Response of Professor Marc Ivaldi to the Compass Lexecon Submission's comments on the Czech network sharing studies

This note has been prepared by Professor Marc Ivaldi at the request of counsel Bell Gully and Simpson Grierson to review the criticisms of the papers of A Cojoc, M Ivaldi, FP Maier-Rigaud and O März, *Horizontal cooperation on investment: Evidence from mobile network sharing* (SSRN, March 2020) (**Cojoc Paper**)[1] and FP Maier-Rigaud, M Ivaldi and C Philipp Heller, *Cooperation among Competitors: Network sharing can increase Consumer Welfare* (SSRN, March 2020) (**Maier-Rigaud Paper**[2] (together, the **Papers**)) expressed in paragraph 3.12 of the 14 October 2026 submission of Compass Lexecon (commissioned by Chapman Tripp) (**Compass Lexecon Submission**).[3] Note that Professor Marc Ivaldi is one of the coauthors of both the Cojoc Paper and the Maier-Rigaud Paper.

Executive Summary

This report responds to the Compass Lexecon Submission's criticisms of the Czech network-sharing studies referred to in the Papers. None of those criticisms undermine the studies' methods or conclusions:

- **Compass Lexecon identifies no error in the studies' methods, data or estimations**. There is therefore no basis for disregarding the studies' findings.
- **Network sharing lowers marginal costs**. The studies find a statistically significant fall in both RAN sharing parties' marginal costs, and Compass Lexecon does not challenge this finding. Lower marginal costs directly improve pricing incentives, so they are the efficiencies most likely to benefit consumers.
- **Network sharing lowers consumer prices**. The studies show that RAN sharing did not lead to price increases and it was associated with improvements valued by consumers. No usage basket in the studies shows a price increase, and the medium, large and very large baskets show economically meaningful price reductions.
- **There is no evidence to the contrary**. Compass Lexecon identifies no study of a comparable RAN sharing arrangement that found higher prices or lower network quality. Both the Maier-Rigaud Paper and the Cojoc Paper remain the most directly relevant ex-post evidence on RAN sharing in an EU mobile market.

These points are expanded on below.

1 A Cojoc, M Ivaldi, FP Maier-Rigaud and O März, *Horizontal cooperation on investment: Evidence from mobile network sharing* (SSRN, April 2020) (**Cojoc Paper**).

2 FP Maier-Rigaud, M Ivaldi and C Philipp Heller, *Cooperation among Competitors: Network sharing can increase Consumer Welfare* (SSRN, March 2020) (**Maier-Rigaud Paper**).

3 Submission of Compass Lexecon in response to the Statement of Preliminary Issues (**Compass Lexecon Submission**), see https://www.comcom.govt.nz/assets/Documents/timeline/Compass-Lexecon-Report-for-Chapman-Tripp-Submission-on-Statement-of-Preliminary-Issues-15-October-2026.pdf.

1. The Compass Lexecon Submission says nothing about whether the Papers' methods are sound

The Compass Lexecon Submission turns first to who wrote the Papers and the context they were written in. Compass Lexecon state:[4]

> *"The papers were prepared in the context of the Czech investigation, by consultants advising one of the parties and we understand were not peer reviewed. The same economic consultancy is advising the Parties in this transaction. Cojoc et al. (2020) states that it draws on consulting work the authors have done on behalf of a mobile network operator in response to allegations of anticompetitive behaviour in the EC case AT.40305."*

The Compass Lexecon Submission does not identify any errors in the Papers in terms of their methods, data or estimations. Economic evidence prepared for a party is routinely put before the European Commission and assessed on its merits. The authors of the Papers disclosed the consulting context openly, which is good practice and not a reason to set the work aside.[5]

The Papers set out their data, identification strategy and robustness checks in enough detail for a third party to replicate or challenge them.[6] They were released in recognized working paper series (TSE / CEPR / SSRN) and have been presented at academic venues. If Compass Lexecon consider the results are biased, the right response is to show where the analysis goes wrong. Referring to who funded it is not a substitute for that.

We note that in its Article 27(4) Notice[7] and its Final Article 9 Decision,[8] the European Commission explicitly acknowledged that, after reviewing the arguments and economic/technical evidence submitted by the parties at the Oral Hearing and in written submissions, it had re-evaluated its preliminary concerns with the Czech RAN sharing agreement.[9] Rather than pursuing an infringement decision with fines or ordering the unwinding of the network sharing arrangements, the European Commission agreed to resolve the case via binding commitments under Article 9 of Regulation 1/2003 on 11 July 2022.[10]

2. The differences between the Czech agreement and a JV do not make the evidence irrelevant

The Compass Lexecon Submission states that:[11]

> *"Cojoc et al. (2020) distinguishes the Czech arrangement from a joint venture such as RANCo. The Czech agreement excluded the major cities and was organised on a geo-split basis, under which each operator ran the shared network in its own half of the country. The authors contrast this with a joint venture, where strategic decisions relating to investments in infrastructure and the deployment of technology are made to maximise the joint profits of all sharing parties. RANCo is a jointly owned entity, i.e.,*

4 Compass Lexecon Submission at [3.12(a)–(b)].
5 Cojoc Paper at 1, n 4 and Maier-Rigaud Paper at 1, n 1.
6 Cojoc Paper at [5.2]–[5.3], [6.1]–[6.2] and [7] and Maier-Rigaud Paper at [3.2], [4.2]–[4.3] and Technical Annex.
7 See https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021XC1001(05) .
8 See https://ec.europa.eu/competition/antitrust/cases1/202250/AT_40305_8638841_4187_5.pdf.
9 See https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021XC1001(05) at [5]–[6] and https://ec.europa.eu/competition/antitrust/cases1/202250/AT_40305_8638841_4187_5.pdf at [21]–[22].
10 See https://ec.europa.eu/competition/antitrust/cases1/202250/AT_40305_8638841_4187_5.pdf at [207], [216] and [223]–[228].
11 Lexecon Compass Submission at [3.12(b)].

precisely the structure the authors distinguish. Their findings therefore do not speak to the effects of the JV. When the authors model the Czech agreement as a JV, their model does not produce realistic results."

We respond to each of the points in the paragraph above in turn (with the relevant Compass Lexecon point we are addressing in bold):

- ***The Cojoc Paper distinguishes the Czech arrangement from a joint venture***. While the Cojoc Paper distinguishes a geo-split arrangement from a joint venture, it does so principally by reference to their different governance and decision-making arrangements, including how investment and network quality decisions are made.[12] This is a separate point from the underlying economics of RAN sharing. The Cojoc Paper identifies the economic mechanisms through which RAN sharing affects prices and quality: lower unit costs, faster and wider rollout, and pooled infrastructure.[13] Those mechanisms work in the same way whichever legal form the sharing takes.

- ***The Czech agreement left out the major cities.*** It is correct that the Czech RAN agreement did not involve major Czech cities. At the time of the review of the Czech RAN agreement referred to in the Cojoc Paper, there was a lot of discussion among economic experts on the impact of this type of agreement in dense (i.e. urban) areas. Since then, Elliott et al. (2025) have shown that economies of density do not matter much in telecommunications networks.[14] This suggests that broader sharing including cities would produce larger efficiencies, not smaller ones.

- ***When the Cojoc Paper models the Czech agreement as a JV, their model does not produce realistic results***: The allegedly "unrealistic results" under the JV model referred to in [3.12b] of the Compass Lexecon Submission come from the particular JV model used in the Cojoc Paper, not from JVs generally.[15] The JV model in the Cojoc Paper is a simplified hypothetical virtual model.[16] That JV model assumes that the operators jointly set effective network quality to maximise their combined profits. This is unrealistic because, in practice, the effective quality of telecommunications networks is mainly driven by the intensity in using the networks which depends on the sole behavior of users. Then, it is not surprising that the observed outcomes do not fit the Cojoc Paper's JV assumption, and instead suggest the operators kept acting independently and continued to compete with each other.[17] The Czech RAN sharing's governance arrangements (independent retail pricing, independent spectrum holdings, independent capacity and upgrade rights, information barriers, etc.) were designed precisely to keep the competitive incentives that the Czech evidence indicates were maintained.[18]

The Compass Lexecon Submission points to no study of comparable RAN sharing arrangements that finds price increases or quality degradation.[19] Ex-post evidence in the Cojoc Paper, which is from a

12 Cojoc Paper at 7–8 and 10–12.
13 Cojoc Paper at 8–9, 13–14 and 23–24.
14 See https://www.tse-fr.eu/sites/default/files/TSE/documents/doc/wp/2021/wp_tse_1207.pdf at [4.1.3], [6.1.1] and Appendix D.3.
15 Cojoc Paper at [5.3.4].
16 Cojoc Paper at [4.2] and [5.3.4].
17 Cojoc Paper at [5.3.4].
18 Cojoc Paper at [4] and [5.1].
19 Compass Lexecon Submission at [3.11]–[3.12].

closely related arrangement in an EU mobile market, is more informative than a theoretical concern (like that expressed by Compass Lexecon) that has not been tested.

3. The Maier-Rigaud Paper finds that network sharing lowered costs

The Compass Lexecon Submission states:[20]

> *"Maier-Rigaud et al. (2020) also focus on the Czech network sharing which, as noted above, differs in important respects from the proposed JV. The authors acknowledge that they "do not directly estimate the effect of the NSA on the sharing partners' incentive to invest in mobile infrastructure". The authors do not observe or measure network quality directly. They infer a quality improvement from any increase in demand for the two sharing parties after the agreement. Such an increase could reflect other party-specific factors, such as marketing or bundling, rather than network quality."*

The Compass Lexecon Submission only addresses one part of the Maier-Rigaud Paper. In fact, the Maier-Rigaud Paper finds that the network sharing agreement both improved network quality (which it infers from demand) and reduced costs.[21] The Compass Lexecon Submission challenges the former finding, but does not address the latter. The cost finding is estimated separately, inferred from the operators' prices and customers' price sensitivity,[22] and shows a statistically significant fall in both parties' marginal costs.[23]

Cost reductions are the efficiency that matters most for consumers. The European Commission's own Horizontal Merger Guidelines state that reductions in variable or marginal costs are more likely to benefit consumers than reductions in fixed costs, because they directly affect pricing incentives.[24] The Maier-Rigaud Paper documents exactly this kind of efficiency, using a methodology the European Commission itself relies on in merger control.

The Compass Lexecon Submission also raises two further points in relation to the Maier-Rigaud Paper which we respond to (with the relevant Compass Lexecon point we are addressing in bold):

- ***The increase in demand could "reflect other party-specific factors, such as marketing or bundling, rather than network quality"***. The concern that a rise in demand might reflect marketing or bundling rather than the benefits from the RAN sharing agreement misses the point. Costs are recovered from the supply side, given estimated demand and observed prices. Shifts in demand for other reasons do not produce a fall in estimated marginal costs, as was observed here. Note that the specification of the demand in the Maier-Rigaud Paper controls for operator-specific and time-varying factors.
- ***The authors "do not directly estimate the effect of the NSA on the sharing partners' incentive to invest in mobile infrastructure".*** The authors do not estimate the effect on investment

20 Compass Lexecon submission at [3.12(c)].
21 Maier-Rigaud Paper at 21–22 and 25–26.
22 The Maier-Rigaud Paper uses a nested logit model of demand, an approach commonly used to simulate the effects of mergers: see the Maier-Rigaud Paper at 31, n 51–52, citing M Ivaldi and F Verboven "Quantifying the effects from horizontal mergers in European competition policy" (2005) 23 International Journal of Industrial Organization 669.
23 Maier-Rigaud Paper at 22, 24 and Annex A.2.
24 European Commission *Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings* (2004) at [80] (here).

> directly, and they say so. But lower costs of providing capacity and coverage raise the return on each unit of investment. The absence of a direct estimate is not evidence that incentives to invest were weakened, and the critique offers none.

It is correct that the Maier-Rigaud Paper does not measure network quality directly, nor set out the mechanism through which the agreement would have improved quality. The case for the agreement's benefits does not depend on that statement. The cost reduction is the Maier-Rigaud Paper's main and well-identified result, and it stands on its own.

4. The European Commission's preliminary view was never confirmed

The Compass Lexecon Submission states:[25]

> *"In fact, the EC preliminarily concluded that the agreement resulted in a lower quality of service for T-Mobile's customers in parts of the country due to the delayed deployment of carrier aggregation functionality and the lack of roll-out of LTE2100."*

The reference to the European Commission's preliminary conclusions in the Compass Lexecon Submission should be put in context. They were set out in a 2019 Statement of Objections, which is a preliminary step in the procedure.[26] The case was closed in July 2022 by a commitments decision under Article 9 of Regulation 1/2003.[27] This commitments decision made no finding of infringement, and it did not confirm the quality concerns the Statement of Objections raised.[28]

The specific issues mentioned in the 2022 decision (carrier aggregation and LTE2100) concern particular functionalities in parts of the country.[29] They did not show that overall network quality fell, and they have to be weighed against the coverage and quality gains the agreement brought elsewhere.

5. The price results consistently point to no harm

The Maier-Rigaud Paper states:[30]

> *"Overall the results show that the NSA led to a reduction of usage-adjusted prices. Only for the small usage basket is the estimated effect of the NSA insignificantly different from zero. For the medium, large and very large usage baskets we find a consistent negative and economically meaningful effect of the NSA on prices. Note that the effect size increases as the usage increases, suggesting that the NSA had larger beneficial effects on consumers with greater data requirements."*

The Compass Lexecon Submission responds by stating:[31]

> *"The results in Maier-Rigaud et al. (2020) regarding the effect of the agreement on prices are not statistically significant for the smallest usage basket and only weakly significant for the medium usage*

25 Compass Lexecon submission at [3.12(c)].
26 See https://ec.europa.eu/commission/presscorner/detail/en/ip_19_5110.
27 See https://ec.europa.eu/competition/antitrust/cases1/202250/AT_40305_8638841_4187_5.pdf.
28 See https://ec.europa.eu/competition/antitrust/cases1/202250/AT_40305_8638841_4187_5.pdf at [21].
29 See https://ec.europa.eu/competition/antitrust/cases1/202250/AT_40305_8638841_4187_5.pdf at [98]–[106].
30 Maier-Rigaud Paper at 16.
31 Compass Lexecon Submission at [3.12(d)].

> *basket. For the large usage basket, a common trend assumption is not satisfied for the first control group, used for their 'mainline' results, suggesting it is not an appropriate basis to estimate the effects of the Czech sharing by comparison."*

However, statistical significance should not be confused with the direction of an effect. We respond to each of the points made by Compass Lexecon in turn (with the relevant Compass Lexecon point we are addressing in bold):

- ***The price effects are not statistically significant for the smallest usage basket and only weakly significant for the medium usage basket.*** However, no basket shows a price increase. The estimated effects point the same way across all usage baskets. Whether a coefficient is significant reflects how precisely it is estimated, not whether the effect exists. The relevant question for the assessment is whether the evidence supports the claim that network sharing raises prices. A failure to find a statistically significant price increase in any basket weighs against that claim.
- ***For the large usage basket, the common trend assumption is not satisfied for the first control group used for the "mainline" results*.** The common-trend issue is narrow. It concerns one control group for one basket. The results for the large basket are robust to the alternative control group(s), for which the pre-trend test is satisfied. Robustness of this kind is exactly what makes difference-in-differences evidence credible. A pre-trend issue in a single specification does not invalidate the paper's conclusions.

Conclusion

None of the points raised in the Compass Lexecon Submission identifies an error that would reverse the Papers' findings. Both the Maier-Rigaud Paper and the Cojoc Paper remain the most directly relevant ex-post evidence on RAN sharing in an EU mobile market. That evidence consistently shows that RAN sharing did not lead to price increases and was associated with improvements valued by consumers. The Compass Lexecon Submission has put forward no comparable empirical evidence to the contrary.

Sources

- Commission press release IP/21/4986
- Commission accepts commitments from T-Mobile CZ, CETIN and O2 CZ (July 2022)
- Commission sends Statement of Objections (2019)
- Maier-Rigaud et al., "Cooperation Among Competitors: Network Sharing Can Increase Consumer Welfare" (SSRN)
- Cojoc & Ivaldi, TSE working paper
- Market Structure, Investment, and Technical Efficiencies in Mobile Telecommunications | Journal of Political Economy: Vol 133, No 5
- Quantifying the effects from horizontal mergers in European competition policy - ScienceDirect