IN THE COMPETITION APPEAL TRIBUNAL   **Case no. 1329/7/7/19**

IN THE MATTER OF PROPOSED COLLECTIVE PROCEEDINGS
UNDER SECTION 47B OF THE COMPETITION ACT 1998
RELATING TO FOREIGN EXCHANGE RATES

BETWEEN:-

MICHAEL O'HIGGINS FX CLASS REPRESENTATIVE LIMITED
("THE O'HIGGINS PCR")

<div align="right"><u>Applicant</u></div>

and

(1) BARCLAYS BANK PLC
(2) BARCLAYS CAPITAL INC.
(3) BARCLAYS EXECUTION SERVICES LIMITED
(4) BARCLAYS PLC
(5) CITIBANK N.A.
(6) CITIGROUP INC.
(7) JPMORGAN CHASE & CO.
(8) JPMORGAN CHASE BANK, NATIONAL ASSOCIATION
(9) J.P. MORGAN EUROPE LIMITED
(10) J.P. MORGAN LIMITED
(11) NATWEST MARKETS PLC
(12) NATWEST GROUP PLC
(13) UBS AG

<div align="right"><u>Respondents</u></div>

and

(1) MUFG BANK LTD
(2) MITSUBISHI UFJ FINANCIAL GROUP INC.

<div align="right"><u>Proposed Objectors</u></div>

THE O'HIGGINS PCR'S STATEMENT OF CASE ON CAUSATION OF HARM

References in the form {bundle/tab(/page)} are to the Opus2 hearing bundles.
Tab references in square brackets are to the accompanying bundle.

INTRODUCTION AND SUMMARY

1.   This Statement of Case provides further information as to the O'Higgins PCR's case on causation of harm, which was addressed in paragraphs 75 and 76 of the Re-Amended

Collective Proceedings Claim Form[1] by reference to the expert reports of Professor Breedon and Professor Bernheim annexed thereto. It responds to observations of the Tribunal at the hearing on 12-16 July 2021, as distilled in the Tribunal's letter to the parties dated 20 July 2021. For the avoidance of doubt, this document is intended to summarise and clarify, and not to replace, the O'Higgins PCR's case on causation of harm as contained in: the original Breedon and Bernheim Reports; the two supplemental Breedon and Bernheim Reports; the explanations provided by Professor Bernheim at the teach-in; the oral evidence of Professors Breedon and Bernheim at the certification hearing; the O'Higgins PCR's skeleton argument; the O'Higgins PCR's neutral statement on the merits; and the oral submissions at the certification hearing (including those relating to the principles set out by Supreme Court in its judgment in *Merricks v. Mastercard* [2021] Bus LR 25[2]).

2.   In the course of the hearing, the Tribunal requested a "*straightforward articulation*" of the theory of harm.[3] The Tribunal also requested examples of academic articles supporting the underlying concepts that give rise to the O'Higgins PCR's case on causation.[4] References to academic articles are contained in the Statement of Case below, including by way of footnotes. Electronic copies of the academic articles and book extracts referred to are provided together with this Statement of Case.

3.   In summary on causation of harm:

(1)   The "*nearly daily communications*", the "*extensive, recurrent and reciprocal*" exchange of commercially sensitive information and the coordinated trading between the participant dealers, as described in the Commission Decisions and as summarised in paragraph 58 of the Re-Amended Collective Proceedings Claim Form,[5] gave rise to informational advantages to participating dealers (the cartel members).

(2)   Information asymmetry arises in FX trading when some dealers have superior information, which gives them an advantage over less-informed counterparties. A

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[1]   {**MOH-A/0/53-54**}.
[2]   {**AUTH/34**}.
[3]   {**T4/113/15**}-{**T4/114/4**}.
[4]   {**T4/119/10-14**}.
[5]   {**MOH-A/0/40-46**}.

dealer in the FX market incurs 'adverse selection costs' when the dealer trades with a counterparty that is better informed about the factors affecting that trade than the dealer. The conduct of cartel participants is likely to have materially increased the information advantage of cartel dealers and therefore the adverse selection risk that rival (non-cartelist) dealers faced in the inter-dealer segment of the market. This increased adverse selection risk in the inter-dealer segment amounted to an additional cost to rival (non-cartelist) dealers.

(3)   An increase in cost – actual and anticipated – to rival (non-cartelist) dealers trading in the inter-dealer segment is likely to have led to higher prices charged by the rival dealers in the dealer-to-customer segment. This increase in price would have taken the form of wider bid-ask effective spreads charged to their customers.

(4)   As rival dealers widened their spreads, the competitive pressure on cartel dealers would have been reduced, allowing them safely to widen their own spreads. Such spread widening by the cartel members is likely also to have been further facilitated by the exchanges of information, and coordination, on spreads between the cartel dealers themselves, as recorded in the Commission Decisions.[6]

(5)   By virtue of having better information pertaining to upcoming price movements and by reason of their coordinated trading, the cartel members are also likely to have increased their profits (and caused harm to their customers) by manipulating the mid-point at which their customers traded. In particular, the Commission Decisions strongly suggest that the cartel dealers "*occasionally*" succeeded in manipulating the market mid-point through coordinated trading, particularly in connection with benchmark fixes. This manipulation will have affected the price before the relevant trade leading to a larger than usual post-trade movement. This

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[6]   The O'Higgins PCR does not currently emphasise mechanisms that involve coordination concerning spread sizes as the principal causal mechanism because the Commission Decisions provide insufficient information concerning the nature of the anticompetitive conduct. A thorough examination of the Commission case file and the relevant chat extracts underlying the Commission Decisions (as will be made available on disclosure post-certification) and analysis of spreads may reveal such coordination. Nevertheless, as explained in evidence and submissions (and below) the O'Higgins PCR considers that coordination regarding spreads was likely to have been a contributory factor to the reaction of the cartelist dealers.

change in the post-trade price movement will likely be reflected in larger realised spreads in the cartel period.

(6) The aforesaid causal hypotheses can be empirically tested (and, if certification is granted, will be tested) by comparing the effective spreads and realised spreads during the cartel period with, respectively, the effective spreads and realised spreads during a 'clean' (non-cartel) period using regression analysis.

4. The O'Higgins PCR's case on how the cartel conduct caused harm to the members of the Proposed Class is set out in detail below.[7]

THE SERVICE IN QUESTION

5. Dealers provide foreign exchange ("**FX**") transaction or market-making services. The bid-ask spread is the price of the service. In particular:

(1) FX dealers on voice and single-bank platforms ("**SBPs**") provide the market with liquidity by offering to purchase FX at a "*bid*" price or sell it at an "*ask*" price.

(2) FX dealers thereby provide a market-making transaction service. The price of the FX market-making service is embedded in the gap between the bid and the ask (also known as the "*spread*"), or alternatively between the bid or ask and the market mid-point, also known as the "*half-spread*".[8]

(3) When the market mid-point is measured at the same point in time as the transaction, this is the "*effective half-spread*".[9] It is a measure of the dealer's gross revenue and the price paid by the customer.

(4) When the market mid-point is measured shortly after the transaction, this is the "*realised half-spread*".[10] It is a measure of the dealer's net revenue which adjusts for systematic price movements that occur immediately after a trade. Under normal competitive conditions, the post-trade price movement tends to reduce the dealer's total revenue from market making. However, for a dealer who trades on superior

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[7] The O'Higgins PCR reserves the right to amend and/or refine its case following disclosure and analysis of the Respondents' evidence. The Respondents have provided no evidence to date.
[8] Bernheim 1, paras. 25-26 {**MOH-H/0/11**}.
[9] Breedon 1, para. 6.13(c) {**MOH-B/0/57**}.
[10] Breedon 1, para. 6.18(b) {**MOH-B/0/58**}.

information, the post-trade price movement can increase total revenue from market making.

TWO SEGMENTS OF THE MARKET: CUSTOMER-DEALER AND INTER-DEALER

6. There are two interconnected segments of the FX market: (a) the customer-dealer segment; and (b) the inter-dealer segment. In particular:

(1) Most customers of FX transaction services trade in the customer-dealer segment, where the dealer acts as a market maker offering customers bid and ask prices that the customer can either accept or reject. Trading in the customer-dealer segment at the relevant time occurred primarily through voice and SBPs.

(2) The dealers themselves, on the other hand, typically trade with one another in the inter-dealer segment. The purpose of dealers trading on the inter-dealer segment is typically either: (a) to 'lay off' customer trades as required in light of the rest of the dealer's inventory (i.e. to execute a trade that transfers the risk passed to them by a customer trade and/or to lay off or recoup FX inventory spent by reason of such a trade); or (b) to trade on their own account (i.e. to take a speculative position in a currency). Trading in the inter-dealer segment occurs through a number of routes, including electronic platforms such as EBS and Reuters (now Refinitiv) where the trading counterparty is typically anonymous at the time of the transaction.[11]

(3) When a dealer accesses the inter-dealer segment to transfer risk/inventories acquired from customer trades, this entails transaction costs, including exposure to adverse selection risk (described below). These transaction costs form an important component of the dealer's costs of doing business with customers as a market maker. Accordingly, prices in the inter-dealer segment are in practice a reference point for pricing in the dealer-to-customer segment.

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[11] Breedon 1, paras. 2.15-2.16 {**MOH-B/0/21-22**}.

COMPETITIVE STRUCTURE OF THE MARKET

7.   The FX market is imperfectly competitive.

8.   A perfectly competitive market is defined by the presence of four conditions: (1) complete information (i.e. buyers and sellers have full access to all information relevant to their production and consumption decisions); (2) a homogeneous product or service; (3) inability of any buyer or seller to affect the market price and the infinitely elastic demand curve facing an individual seller; and (4) free entry.[12] These conditions do not characterise the FX market. In particular:

(1)   The FX market is not characterised by complete information as between either buyers or sellers. On the contrary, as explained below, an important feature of the market is the presence of asymmetric information amongst FX dealers.[13]

(2)   Whilst any particular currency is a homogeneous product (in the sense that, for example, one US dollar is perfectly substitutable for any other US dollar), FX transaction services are not homogeneous. For example, FX transaction services differ across voice and electronic trading, as well as between SBPs and multi-bank platforms. Some regional dealers specialise in particular currency pairs while some global banks make markets for almost all currency pairs. Trading with dealers who differ with respect to their ability to predict upcoming FX movements carries different risks and benefits.

(3)   During the cartel period, the FX market was relatively concentrated. The worldwide market share of the six cartelist banks totalled approximately 43-47% during the relevant period, with a limited number of other banks amounting to a further 40%.[14] Accordingly, as stated in the Re-Amended Collective Proceedings

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[12]   'Glossary of Industrial Organisation Economics and Competition Law', compiled by R. S. Khemani and D. M. Shapiro, commissioned by the Directorate for Financial, Fiscal and Enterprise Affairs, OECD, 1993, p. 66. Available at https://www.oecd.org/regreform/sectors/2376087.pdf.

[13]   On market opacity, see Re-Amended Collective Proceedings Claim Form para. 29(2) {**MOH-A/0/14**}. As Professor Breedon pointed out in oral evidence, opacity was a problem for contemporaneous market participants, but is not now for the experts when attempting to calculate damages, owing to the underlying transaction data to which they will have access: see {**T2/152-158**}, as relevantly extracted in the note prepared by the O'Higgins PCR at {**AB/22/12-13**}.

[14]   Breedon 1, paras. 2.19-2.22 {**MOH-B/0/22-23**}. See the Euromoney market share surveys at {**MOH-B/7**}. In this regard, it cannot be assumed that other non-cartelist dealers such as Deutsche Bank were competing vigorously with the cartelists, contrary to the Respondents' submissions (see, e.g., the Respondents'

Claim Form, "*the addressees of the Settlement Decisions collectively had, throughout the Relevant Period, significant market power*",[15] and the market was significantly more concentrated than a market characterised by perfect competition.

(4) Entry into the FX market entails significant costs. In particular, large FX dealing institutions operate with geographically distributed trading desks across Asia, Europe, and North America. Banking regulation in many countries also mandates FX dealers to obtain a licence, which usually requires a significant upfront expense. Additional barriers to entry include the capital necessary to act as a primary market maker in major currency pairs and the relationships with large asset managers, corporates, regional banks, leveraged money and sovereign wealth funds that must be cultivated to maintain a place in league tables.

INFORMATION ASYMMETRY AND ADVERSE SELECTION IN THE INTER-DEALER SEGMENT OF THE FX MARKET

9. Potential trading partners decide what and when to buy and what and when to sell based on the information they possess. Information asymmetry arises when some traders have superior information, which gives them an advantage over less-informed traders. This general phenomenon is termed 'adverse selection'.[16] In the context of the present market, having information concerning likely future movements in the price of a traded asset (here FX) helps the more informed trading party to profit at the expense of the less informed trading party by avoiding the risk of buying the asset just before its price falls, or selling the asset just before its price rises.

10. The costs associated with asymmetric information and adverse selection account for a substantial portion of bid-ask spreads in the FX market, including in the inter-dealer

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skeleton argument at para. 111(b) {**AB/5/42**}): see the table of regulatory decisions involving non-addressee banks at {**MOH-A/3/1-2**}.

[15] Re-Amended Collective Proceedings Claim Form para. 29(1) {**MOH-A/0/14**}.

[16] Bernheim 1, para. 41 {**MOH-H/0/15**}. For the explanation of adverse selection at the teach-in, see transcript at {**T0/61/18**}-{**T0/64/1**}. See further, e.g., B. Douglas Bernheim and Michael D. Whinston, 'Microeconomics', 2nd ed. (McGraw-Hill, 2013), pp. 752–753 [**TAB 1**]. The phenomenon of adverse selection was first identified in insurance markets in the 19th century and has been a standard feature in microeconomics for almost half a century, since the seminal article of George Akerlof for which he was later awarded the Nobel Prize for Economics: Akerlof, George A. 'The Market for 'Lemons': Quality Uncertainty and the Market Mechanism' (1970) 84 Quarterly Journal of Economics 488–500 [**TAB 2**].

segment of the market. There is a sound empirical and theoretical foundation for this view in the academic research: see Ranaldo and Somogyi (2021);[17] Bjønnes and Rime (2005);[18] Payne (2003).[19]

11. Adverse selection risk depends on the fraction of informed traders and the degree of the information asymmetry.[20] However, even a relatively small volume of informed trades suffices to generate adverse selection producing significant effects upon spreads.[21]

EFFECT OF THE COLLUSION DESCRIBED IN THE COMMISSION DECISIONS

12. The exchanges of commercially sensitive information and trading coordination described in the Commission Decisions provided participants with substantially more information as to market conditions than they would have obtained under non-collusive conditions. In particular:

(1)   The participants in the chat rooms engaged in "*nearly daily communications*" and "*extensive, recurrent and reciprocal*" exchanges of commercially sensitive

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[17]   Angelo Ranaldo and Fabricius Somogyi, 'Asymmetric Information Risk in FX Markets' (2020) 140 Journal of Financial Economics 410: "*[w]e find compelling evidence that order flow impacts FX spot prices heterogeneously across agents, time, and currency pairs, supporting the asymmetric information hypothesis. In particular, we demonstrate that some agents are always more informed than others, providing empirical substantiation that asymmetric information risk is systematically present in the FX market.*" A version of this article appears at {**C/1.4**} [**TAB 3**].

[18]   Geir Høidal Bjønnes and Dagfinn Rime, 'Dealer behavior and trading systems in foreign exchange markets' (2005) 75 Journal of Financial Economics 571 [**TAB 4**], showing that (p. 600): "*... private information is indeed important in the FX market. For DEM/USD, we find that private information is responsible for as much as 80% of the effective spread in the interdealer market. For NOK/DEM, roughly 50% of the effective spread is explained by private information.*"

[19]   Richard Payne, 'Informed trade in spot foreign exchange markets: an empirical investigation' (2003) 61 Journal of International Economics 307 [**TAB 5**], showing based on a DEM/USD sample that "*... asymmetric information accounts for around 60% of average bid-ask spreads.*"

[20]   Lawrence R. Glosten and Paul R. Milgrom, 'Bid, Ask and Transaction Price in a Specialist Market with Heterogeneously Informed Traders' (1985) 14 Journal of Financial Economics 71 [**TAB 6**] at p. 90: "*[i]ntuitively, the adverse selection problem is worse the greater the fraction of informed traders and the better their information. The specialist is forced to set a higher spread if there are more informed [traders] or if they have better information, in order to avoid losses.*"

[21]   Researchers measure the level of asymmetric information in financial markets based on the Probability of Informed Trading (PIN) model, which estimates the fraction of informed transactions among all trading volume during a certain period: see David Easley, Nicholas M. Kiefer, Maureen O'Hara, and Joseph B. Paperman, 'Liquidity, Information, and Infrequently Traded Stocks' (1996) 51 Journal of Finance 1405 at p. 1412 [**TAB 7**]. Clara Vega, 'Stock price reaction to public and private information' (2006) 82 Journal of Financial Economics 103-133 [**TAB 8**] calculated the probability of information-based trading (PIN) for US listed stocks to be around 20% based on data of 9,213 US listed stocks from 1986 to 2001. These are generally thought to carry greater adverse selection risks than FX. Gençay and Gradojevic, 'Private information and its origins in an electronic foreign exchange market' (2013) 33 Economic Modelling 86-93 [**TAB 9**] estimate that the PIN is 18% for EUR/USD, 17% for USD/JPY, and 24% for USD/CHF.

confidential information in relation to their open risk positions, outstanding customers' orders, other details of current or planned trading activities, and bid-ask spreads (which, the Decisions acknowledge, may have facilitated tacit coordination of their spread behaviour). They also engaged in coordinated trading with a view to obtaining a commercial benefit, including by 'standing down' and in relation to benchmark trades, as described in the Commission Decisions. This is summarised in paragraph 58 of the Re-Amended Collective Proceedings Claim Form[22] and in the O'Higgins PCR's Note on the Commission Settlement Decisions.[23]

(2) Most of the individual traders who participated in that exchange of information held senior and/or supervisory roles.[24] Each was therefore likely to have been capable of exerting influence over trading strategies of other dealers at the same bank, (regardless of whether or not they revealed the source of the information). Their information advantage is therefore likely to have extended to others in the bank.

(3) Between 2007 and 2013, the worldwide market share of the banks which employed those traders totalled approximately 45%.[25]

(4) In these circumstances, the conduct was likely to have increased information asymmetry between cartelist and non-cartelist dealers and therefore increased the adverse selection risk that non-cartelist dealers faced in the inter-dealer segment.[26]

EFFECT IN THE INTER-DEALER SEGMENT: HIGHER COSTS

13. As a result of the increased information asymmetry, non-cartelists trading in the inter-dealer segment faced elevated risk of 'adverse selection' – i.e. trading with a better-informed dealer (either a cartelist dealer or potentially a dealer following the lead of a cartelist). The corresponding increase in adverse selection costs would have been experienced by non-cartelist dealers during the cartel period in the form of a higher rate

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22   {**MOH-A/0/40-46**}.
23   {**AB/21**}.
24   See the details of four of the individual cartel traders' positions set out in {**H/606**}. See also {**T4/96/8**}-{**T4/97/9**}.
25   Breedon 1, paras. 2.19-2.22 {**MOH-B/0/22-23**}.
26   Bernheim 1, para. 42 {**MOH-H/0/15**}. See also the exchange regarding Prof Bernheim's 'shark pool' analogy on Day 2 {**T2/197-200**}, as extracted at {**AB/22/15-16**}.

and/or extent of loss-making trades suffered by such non-cartelist dealers in the inter-dealer segment. Put simply, as a result of the cartels, a non-cartelist ran a greater risk of making a bad bargain. In particular:

(1) A trader is likely to be unaware of the specific occasions when they trade with a better informed counterparty but will experience greater average trading losses than would otherwise be the case. A trader in such a position (i.e. one who cannot tell how well informed their counterparty is for any particular transaction in a given series) must assume that <u>every</u> transaction in that series carries the *risk* that the counterparty is unusually well informed and hence that the particular transaction may be loss making.[27] For that reason, even if it were the case that only a fraction of the trades were actually affected, the impact of adverse selection risk would remain relevant for every such trade.[28]

(2) Such elevated adverse selection risk thereby increased the transaction cost for the non-cartelist of using the inter-dealer segment to lay off inventories acquired from customer trades. For the avoidance of doubt, this elevated adverse selection risk arose because of the presence of increased informed trading in the market owing to the existence of the cartels and did not depend on the level of market power possessed by the members of the cartel.

(3) This cartel mechanism of operation is an example of a strategy known as "*raising rivals' costs*".[29]

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[27] See Lawrence Harris, 'Bid-Ask Spreads' in 'Trading and Exchanges: Market Microstructure for Practitioners' (Oxford University Press, 2003), Ch. 14 [**TAB 10**] at p. 300: "*Since the dealer does not know which clients are well informed and which are uninformed, the dealer must adjust his estimate of value partially following every trade. In particular, he will discount the pricing error by the probability that his next client is well informed. From the information perspective, the adverse selection spread component thus is the product of the pricing error (assuming that the trader is informed) times the probability of trading with an informed trader.*"

[28] Bernheim 2, para. 50 {**C/2/23-24**}.

[29] On the concept of raising rivals' costs, see the teach-in transcript at {**T0/66/16**} ff and the associated slide at {**H/578/21**}. See also Bernheim 1, Section II.A.2.a {**MOH-H/0/14-16**} and Bernheim 3, Section IV.A {**C/4/35-37**}.

CONSEQUENTIAL EFFECT ON SPREADS IN THE DEALER-TO-CUSTOMER SEGMENT

14. As averred in paragraph 6 above, transaction costs incurred in accessing replacement inventory in the inter-dealer segment form an important component of the dealer's costs of doing business with customers as a market maker and prices in the inter-dealer segment are, in practice, a reference point for pricing in the dealer-to-customer segment.

15. It is a standard insight of economic analysis that profit-maximising firms generally respond to higher variable costs by raising their own prices.[30] The extent of this response depends, in particular, on the nature of competition among firms and on the supply and demand characteristics of the relevant product.[31]

16. In light of the rising costs for the non-cartelist dealers on the inter-dealer segment as described in paragraph 13 above, the non-cartelists had to recover such costs to remain profitably in business and/or to maintain their profitability.[32] In consequence, the likely effect of the increased variable transaction cost to non-cartel dealers in the inter-dealer segment (as described at paragraph 13 above) would have been for non-cartel dealers to have in turn widened the spreads to their own customers in the dealer-to-customer segment.[33]

17. Harris (2003) explains how increased adverse selection costs leads to spread-widening in markets with asymmetric information as follows:

> "*If dealers set their spreads to reflect only their normal costs of doing business, their losses to well-informed traders would eventually force them out of business. Dealers must widen their spreads further to cover their losses to informed traders. This additional widening of the spread is the adverse selection spread component. It allows dealers to recoup from uninformed traders what they lose to informed traders. By widening the spread, it also decreases dealer losses to informed traders by ensuring that informed traders trade at less attractive prices.*"[34]

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[30] See, e.g., Hal R. Varian, 'Intermediate Microeconomics: A Modern Approach', 8th ed. (W. W. Norton & Company, 2010), pp. 440–445 [**TAB 11**] or Jeremy I. Bulow and Paul Pfleiderer, 'A note on the effect of cost changes on prices' (1983) 91 Journal of Political Economy 182–185 [**TAB 12**].

[31] Bernheim 1, para. 162 {**MOH-H/0/59**}.

[32] Breedon 1, para. 5.9(a) {**MOH-B/0/50**}; Bernheim 3, para. 89 {**C/4/36-37**}.

[33] Breedon 1, para. 5.9(a) {**MOH-B/0/50**}; Bernheim 1, para. 42 {**MOH-H/0/15-16**}.

[34] Lawrence Harris, 'Bid-Ask Spreads' in 'Trading and Exchanges: Market Microstructure for Practitioners' (Oxford University Press, 2003), Ch. 14 [**TAB 10**] at p. 299.

18. For the above reasons, the consequence of elevated adverse selection risk for non-cartelist RFIs in the inter-dealer segment was increased transaction costs for those RFIs and those RFIs would have been highly likely to have, in turn, increased their prices charged to their own customers in the form of widened spreads.

THE CARTELISTS' PRICES TO THEIR OWN CUSTOMERS

19. By inducing the competing non-cartelist dealers to widen their spreads (for the reasons described above), the cartelist dealers would have faced relaxed competitive constraints as regard their own pricing (i.e. bid-ask spreads).

20. There are two theoretical possibilities – the cartelist dealers could either have: (a) reduced their own prices (viz. spreads) or maintained their own prices at the same level as they would have been in the absence of the cartels (and thereby enjoyed gains by expanding their share of the relevant market solely by undercutting their rivals); or (b) increased their own prices (viz. spreads) in order to enjoy higher profits. For the following reasons, the first possibility is far less probable than the second:

    (1) The prices of distinct firms operate typically as *strategic complements* – i.e. an increase in price by one firm tends to elicit price increases by its competitors.[35]

    (2) The cartel activity is unlikely to have materially *reduced* the cartel dealers' own variable costs of laying off inventories acquired through trading with their own customers when the cartel dealers were not better informed – i.e. the increase in costs to the non-cartelist dealers was probably not mirrored by a reduction in costs to cartelist dealers. On the contrary, the wider spreads in the inter-dealer segment may well have caused cartel dealers to have incurred greater costs (paid wider spreads) when they were themselves sourcing liquidity on many trades.

    (3) The Commission Decisions record that there were exchanges between the cartelists of information relating to bid-ask spreads. The Commission Decisions also acknowledge that these exchanges "*may have facilitated occasional tacit*

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[35] See, e.g., Jeffrey Church and Roger Ware, 'Industrial Organization: A Strategic Approach' (McGraw-Hill, 2000), pp. 529-531 [**TAB 13**] or Jean Tirole, 'The Theory of Industrial Organization' (The MIT Press, 1988), pp. 207-208 [**TAB 14**].

coordination of those traders' spreads behaviour".[36] Although the Commission Decisions note that this might have resulted in "*tightening or widening the spread quote in that specific situation*" it is inherently more likely to have more often led to spread widening, since this would tend to increase the price (and hence maximise profit to the dealers in question). In the present context, raising prices means in particular widening the (effective and/or realised) spread.[37] Further, the Commission Decisions explain that cartel members exchanged information in part to monitor and enforce compliance with the cartel strategy, thereby potentially deterring cartel members from tightening spreads.[38] Regulatory filings from the US FX litigation report evidence of such information exchange from cartel chatrooms.[39]

21. For the avoidance of doubt, although with collective market shares under 50%,[40] a simple attempt by cartel members to widen their own spreads may have been unsuccessful, because it may have driven business to opportunistic rivals,[41] the effect described above whereby the cartelist dealers raised the variable costs (and in turn spreads) of their rival non-cartelist dealers does not depend upon the cartelists having a high market share. While a relatively small cartel (in terms of market share) might have difficulty profiting from a naked coordinated price increase due to competition from non-colluding rivals, the same strategy may be highly effective if the cartel members can also engage in strategies which raise their rivals' costs.[42] To the extent they succeed in achieving the latter objective, they can successfully raise their own prices without fear of losing business to rivals on a scale that would make the price increase unprofitable.

22. The raising rivals' costs mechanism also likely impacted the e-commerce segment. Although the Commission Decisions do not define e-commerce transactions precisely, one interpretation is that the term refers to transactions conducted through single bank

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[36] Recital (89) of each of the Commission Decisions: {**MOH-A/2A/23**}; {**MOH-A/2B/22-23**}.
[37] Bernheim 1, paras. 25-33 {**MOH-H/0/11-13**}.
[38] e.g. Essex Express Decision, recitals 49 {**MOH-A/2B/12**} and 81 {**MOH-A/2B/20-21**}. Considered further at Breedon 2, paras. 3.16-3.17 {**C/1/18-19**}.
[39] See {**C/1.2/17**}, paras. 44-46.
[40] Rime 1, para. 192 {**EV/9/61**}: "*[T]the combined market share of the Cartels ranged between 23.9% - 48.0%.*" See also Breedon 1, Table 2 {**MOH-B/0/23**}.
[41] Joint CPO Rejoinder, paras. 77 and 80 {**A/6/35-37**}.
[42] Bernheim 3, para. 17 {**C/4/10-11**}. It is that cartel's collective market share compared with that of the individual dealer which confers the information advantage that raises costs: see Bernheim 3, paras. 85-86 {**C/4/35-36**}.

platform matching algorithms.[43] Most customers trading on such platforms would also be subject to an information disadvantage (which could be exploited through cross-platform trading strategies) and hence would face higher variable costs. Accordingly, those transactions would be subject to the same spread-widening effects described above.

EFFECT OF COORDINATED TRADING REFLECTED IN REALISED SPREAD

23. As recital (9) of each Settlement Decision confirms,[44] the cartelist dealers' conduct related to three types of customer orders:

    (1) "*Customer immediate orders*", which are orders "*to immediately enter trades for a certain amount of currency based on the prevailing market rate*";

    (2) "*Customer conditional orders*" (also known as 'limit' or 'resting' orders, which are orders "*triggered when a given price level is reached*"). Examples of such conditional orders include stop-loss and take-profit orders. A 'stop-loss' order is triggered when a floor price is reached, and a 'take-profit' order is triggered when a ceiling price is reached.

    (3) "*Customer orders to execute a trade at a specific Forex benchmark rate or 'fixing' for particular currency pairs*", also known as 'trading at the fix'. The 'fixes' affected in this case were: (i) the WM/Reuters Closing Spot Rates (the WMR fixes); and (ii) the European Central Bank foreign exchange reference rates (the ECB fixes).

24. The Commission further identified some specific types of coordination as being facilitated by the exchange of information, namely: (a) "*Coordinated trading with a view to affecting a fix*"; and (b) "*Standing down*", meaning refraining from trading as the trader had otherwise planned during a particular time window on account of another trader's announced position or trading activity.[45]

25. The cartelists can be assumed to have coordinated trading and exchanged information in order to increase their own profits for FX transactions. This is likely to have been to the

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[43]   Breedon 2, para. 3.40 {**C/1/26**}.
[44]   {**MOH-A/2A/7**}; {**MOH-A/2B/7**}.
[45]   See recitals (61)-(63) of each Commission Decision: {**MOH-A/2A/16-17**}; {**MOH-A/2B/16-17**}.

detriment of their customers as a whole. In particular, the coordinated trading and exchange of information in relation to all three of the types of order affected, including those relating to benchmark/fix transactions and price conditional orders, is liable not only to have widened effective spreads (for the reasons described above) but also to have caused losses to customers of the cartelist dealers by reason of manipulation to the price mid-point. This is an additional mechanism by which the O'Higgins PCR contends that harm was caused to the class. By way of illustration, with regard to benchmark transactions:[46]

(1)   Benchmark transactions match buy orders and sell orders at the same price (the fix rate), and accordingly both the quoted and effective bid-ask spreads on such transactions are generally zero.

(2)   Nevertheless, the coordinated trading (such as collusive front running) described in the Commission Decisions is likely to have led to price manipulation – i.e., to have affected the price of the transactions at the fix to the net benefit of the cartelist dealers (and to the net detriment of the cartelist dealers' customers).

(3)   Because the colluding traders will have acted in advance of the relevant benchmark fix to seek to raise or lower the price, such conduct will have had effect on the mid-price *before* the customer entered into the affected trade. In particular, in the case of collusive front-running in relation to benchmark transactions, the colluding traders will have coordinated in order to raise or lower the price in advance of the fix.

(4)   In consequence, after the trade is executed at the fix, a larger than usual price movement would be expected as the market price returns to the level at which it would have been in the absence of the collusive conduct.

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[46]   We have illustrated this mechanism by reference to benchmark transactions but the same mechanism applies to customer price conditional (e.g. stop-loss and take-profit orders) and immediate orders where cartel dealers had foreknowledge of upcoming trades. Breedon 1, paras. 6.15-6.29 {**MOH-B/0/58-62**}; Bernheim 1, paras. 72 {**MOH-H/0/26**} and 142-145 {**MOH-H/0/52-53**}; Breedon 2, paras. 4.6 {**C/1/34-35**}; Bernheim 2, para. 12 {**C/2/10**}; Bernheim 3, paras. 30-33 {**C/4/15-16**}.

(5)   Accordingly, the extent of the mid-point price manipulation by the cartelist dealers should be reflected in the magnitude of the price movement *after* the manipulated transaction has executed.

(6)   The size of this subsequent price movement will itself be reflected in the size of the realised spread (since the latter is the difference between the transaction price and the market mid-point at this later point in time).

26.   Accordingly, controlling for changes in relevant market factors, the differences in realised spreads as between the cartel period and a non-cartel period will reflect the impact of widening of the effective spread as well as the impact of collusive price manipulations around the time of benchmark fixes, and thereby measure the aggregate harm to customers from the full spectrum of the cartelists' conduct as identified in the Commission Decisions.

CONCLUSION AND PROPOSAL FOR EMPIRICAL TESTING

27.   In the premises, it is considered highly likely (and certainly more probable than not) that the cartels elevated bid-ask spreads market-wide relative to the spreads that would have prevailed without collusion.[47]

28.   The O'Higgins PCR intends to test the causative effect of the cartels via their effect on effective and realised spreads. This will be achieved by rigorous empirical testing using regression analysis[48] and corroborative techniques based upon the disclosure (including the chat transcripts) as summarised in the Neutral Statement of the O'Higgins PCR on the Merits at paragraphs 20-28.[49] In particular, the possibility that the cartel conduct had a differential impact on the spreads of cartelist dealers and non-cartelist dealers (or other variety of differential impact, such as volume of the trade, currency of the trade, mode of

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[47]   Bernheim 1, para. 43 {**MOH-H/0/16**}.

[48]   On the recognised utility of regression analysis in competition cases, see in particular the European Commission's Staff Working Document, Practical Guide: Quantifying Harm in Actions for Damages Based on Breaches of Article 101 or 102 of the Treaty on the Functioning of the European Union SWD (2013) 205 (June 11, 2013) {**B/16**}, as referred to in footnote 41 of Bernheim 1 {**MOH-H/0/36**} and the submissions at {**T4/109/14**}-{**T4/112/4**}, referring to the judgment of Rose J in *Emerald Supplies Ltd & ors v British Airways PLC* [2015] EWHC 2094 (Ch) {**AUTH/20.1**}.

[49]   {**AB/6/12-17**}. See further: Bernheim 1, sections II.B {**MOH-H/0/27-39**} and II.D {**MOH-H/0/40-41**}; Bernheim 2, section IV.B {**C/2/25-33**}; teach-in slides 22-48 {**H/578/24-50**}.

the trade (voice/SBP/e-commerce), etc.) can be tested empirically by the application, in particular, of multiple cartel dummy variables and interaction terms combined with a close analysis of the underlying documents (in particular, the cartel chatroom records). It is expected that data will be available from the Respondents enabling this empirical analysis to be carried out.[50]

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[50] Accordingly, it may well not be necessary to obtain data from either non-defendant banks or from class members. Other third-party data sources are likely to be available. See the O'Higgins PCR's experts' comments in evidence on Day 2 as extracted at {**AB/22/11-14**}. See also Bernheim 1, Section III {**MOH-H/0/42-49**}, and Breedon 3, paras. 5.10-5.15 {**C/3/47-51**}.