control

Concessions are often sold by governments to whoever is prepared to pay most (e.g. radio spectrum auctions). If we used such an approach here, it could extract the rents that would otherwise accrue to the CTP. However, this would do nothing to protect users from a monopoly CTP. Moreover, it is not the policy intention for the government to raise revenue from this process at the cost of CT users.

Therefore, a better approach would be to procure the CTP by potential exclusive concessionaires bidding in terms of price control parameters that would subsequently apply if they won. In very rough terms, we might imagine the bidder committing to the lowest price per user winning the concession.

In practice, matters are somewhat more complex because it is likely to be desirable for the CTP to offer several different licence types. Therefore, a price control is not as simple as just capping the price of a single service. However, workable solutions exist to the issue of multiple licence types. We shall work through some alternative approaches below. Anticipating our eventual conclusion, it is possible to use a weighted average of various licence types – a so-called tariff basket – and then control this using a single parameter.

Revenue cap model

Capped revenue model

In a submission to the FCA, a large UK trade association has recommended a **revenue cap model** for a CTP. This would set a 'reasonable return', preventing the selected provider from exploiting market power to maximise profits. The suggested tender process should reveal applicants' estimated costs through bids to set an annual maximum revenue cap.

Incentive problems with the capped revenue model

Under this capped revenue model, the appointed concessionaire would have a limit on the total revenue generated from CT services. Whilst this approach is superficially attractive in terms of limiting any exercise of market power, it comes with a major drawback.

As the CT user base grows, it would be necessary for the CTP to cut prices to stay within the revenue cap. At the same time, even though a large part of a CTP's costs are likely to be fixed, a larger user base would increase some costs (for example, IT systems might need to be dimensioned to deal with larger peak query load). Therefore, the CTP has no incentive to grow the user base. Indeed, if revenue is flat and costs increase as the user base grows, the revenue cap would create a *disincentive* to grow the user base. In our view, this incentive consequence of capping revenue is sufficient by itself to rule out such an approach, as it would unduly limit the benefits of the CT intervention.

Simple price cap

Bidding a simple price cap

To consider alternative approaches, it is helpful to artificially simplify the problem for a moment, by assuming that it would be adequate to require the CTP to offer just a single CT licence type with a simple per unit licence price. We will then add back more realistic features one-by-one.

In this toy model:

- potential CTPs bid a (unit) price for a CT licence;
- the lowest offer becomes the exclusive CTP; and

- the appointed CTP is subject to a restriction not to set a price for a CT licence higher than its winning price.³¹

To formulate their bids under this approach, potential CTPs would need to form expectations about:

- their fixed and variable costs of operating (where variable costs are those that are incremental to issuing additional licences); and
- the potential number of licences they would expect to issue.

A break-even bid would be a price that divided fixed costs across the expected volume and added on any variable (per licence) costs.

Incentives under a simple price cap

Under this **simple price cap model**, there are good incentives to grow the user base, as the CTP retains incremental revenues and benefits from lower average costs. However, as a result, it becomes important for bidders to form volume expectations when deciding what to bid. This contrasts with the revenue cap model, where bidders are fully insured against risks related to future volumes (as they always get the same revenue), but then have no incentive to grow the user base as a result.

Forecasting volumes and incentive effects are interrelated

This link between incentives to grow the user base and needing to forecast future volume to bid for the concession arises for a fundamental reason. If a bidder could formulate a bid without regard to expectations about future volume, then it follows that once appointed as CTP, there is no effect on profitability from changes in volumes and so no incentive to grow the user base. Whilst the revenue cap model reflects a case in which future profitability is at best unaffected or potentially could *decrease* (due to higher variable cost) as the user base increases, the price cap model increases revenue proportionately in line with the user base.

Combining a price cap and a revenue cap

A composite control model

It is possible to create a more complex **composite price control** model in which there is an incentive to grow the user

³¹ This simple model is analogous to a 'pay-as-bid' or first price auction. An alternative is to set the price cap according to the lowest losing bid (i.e. the one but lowest offer), which is a *second price* auction. We discuss the merits of different auction formats subsequently in Section 5. However, in this section we are concerned primarily with the structure of the price cap, rather than how the auction mechanism that might be used to set the price cap parameter(s).

base, but the strength of this incentive is intermediate between the revenue cap model and the simple price cap model.

In this case, there would be a revenue cap model of the form $R \leq \alpha + \beta q$, where R is the CTP's revenue and q is the volume of licences. In the revenue cap model, $\beta = 0$ and α is the maximum permitted revenue. In the simple price cap, $\alpha = 0$ and β is the maximum permitted unit price. If we use both parameters, then potentially α could be set to allow fixed cost recovery and β set to recover variable cost (per licence), plus providing some positive incentive to grow the user base if set somewhat above variable cost.

*Evaluating
composite bids*

The difficulty with this more complex two-part price control is that we now have two parameters to set, rather than just one. In principle, one could imagine a bid for the concession having two linked parts (α, β) , corresponding to fixed and variable costs. However, suppose that we have two bids (α_1, β_1) and (α_2, β_2) with $\alpha_1 < \alpha_2$ but $\beta_1 > \beta_2$. If we suppose that these bidders had made simple cost-reflective bids (which they may not, as this depends on the incentives created by the auction), then the first bid is cheaper on the fixed cost component, whereas the second is cheaper on the variable cost component.

In order to evaluate these two bids, the FCA would need to form its own expectation of the future quantity of licences supplied. However, the FCA would be at a severe informational disadvantage in doing so. In contrast, bidders would need to have formed such volume expectations to create operational plans and build their business cases. In our view, this difficulty in evaluating two-part bids is a severe limitation of this approach.

Furthermore, if we did somehow manage to form some volume expectation \bar{q} , then this would act as a weighting for evaluative purposes. Bids would be ranked according to total expected cost $\alpha + \bar{q}\beta$, which is a weighted sum of the two bid parameters. However, there is little to keep bidders honest in terms of submitting individual parameters reflecting their true fixed and variable costs. Rather, bidders will have an incentive to specify the parameters in a way that gives them the best chance of winning against the assumed weight. For example, suppose a bidder thinks that the evaluative assumption about quantity is too conservative and the true volume will be higher (i.e. $q > \bar{q}$). In this case, the bidder should overstate its variable cost (β) and understate its fixed cost (α) to improve its ranking within the concession auction. The converse occurs if the evaluative

assumption about volume is too aggressive. These incentives to misstate bids can be severe.³²

Reasons for using the simple price cap

For these reasons, we do not see two-part bid schemes as being practical. In contrast, there is considerable merit in the simple price cap model as:

- it only requires a single parameter to be bid in an auction to allocate the concession (on the simplifying assumption of a single licence type);
- whilst bidders need to form volume expectations to determine how fixed costs would be recovered through unit prices, potential providers would be in a much better position than the FCA to form such expectations (which the FCA would need to do in any two-part bid scheme);
- the price cap model provides strong incentives to grow the use base, which may be particularly helpful in a context in which an exclusive CTP concession is being used temporarily to create entry and develop the CT rapidly, with exclusivity potentially being removed at the end of the concession if conditions allow.

Tariff baskets for multiple licence types

Extending the simple price cap to multiple licences

We consider how to extend a simple price cap to multiple licence types. Earlier, we concluded that having multiple licence types was likely to be necessary to allow take-up of a CT by different customer segments. How would a price control then operate?

One simple option would be to price cap a single licence type and then hope that other licence types would be sufficiently substitutable that their prices are effectively constrained by the price-capped licence. This is unlikely to work across the core licence types that the CTP would be required to provide. By definition multiple licences are being offered to expand the user

³² This phenomenon has been observed in practice. There was a sequence of Californian electricity procurement auctions run in 1993 (so-called biennial resource planning update auctions) where differences between scoring rules (which determined winning bids) and settlement rules (which determined what bidders were eventually paid) led to huge bids for capacity payments (analogous to the fixed cost α in our model) and negative bids to supply energy (analogous to the variable cost β). See Bushnell J. and S. Oren (1994) "Bidder Cost Revelation in Electric Power Auctions", *Journal of Regulatory Economics* 6: 5-26.

base by appealing to different user groups and so will have limited substitutability.

A price control needs to cover all licence types

Therefore, we conclude that price control would somehow need to cover all the licence types that are intrinsic to achieving the CT intervention's goals. However, this does not need to include further value-added services that a CTP might optionally provide, as we discuss in the following subsection.

The strawman proposal for required licence types discussed above consists of 'direct use' licences than might be differentiated by usage (e.g. by number of 'seats') and a 're-use' licence to allow further services to be derived from CT data. Taking this as an example, how might a price cap then operate?

Tariff basket price controls

Directly analogous situations arise in telecoms regulation where providers use common infrastructure to offer a suite of differentiated services.³³ Here, the common approach is to use a *weighted price cap*. If we have multiple services with prices p_1, \dots, p_n then there is a pricing constraint that $w_1 p_1 + \dots + w_n p_n \leq \hat{p}$, where \hat{p} is the maximum weighted average price.³⁴ The weights are such that $w_1 + \dots + w_n = 1$, so they reflect the relative importance of the different services within the price cap. The weights can be thought of as defining a 'tariff basket', so that the unit cost of a hypothetical consumer of a basket of services purchased in these proportions is price capped.

The weights might just be set arbitrarily to reflect some notion of the relative importance of the various services. However, it can be shown that the regulated provider will have incentives to choose an efficient structure for relative prices if the weights

³³ For example, leased lines (commonly used by businesses and telecoms operators to connect two points) supplied by Openreach are differentiated by the bandwidth of the connection.
https://www.ofcom.org.uk/_data/assets/pdf_file/0025/216088/wftmr-statement-volume-4-pricing-remedies.pdf

³⁴ In practice there are additional complications from price controls operating over several years, so caps tend to be indexed for some period (often using an CPI-X approach if real costs are expected to fall at rate X) and then re-set following a periodic review.

*Choosing
appropriate tariff
basket weights*

reflect the expected relative volumes of the different services.³⁵ By delegating the pricing decision, the provider can use its knowledge of use characteristics to determine appropriate relative prices for different services within the constraint of the overall weighted price cap.

To set appropriate tariff basket weights, we again have an issue of forming volume expectations. However, this time we only need consider *relative* volumes, rather than form absolute volume forecasts. A common approach to tariff basket caps is to use historic volumes and to update the weights periodically (say annually). However, when starting from scratch, as would be the case here, initial weights would still need to be chosen, which is not straightforward.

Contemporaneous volumes are not typically used to set weights in a weighted price cap (i.e. to set $w_i = q_i / \sum_j q_j$ where q_i is the current volume). This is because it would make it difficult for a price-regulated provider to comply with the price cap. Compliance could only be determined retrospectively and the provider would not know what weights would be applied when setting its prices.

If tariff basket weights are set incorrectly and do not reflect likely relative volumes, then there can be an incentive for the provider to boost prices for services with small weights relative to actual volumes and conversely lower prices for services with large weights relative to actual volumes. However, this problem is typically kept under some control by users' demand responses, as increasing prices too much for under-weighted services will be unprofitable if demand falls sufficiently.

³⁵ Ramsey prices are those that involve efficient recovery of fixed costs common across several services. They involve setting prices at a mark-up over the variable cost of each service. The relative markups are determined by the price elasticity of each service. This results in fixed costs being recovered preferential from less price elastic services, which is efficient as demand is reduced less. If a price cap is set with weights reflecting expected relative volumes of different services and then pricing decisions delegated to the regulated firm, it is profit-maximising to set Ramsey prices (assuming the level of the cap is such that it earns no excess profit and just recovers its fixed and variable costs). Because pricing decisions are delegated to the provider, any private information that the provider has about the relative price sensitivity of different services can be factored into its pricing decision. The structure of demand may be complex, as users might switch between services in response to price changes, as well as choose to take no service at all.

Therefore, incorrect weights lead to inefficient relative prices, but typically not extremely skewed outcomes.³⁶

Sub-caps within a tariff basket

To the extent that there are concerns that a weighted price cap may allow under-weighted services to have inefficiently high prices set, it is possible to use *sub-caps* alongside a tariff basket constraint to limit pricing flexibility. The simplest example of sub-cap is a cap on an individual service price. More generally a sub-cap might be a further weighted price cap applying to some subset of the services within the main weighted price cap. We could also limit the price of one service *relative* to the price of other services.

Sub-caps are typically used in a prudential manner to guard against significantly distorted prices arising from a tariff basket constraint with poorly set weights. They limit, but do not eliminate discretion for the provider to determine relative prices for different services.³⁷

A tariff basket constraint is good candidate for controlling the prices of a multi-licence CTP

This tariff basket approach is a good candidate to use if the CT obligation required several distinct licence types. However, weights would then need to be determined. Dynamic adjustment of the weights might be helpful, but we must remember that we are not trying to set a price control regime in place for an enduring monopoly, but rather ensure that having created a time-limited exclusive position for a CTP, market power is not exercised to a significant degree. Given the limited duration of an exclusive concession and the potential to lift exclusivity at the end of the term, it is not clear that the much greater complexity of a dynamically weighted tariff basket constraint is appropriate.

A simplified tariff-basket approach

Simplifying a tariff basket approach

If we take our strawman licence structure – a single licence type allowing data re-use within derived services with a few tiers of

³⁶ This is in contrast with unlike the earlier discussion about unbalanced components in two-part bids, where in some cases one bid component might be set as low as possible.

³⁷ Clearly if we set sub-caps on each of the services within a tariff basket constraint at a sufficiently low level, then the tariff basket constraint would become redundant. However, typically sub-caps are set loosely so that the main constraint of pricing is still the tariff basket constraint, but flexibility to adjust prices within this constraint is somewhat limited. In this sense sub-caps are prudential, as they are guarding against high prices on services whose weights are too small within the main tariff basket constraint.

“per seat” licences not allowing reuse – then a weighted price cap could be applied directly to these various licence types. However, it is difficult to see how volumes of licences could be anticipated sufficiently well to allow weights for a tariff basket constraint to be set with confidence.

We can overcome this problem with a simplification of the traffic basic approach making use of the specific structure of our proposed strawman licence structure.

Focusing for a moment on no-reuse “per seat” licences, we would expect these to increase in absolute price with a greater number of seats, but the *per seat* price to fall due to quantity discounting to incentivise greater take-up. In this case, we could simply set a maximum per seat price that would apply across all these various no-reuse licence types. The CTP could then choose to discount below this maximum to implement a quantity discount if it wished. This greatly reduces the number of distinct weights that would need to be set. This leaves us with just the relative weight to be given to the totality of the various non-reuse licences on the one hand against the single re-use licence on the other.

Limiting relative prices for licences with and without re-use rights

The only remaining issue is then that it is difficult to anticipate what volume of re-use licences might be issued for a CT. If they are given too little weight in a price cap, there is a danger of a relatively high price being set which may choke off some use of CT data to create derived services. However, the impact of under-calling demand for re-use licences (for example, because there are innovative new services that could be derived from the CT) could be much reduced by setting a sub-cap on the price of re-use licence *relative to* the maximum “per seat” direct use licence price.

It is possible to limit pricing discretion further by setting a further cap on the maximum “per seat” direct use licence price *relative to* the price of the re-use licence (i.e. to cap the reciprocal ratio). However, the rationale for this is less clear. The greatest uncertainty concerns the take-up of a re-use licence enabling derived services, whose volumes are difficult to judge. Innovative services derived from a CT may generate significant additional value for users, although the magnitude of this is difficult to judge. Therefore, the primary risk is that re-use of CT data is choked off because a licence with re-use rights in underweighted in the tariff basket.

A strawman price control

Strawman price cap structure

To summarise, we conclude with a strawman price control to apply to our strawman licences:

- no-reuse licences (i.e. without right to use CT data in derived services) can charge at most some *maximum* per seat price p_N . The provider can apply discounts, for example to create quantity discounts through some tiering structure of different numbers of licensed seats;
- There is a price p_R on a licence allowing data re-use within derived services³⁸;
- A relative weight w for the re-use licence is chosen to reflect the anticipated relative volumes of the two broad licence types;
- Optionally, the ratio p_R/p_N is limited to some maximum value M , set in advance as a prudential measure (and announced to potential CTPs);
- Potential CTPs bid a price cap C , with the lowest price cap winning the exclusive concession;
- The winning bidder has its price cap C applied as a pricing constraint that $wp_R + p_N \leq C$ (together with the prudential constraint $p_R/p_N \leq M$ if used). Within these limits the CTP can choose its own pricing structure.

Indexation

Because a CTP would be appointed for some fixed term, all the price control options above would require some indexation over time, otherwise inflation risk must be considered by potential CTPs and priced in when bidding for the concession. Simple CPI indexation would probably be adequate. A large part of the CTP's ongoing cost base would be IT related. Equipment costs would likely fall in real terms, though there would also be energy costs and personnel costs which are more likely to remain broadly constant in real terms (over the long term). In addition, there would be significant set-up costs associated with designing systems for data ingestion and publishing the CT, and creating detailed licence terms, but these are less relevant to the question of indexation than ongoing costs. Again, input from potential CTPs on this point would be helpful.

³⁸ We have ignored the possibility of a volume-based licence of re-usable CT data. This is because it is not obvious how "volume" of use by different derived services could be measured. In any case, we would expect providers of derived services typically to ingest the entire CT and use a stored copy to provide their service, rather than continuously re-querying the CTP for data.

4.5 Treatment of value-added services

A CTP might want to offer services outside of a core set of required services that it must supply to qualify for preferential access to TVs' and APAs' data. This might be helpful in bringing down the prices of these core services. If we have bidding for an exclusive concession, there may be an incentive to use such value-added services to cross-subsidise core activities to make a bid more competitive on core services. Therefore, there are good reasons to maintain incentives to offer value-added services provided this does not detract from the core function of an exclusive CTP or create competition distortions.

Tying and bundling We emphasise that there would need to be an obligation to provide **a defined set of core CT services** (such as the strawman licence types discussed above) on an **unbundled basis** and subject to a **price control**. Therefore, core services would need to be offered on a standalone basis and could not be tied to supply of value-added services.

Excluding value-added services from price control It is reasonable for value-added services to be outside the scope of the price control for two reasons:

- Provided the required 'core' services subject to price control have been defined with enough variety to provide some reasonable option for every consumer segment, any value-added service would face at least one 'core' service as a significant substitute. Therefore, the existence of a price controlled substitutable core service would constrain the pricing of the value-added service.
- The core services are essential to achieving the objectives of the CT intervention and are price controlled for this reason. However, value-added services are only incidental to these objectives, though they may assist in terms of expanding the user base further and spreading the CTP's fixed costs more widely.

Anchor products The idea of using a 'core' price-controlled service to constrain the pricing of other services that are not directly priced controlled has been used in some telecoms applications. The 'core' services is commonly called an 'anchor product', which holds down the pricing of other substitutable services.³⁹

³⁹ https://www.ofcom.org.uk/_data/assets/pdf_file/0023/207617/spc-networks.pdf

Distortions in value-added services

Whilst we propose a light-touch approach to value-added services, a concern is that a CTP with market power in core services could use this to gain advantages in adjacent markets for value-added services to the detriment of standalone suppliers of competing services. For example, an exclusive CTP could have a first-mover advantage in offering value-added services by virtue of its position in offering core services.⁴⁰ The main safeguard against this possibility is to ensure that there is a requirement on the CTP to offer a licence allowing re-use of data within derivative services and that this is adequately price controlled.

Margin squeeze

If we consider the CTP itself supplying value-added services and a competing independent supplier of similar services, we ideally want equal treatment in the costs they face. The independent supplier needs a re-use licence from the CTP. However, unless we require some accounting separation of its value-added activities, the CTP can absorb the implicit cost of the CT data it is using in creating those value-added services. Therefore, the independent provider might be subject to a margin squeeze. Such exclusionary behaviour on foot of the CTP's dominant could, in theory, be pursued under competition law. However, as discussed above, this would be a costly and uncertain prospect for independent providers of value-added services to pursue.

Accounting separation

A requirement for maintaining separate accounting of value-added activities could be imposed on the CTP as a condition of appointment. Going further, the CTP's value-added activities could be required to be run on a separated basis. However, we would expect the cost of a re-use licence to be only a small, possibly trivial, component of an independent provider's costs of creating derivative services. Therefore, it is unlikely that such measures would be proportionate, especially if an exclusivity of the CTP were for one term only.

Terms for a re-use licence

Nevertheless, this conclusion does sensitively rest on the assumption that a simple structure for re-use licences is used. The 'strawman' licence design (set out above) envisages a single re-use licence with a single price, which would need to be priced low enough to permit a wide variety of re-use cases. In contrast, it would be problematic if the CTP had the ability to

⁴⁰ We note that a closely analogous situation arose historically with the Ordnance Survey when first commercialising its data. In 2006, the Office of Fair Trading (the CMA's predecessor) had concerns about the OS competing unfairly with independent suppliers of derivative services based on OS data. See <https://cdn.nationalarchives.gov.uk/documents/oft-cupi.pdf>.

create complex structures of different re-use licence and price discriminate against particular users depending on how they were re-using CT data. This would allow the CTP to discriminate against any independent provider competing against its value added services.

Fair trading obligations

Given the potential for an exclusive CTP to distort competition in adjacent markets for services derived from the CT, it may be prudent to include a general obligation for fair trading on the concessionaire. This could include a requirement that the CTP's non-core activities did not exclude or disadvantage independent re-users of CT data. The FCA could maintain a right to request disaggregated accounting data between core and non-core activities if the need arose, without there being an *ex ante* requirement for accounting separation.

4.6 Conflicts of interest

Conflict of interest concerns

The Market Structure Partners report raises concerns about conflicts of interest if a CTP were involved in other data activities and suggests that "balanced governance" arrangements are needed to reflect the interests of the various stakeholders in a CT. There appear to be two main scenarios of potential concern:

- An existing provider of data aggregating services becomes the CTP. To the extent that the CT replaces some of the services currently supplied on which supranormal margins (which is more an issue for equity data), that provider might have an incentive to degrade the CT service (e.g. not market the service adequately, have poor sales processes etc).
- An existing upstream data source for a CT, such as a major trading venue, becomes the CTP. It has an incentive to degrade the CT service to avoid cannibalisation of supranormal margins on direct sales of its data.

Costs of restricting who can be a CTP

We need to consider these possibilities critically, because restricting the potential providers of a CT, especially in a context where no entry of a CTP has occurred and there are concerns about the fragility of its business case, may result in no CTP coming forward, or reduced competition in a competition to appoint an exclusive CTP. Therefore, any restrictions on parties becoming CTPs need to be well-justified, especially where any exclusivity of a CTP within an asset class is time-limited and it

may well be possible to allow multiple, competing CTPs once the term of exclusivity ends.

Concerns arise from market power elsewhere

Concerns about conflicts of interest arise primarily because of defence of existing *supernormal* margins earned by businesses who would face additional competition from a CT. Therefore, there needs to be some underlying competition problem already.

Existing data aggregators

Returning to the first of two scenarios of concern above, there is no obvious reason why a supplier of existing data services (which by definition would be insufficiently comprehensive to be considered a CT) would be in this position. These activities are potentially contestable as all aggregators have similar access to underlying data sources. Therefore, there is no compelling reason to expect that such providers would have a strong defensive motive in hindering a CT. Furthermore, existing aggregators might have cost efficiencies in offering a CT and relevant existing experience that could be brought to bear.

Upstream data suppliers

The second scenario of an upstream data supplier providing a CT is more concerning. We have already identified a concern that TVs, especially large ones, may have market power in the supply of their own data beyond being an essential counterparty for the CTP (which is addressed through the preferential access provisions). There is some evidence to suggest that significant margins are being earned at present on data services, especially for equities (as we have discussed earlier). Therefore, there seems to be at least the potential that a major upstream data supplier might behave in a conflicted manner. However, there are mitigating factors.

First, even if an upstream data source does not become the exclusive CTP, it would in any case face additional competition from the CT. This would likely result in lower prices being set for data directly supplied by TVs and APAs. Therefore, the relevant question is less about what existing margins TVs and APAs make, as these may not be sustainable anyway in the face of a CTP entering, but rather what commercial benefit a major upstream data supplier would have for operating the CT itself in order to degrade the CT service and steer demand towards its own data service. It would not be able to achieve through high prices for the CT if there is a price control on core services. Therefore, such degradation would have to be achieved somehow through non-price elements of the CT service, whilst avoiding non-compliance with the CTP's conditions of appointment.

Second, it is likely that introducing a CT will lead to a significant increase in overall demand for data services (which is part of the reason for the intervention). However, then even a major TV operating a CTP has an expanded market to serve through the CT and attempts to steer towards direct sales of its own data will lose many of these new customers. Therefore, these concerns appear to be limited to only the very largest TVs whose data, by itself, can provide a reasonable proxy for overall market conditions.

Third, if we were to adopt the approach of appointing an exclusive CTP though bidding price cap offers then, if an upstream data supplier has a defensive motive to become a CTP to protect existing supernormal margins, it would make a lower bid. This would result in lower prices for CT users, which in turn would make it more difficult to try to steer demand towards its own data, both because the market expansion created by the CT would be large and it would need to price its own service cheaper in response. Therefore, a system of bidding a price cap to appoint an exclusive CTP has a self-correcting mechanism (to some degree).

Overall, it is difficult to see strong reasons for preventing existing data aggregators or upstream data sources (TVs and APAs) from bidding for an exclusive CTP concession. In the worst case, any concerns appear to be limited to the largest TVs, as smaller upstream data source could not credibly offer their own data as alternative to a CT.

4.7 Duration of term

Trade-offs in setting the term

An exclusive CTP would be appointed for some fixed term. Choosing the duration involves a trade-off:

- A longer term provides a longer period to recover fixed and sunk setup costs of establishing the CTP. Therefore, user price may be lower and incentives for developing the CT service are better. Note that here we are concerned about recovery of fixed sunk costs – those that are unrecoverable on termination of activities – rather than just fixed costs. Fixed costs that are not sunk can be unwound by asset disposal at the end of the concession.
- A longer term means that the period of exclusivity is longer, and any possibility of having non-exclusive CTPs is deferred. If circumstances suggest that exclusivity

should be retained and a further exclusive concession offered, we would still want competition for the concession and potential replacement of the CTP to be possible at sufficiently regular intervals to provide for replacement of an under-performing CTP.

End of the initial exclusive concession

In practice, the concession would need to run for long enough for an CTP to be established and for some review of the performance of the exclusive concession regime to be conducted by the FCA prior to deciding how to proceed beyond the end of this first term. This likely creates a minimum practical term of five years, allowing say 2 years for a CTP to establish, 2 years to observe how the CT performed and 1 year to consider and consult on future arrangements.

Such a period appears to provide a reasonable period for recovery of sunk start-up costs. We note that a large part of a CTP's cost base would be in its IT platform, but this does not obviously result in sunk costs. For example, IT resources might be hired (cloud computing) or if dedicated resources are used, the asset lives of equipment are unlikely to exceed a 5-year term. However, consultation input from potential CTPs will be required on this point.

Comparable public concessions

We would caution putting too much store in analogies where concessions are granted by the government, as in many cases more significant sunk investments are needed that may require longer durations to recover. For example, radio spectrum licences are typically 20 years long, but these involve large amounts of investment in network assets to use. The UK National Lottery has been awarded with 10-year concessions, but this involves creating a large national network of physical terminals.

4.8 Re-award of an exclusive concession

An exclusive CTP for an asset class would be appointed for a limited term. As the end of the term approaches, the FCA would need to reach a decision on whether to re-appoint a further exclusive CTP or to allow allcomers. In the latter case, any party meeting the requirements of being a CTP could access data from TVs and APAs on mandated terms.

New exclusive concession vs. CT competition

In either case, it needs to be possible for other parties to provide a comparable CT and provide continuity for users:

- If a further exclusive CTP is appointed, we do not want to create strong incumbency advantages for the existing provider that would limit competition for the follow-on concession.
- If the CT is opening to competing providers, we want to avoid users having significant switching costs of changing provider, otherwise competition will be hampered.

In addition, having the ability for another provider to take over provision of the CT could be useful if the exclusive CTP were to fail.

Measures to facilitate handover

In order to facilitate the actual or potential take-over of a CT by another provider:

- It should be possible to transfer the user base of a CTP to another CTP. This is largely a matter of ensuring that the CTP maintains a database of subscribers to licences that can be ported.
- The CTP should not gain proprietary rights over the data format of a CT, nor over algorithms or processes for ingesting data and creating the CT. This can be avoided by defining open standards for a CT in advance of appointing a CT and requiring that the CTP conform to these.⁴¹
- To the extent that a CTP has contracts with essential suppliers, it should be possible to novate these to a successor.

Framing detailed obligations on an exclusive CTP would likely require consultation with potential CTPs.

⁴¹ There is a strong analogy to Open Banking. See <https://www.openbanking.org.uk>.

5 Auction design issues

In this section we turn to how a tender process to appoint an exclusive CTP might work. This is a high-level analysis and we do not consider practical details.

5.1 Outline process

As a starting point, we assume that:

- An exclusive CTP would be appointed for a fixed term, say 5 years. The CTP would have certainty that no other CTP with preferential access to TVs' and APAs' data (relative to other data aggregators) would be licenced over this period.
- The CTP has access to TVs' and APA's data for free. TVs and APAs are subject to certain minimum quality requirements on the data they provide;
- There is a requirement on the appointed CTP to provide a small number of 'core' services (likely more than one);
- These core services would be subject to a simple price cap, implemented a tariff-basket constraint (discussed in detail in Section 4.4);
- Potential CTPs would offer a maximum price, which would cap the weighted average price that could be set across the required core licences. The cap would be indexed by CPI over the term of the concession.
- The CTP would be subject to obligations to facilitate the transfer of its operations to another provider at the end of its term and to allow for subsequent potential competition in providing a CT (see Section 4.8).

5.2 Quality requirements

Under this proposed approach, core services would have defined characteristics and quality standards that the CTP would need to meet as minimums. There would be contractual penalties if those minimum standards were not meet.

It is common for tenders to have both price and quality components, with a multifactorial evaluation giving weight to both, for example through scoring schemes. Procurement processes commonly operate in this way.

Why bidding should not have a quality aspect

It is neither practical nor desirable to take such an approach here for several reasons:

- Weighting schemes for quality aspects have a large degree of arbitrariness. It would very unclear what weight should be given to different aspects of quality.
- Achieving the goals of a CT intervention requires a service that meet certain usability criterion to make the service appropriate for various customer groups. Meeting these minimum requirements is essential, but improvements beyond this are difficult to value.
- Use of a simple price cap scheme (rather than a revenue cap) gives good incentives to grow the user base. Therefore, to the extent that users have certain quality requirements, there is an incentive for the CTP to meet these.

Therefore, under our proposed approach, the tender for an exclusive concession would only need to have a price aspect, which can be summarised as a single parameter within a price control that can be directly compared across different bidders.

5.3 Auction formats

We now digress to explain various commonly used auction formats that can be used for single items. Although we are proposing an auction in which bids can be interpreted as the maximum price within a tariff basket constraint, the situation is directly analogous to procuring a single item at least cost. Our set-up only differs in that we are not trying to secure an item at minimum cost for the procurer, but rather ensure minimum price for CT users through the price cap.

There are three common auction formats that are used for buying a single item:

- A **first-price sealed bid**, in which the item is procured from the lowest bidder, who is then paid the amount of its bid. This is a very common approach in procurement auctions.

- A **second-price sealed bid**, in which the item is still procured from the lowest bidder, but that bidder is paid the next highest bid (i.e. the second lowest bid).⁴²
- An **open auction**⁴³, in which bids can be dynamically revised downward until one bidder remains. There are various ways in which this might be implemented. Familiar open outcry auctions follow this approach. A more orderly implementation, suitable for online auctions and with finer control of what information is released is a **clock auction**, which proceeds in rounds. In a clock auction, the procurer sets a reserve price at which the auction opens, then invites bids at that price. If there are multiple offers, a lower price is announced, and new offers invited at this price. This continues until there is only one bidder remaining.

First price sealed bids

In a first-price sealed bid, bidders need to assess the strength of competition they face when deciding what to bid. Bidding less – so closer to cost – increases the probability of winning. However, the bidder gets less surplus (that is its bid amount, less its cost of supplying the item) if it wins. Therefore, bidders will not bid their true costs, but rather some amount above these, with the difference determined by expectations about competition from rivals. This has immediate consequences:

- Decision making is complex for bidders, as they need to assess the competition they face within the auction;

⁴² This is also called a Vickrey auction, but Vickrey auctions can be readily generalised to include multiple items. The key feature is that the winner is paying the opportunity cost caused by denying the item to the other bidders. An example of this format in use is Ebay. Bidders submit the greatest amount they are prepared to pay for an item. However, the amount they pay is determined by the price rising only to the point that other bidders' bids are surpassed.

⁴³ In the context of selling a single lot, this is often called an *English auction*, where the price rises until one bidder is left.

- Apart from in special circumstances⁴⁴, we cannot expect the outcome to be efficient, in terms of always selecting the lowest cost provider. This is because bids depend not just on cost, but also on the expectations that bidders have regarding the competition they face. These expectations may differ across bidders.

Second price sealed bids

The second-price sealed bid overcomes these problems. Because a bidder's bid does not affect the amount it is paid if it wins, bids have the sole function of indicating the minimum amount that a bidder is willing to accept. The price the winner receives is dependent on some other bidder's bid. Therefore, it is optimal simply to bid at cost, as this means that the bidder wins only in those cases when it is profitable to do so. Indeed, it is optimal to bid in this straightforward manner regardless of what other bidders do.⁴⁵ Therefore, no complex second-guessing of what competitors might bid is required.

Because bids should be truthful statements of cost in a second price auction, it follows that a second price auction should give efficient outcomes without making any special assumptions about bidders.

First price vs. second price auctions

Why then are second price auctions not always used in preference to first price auctions? Where competition is weak, then can be a large difference between the winning bid and the lowest losing bid in a second price auction. Often this is perceived as "money left on the table", but this is not really the case. If bidders paid what they bid, then they would not have bid at cost, but rather above cost. Nevertheless, where there is significant asymmetry between bidders first price auctions can be helpful in constraining stronger bidders. This is because a

⁴⁴ A sealed price sealed bid is efficient if bidders are symmetric. This does not mean that they all have identical costs, but rather that it is common knowledge that costs are independently drawn from the same underlying probability distribution. This means that, regardless of what cost realisation an individual bidder has, it will have the same view about competition within the auction as other bidders do. As a result, there is a symmetric Bayesian-Nash equilibrium in which bids are an increasing function of cost, but this function is the same for all bidders. Therefore, if we order bidders by the bids they make, then they will also be ordered in terms of their costs. This means that the lowest cost bidder will be selected. However, the assumption of symmetry – although the typical assumption in textbook treatments of auctions – is a very restrictive assumption. Once bidders hold different views about rivals, or one bidder's cost realisation is informative about others' costs, efficiency is not guaranteed.

⁴⁵ This is called a *dominant strategy*, as it is optimal regardless of what other parties do.

strong bidder cannot simply just bid at cost, as it would do in a second price auction. Rather to gain any surplus it needs to bid above cost. However, this exposes the bidder to some risk of losing the expected surplus associated with being the strongest bidder, as it does not know for certain what competition it faces. Just the perceived risk of some competition can materially reduce a strong bidder's bid in a first price auction.

The analysis of which auction format will be cheaper is complex. Under very restrictive assumptions, it turns out that the *expected* cost under the first-price and second-price sealed bids are the same. This is the so-called *revenue equivalence theorem*⁴⁶. Remarkably, the amount by which bidders optimally overbid their costs in a first price auction on average equals the addition cost of paying the lowest losing bid rather than the winning bid in the second price auction. However, this result relies on two critical assumptions: that there are not systematic predictable differences in the strength of bidders and that one bidder's bid is not informative to other bidders about their own costs.⁴⁷

Neither of these assumptions are at all plausible in our application. Once there are systematic differences between bidders, analysis becomes complex, as there are many ways in which bidders might vary. However, the broad finding is that the first price auction will be cheaper on average once there are sufficiently large differences in the strength of bidders.⁴⁸ This may well be the reason that first price auctions are commonly used in procurement settings where there is a good chance that competition may be limited to a small number of potentially asymmetric bidders.

Open auctions

We should think of an open auction as being analogous to a second price sealed bid. This is because the winning price in an open auction is determined by the last bidder to drop out,

⁴⁶ See Riley, J. and W. Samuelson (1981) "Optimal Auctions," *American Economic Review*, 71, 381—392. A requirement of the revenue equivalence theorem is that the auctions whose expected revenue is being compared are efficient. If bidders are asymmetric, the first-price sealed bid does not guarantee efficient outcomes.

⁴⁷ Formally, this means that it is common knowledge that all bidders' costs are independent realisations from the same underlying probability distribution. All bidders are then symmetrical on this assumption, as if we take any pair of bidders, each is equally likely to have lower cost. Because each bidder's cost is an independent realisation, knowing information about other bidders' costs will not lead any bidder to revise its own cost.

⁴⁸ E. Maskin, J. Riley, *Asymmetric Auctions*, *The Review of Economic Studies*, Volume 67, Issue 3, July 2000, Pages 413—438, <https://doi.org/10.1111/1467-937X.00137>

rather than the cost of winner. Therefore, if we ignore information being dynamically revealed in an open auction as prices fall and bidders drop out, it should produce the same outcome as a second-price sealed bid. Under the assumption that each bidder has its own cost estimate that it does not revise during the auction, the additional information revealed by the open auction is of no consequence.

Common value uncertainty

However, in practice there are often unknown, but common factors, affecting all bidders' costs. Therefore, each bidder would make use of information about other bidders' cost estimates to revise its own estimate if given the chance. This is called *common value uncertainty*. The presence of common value uncertainty means that it becomes rational for a bidder not to bid according to its expected cost, but rather add some safety premium to correct for the possibility that it wins by virtue of having an unrealistically low cost estimate. This is the so-called *winner's curse*. With common value uncertainty bidders bid more conservatively and competition is weakened.⁴⁹

With common value uncertainty, open auctions have a major advantage, as they allow information about common factors affecting all bidders to be pooled through the information revealed dynamically. Put simply, bidders can see whether others are staying in or dropping out and adjust their own cost estimates accordingly. This pooling of information leads to greater efficiency (as cost estimates are more refined) and greater competition. In a procurement context, it also reduces the risk that winner makes unrealistically low cost estimates, then fails to deliver.

Asymmetric common value auctions

In practical applications, we might have problem of *both* common value uncertainty *and* asymmetric bidders. This can be troublesome, as weaker bidders are disproportionately exposed to winner's curse. If a bidder thinks it is unlikely to win, then, if it does win, this is much more likely to have been due to over-optimistic cost estimates than would be case for a stronger bidder. As a result, weaker bidders compound their disadvantage by bidding more cautiously. In some cases, this effect can be so strong that it is not even worth weaker bidders participating if there are small costs of turning up at the auction.⁵⁰

⁴⁹ McAfee, R. Preston; McMillan, John (1987), "Auctions and Bidding", *Journal of Economic Literature*, 25 (2): 699–738.

⁵⁰ Bulow, J; P. Klemperer (2002) "Prices and the Winner's Curse", *The RAND Journal of Economics*, Vol. 33, No. 1. (Spring), pp. 1-21.

Under such conditions, there can be some advantages to switching back to a first-price sealed bid. In essence, such auctions, for the very reasons that are they are not fully efficient, inject some randomness. This gives relatively weaker bidders more chance of winning, making them more likely to participate. This increases competition for stronger bidders, potentially enough to outweigh the disadvantage of there being no information pooling in a sealed bid.

*Anglo-Dutch
hybrid auctions*

Under these challenging conditions, there can be merit in using hybridised auctions, which combine an open auction with a sealed bid. For example, a so-called Anglo-Dutch hybrid⁵¹ would involve an open phase until a certain number of bidders are left, say just two, then last and final offers made through a first-price sealed bid. This approach has the advantage of providing some pooling of information during the open phase, but then changing to a sealed bid to deal with asymmetries between the strongest remaining bidders. This is a potentially useful approach where a simple open auction would otherwise leave an advantaged bidder unchallenged.

5.4 Auction design

If potential CTPs only need to bid a single price parameter, which is effectively a maximum weighted price in a tariff basket constraint, this makes for a simple auction process. We simply need to select the lowest offer.

*Common value
uncertainty due to
demand
uncertainty*

However, there is a large degree of common value uncertainty involved in both estimating demand for a CT and the corresponding costs of CTP. Potential bidders would need to form expectations of both in order to formulate a bid. The uncertain factors affecting the business case of a potential CTP that are closely similar for all potential CTPs. In our view, this creates a strong case for using an open auction process to pool information across bidders about these uncertainty factors, especially market size estimates. Therefore there are two main options for the auction format:

- a descending clock auction; and
- an Anglo-Dutch hybrid.

⁵¹ This approach is not commonly used, but it was initially proposed as the format to be used for the UK's 3G auction in 2000. It was not ultimately used due to changes in the technical requirements of licences.

Descending clock auction rules

In a simple descending clock auction to procure a single item, the auctioneer sets a starting price, then invites bids at that price. With a single item this is simply a matter of saying yes or no to that price. If there are multiple acceptances of that price, then the auctioneer posts a new lower price and invites new bids. If there are still multiple acceptances, a further round is run until there is just one offer remaining.

Exit bids

What would happen if the price were reduced too much and there were no offers at all in the next round? We can avoid this problem by asking any bidder who is dropping out to make a last and final offer at a price that it chooses. This price can be intermediate between the current round price and previous round price. This is usually called an *exit bid*. These exit bids can be used to resolve who wins if the rounds finish with all bidders dropping out. We take the lowest exit bid from the previous round, with this bid amount setting the price cap.

Anglo-Dutch hybrid

An Anglo-Dutch hybrid auction is a modest extension of the descending clock auction. In this case, we stop the open rounds once there are only two bidders remaining. Last and final offers are invited (very similar to exit bids) and the lowest one wins, with this bid amount setting the price cap. The Anglo-Dutch hybrid may have the advantage that it can create some degree of competition even when there is one potential supplier in pole position to win.

Running an auction

Both a descending clock auction with exit bids and an Anglo-Dutch hybrid auction are simple formats that could be readily implemented as online processes. Given the simplicity of bidding, we would imagine that two to four rounds of bidding could be run each day, with prices decreasing by, say, 10% between rounds. There is no necessity to use very small round price increments if exit bids are used. The only constraint on the speed of rounds is ensuring that bidders have sufficient time to consider their bids. However, much of this consideration would have happened in advance of the start of the auction (i.e. deciding the lowest viable price and whether this might be updated in the light of the open rounds of the auction). Overall, one might expect such an auction to be completed within a week for the bidding stage, though additional time beforehand would be needed to check that qualification criteria were met.

5.5 Reserve price

Reserve price

Both formats involve starting an open auction from an initial price. This is a reserve price, that would need to be set by the FCA. In any case where two or more bidders show up, the reserve price would not affect the ultimate clearing price. Therefore, the reserve price should be thought of as a take-it-or-leave offer for the average price cap if faced by a single supplier.

Choke price

There are two relevant factors to consider in setting this reserve price. First there would be a price for CT users at which demand would be choked off by price and the benefits of having a CT lost as a result. This is the highest average price for users at which there are still benefits from the intervention. Clearly the reserve price should be no higher than this 'choke price'.

Cost estimates

Second, expectations of the costs of a CTP, on the assumption that just one potential provider showed up, are relevant. Expected costs are likely to be much lower than the price at which user benefits are choked off. Therefore, it may be possible to set a lower reserve price, less than the choke price, at which there is some balancing of the benefits to users of a lower price with the possibility of no potential CTP turning up at all. The reserve price would typically be set at some premium over the expected cost of a CTP, but below the choke price. Given that cost estimates for the CTP are likely to be highly uncertain, a substantial premium over any estimate of that cost is likely to be needed, otherwise there would be too great a chance of no potential provider showing up at all.

5.6 Qualification criteria

It is common to require participants in tenders to meet various technical and financial characteristics as conditions to qualify to participate in the process. These might include:

- capitalisation requirements;
- being of good standing regarding disputes with creditors and tax authorities; or
- providing a credible commercial and/or technical plan to deliver the services.

Limited need for qualification criteria

In the case of a CTP, it appears quite possible to set various service standards that the CT must meet, with a set of core services that must be supplied on a standalone basis (not tied to other value-added services) and subject to a price cap. Incentives can be given to the CTP to meet these requirements

through either contractual penalties or enforcement action under its licence from the FCA. Therefore, there is no strong need to review detailed commercial and technical plans to be able to appoint a CTP. Qualification criteria should be pass/fail tests, with the competition then being solely on the maximum average price offer to users.

Financial standing

One particular concern is likely to be the viability of a CTP over the term of its appointment, as there could be significant disruption if a CT became unavailable at short notice due to the CTP failing. Therefore, the main issue for qualification tests would appear to be the financial standing of the provider.

Annex A Glossary

| | |
|----------------------------|---|
| Anglo-Dutch Hybrid auction | An auction combining an open phase with a final first-price sealed bid amongst a small number of remaining bidders |
| APA | Approved Publication Arrangement |
| CTA | Consolidated Tape Association |
| Common value uncertainty | A situation in a (procurement) auction where there are common uncertainty factors affecting bidders' cost estimates, resulting in positive association between bidders' estimates and the possibility that bidders may learn from each other to refine those estimates. |
| EC | European Commission |
| ESMA | European Securities and Market Authority |
| ECTP | Exclusive consolidated tape provider |
| FCA | Financial Conduct Authority |
| FINRA | The Financial Industry Regulatory Authority |
| First price auction | In the context of procurement of a single item, the price paid to a winning bidder being set equal to its bid. |
| CT | Consolidated tape |
| CTP | Consolidated tape provider |
| MiFID II | Second Markets in Financial Instruments Directive |
| NCA | National Competent Authority |
| IPR | Intellectual property right |
| Open auction | A dynamic auction, usually proceeding in rounds. |
| SEC | Securities and Exchange Commission |

| | |
|----------------------|--|
| Second price auction | In the context of procurement of a single item, the price paid to a winning bidder being set equal to the lowest losing bid. |
| TV | Trading venue |

Annex B Issues for consultation

This annex provides a consolidated list of areas where it would be useful to gain additional information during a consultation with potential users and providers of a CT.

Users and licences

1. Can key user segments for a CT be identified?
2. What requirements do these user segments' have in terms of:
 - a. manual access to CT data over a web interface;
 - b. computer-to-computer CT data feeds
 - c. latency of feeds (which may vary by asset class);
 - d. access to historic CT data?
3. What forms of licence are appropriate to serving each of these segments?
4. Would our 'strawman' licences be adequate as a set of core services that the CTP is required to provide (i.e. a licence allowing re-use to create derived services, plus various tiers of "per seat" licences not allowing re-use)? Might extra differentiation be needed? If so, can excessive complexity be avoided?
5. At what price level might the benefits of a CT be eroded by poor user take-up?
6. Could the needs of those re-using a CT to create derived services be adequately met by just one licence type? If not, how could different types of re-users of CT data be defined? Would the CTP be able to use multiple licence types to discriminate against users who might compete with the CTP's own value-added services?

CTP costs

7. To what extent is a CTP's cost base expected to be largely fixed costs or will there be a significant element of variable cost related to the size of the user base?
8. How might requirements for uptime and latency in providing CT data affect a provider's costs?
9. Does a high coverage level – say essentially 100% with some leniency on adding new TVs/APAs – significantly affect provider's costs?

10. What term is appropriate for the appointment of an exclusive CTP for an asset class in order to support investment in creating the platform needed to supply the CT?

Data in-feed requirements

11. What minimum requirements might a CTP have for data quality in-feeds from TVs and APAs? What performance metrics are appropriate (e.g. uptime, latency etc)? What penalties might be appropriate to provide incentives to maintain these minimum requirements?
12. Are there aspects of feed data quality that cannot be readily captured as defined minimum quality standards related to measurable performance variables? Is there any concern that data providers could degrade data quality in ways that would not fall foul of minimum quality standards?