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# The Huawei Question: Managing the Competitive Consequences

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## Introduction

The U.S. government's recent tightening of sanctions around Huawei may effectively take decisions on Huawei's participation in European telecom networks out of European governments' hands.[2] If these sanctions deliver a knock-out blow to Huawei's viability as an equipment provider, the policy discussion needs to move swiftly to managing the aftermath of Huawei's near-complete exit. Whatever the broader geo-political issues raised by Huawei, its exit from the European telecom supply chain certainly raises concerns about future competition in the supply chain of European mobile networks. So too does the prospect of a wider splintering of 5G and future standards — and with it supply chains for both network equipment and consumer equipment — between Western and Chinese "spheres of technological influence" with hard barriers separating them.[3,4] Although there may be compelling reasons for engineering such a divorce, like all divorces it will have significant costs. In this case, the costs are not just to the telecom sector but potentially the broader economy. Does competition policy have a role in mitigating the costs?

The Huawei affair coincides with an era when critics at both ends of the political spectrum routinely call out competition policy — a term used here to encompass both "antitrust" and sectoral economic regulation[5] — for its allegedly narrow and reductionist vision of economic efficiency, i.e. its focus on short-term price and output effects.[6] The exit of Huawei from European supply chains and a broader fragmenting of global technological standards are, of course, exogeneous developments that competition authorities cannot govern. But competition policy has an important role to play in managing the aftermath of such technological splintering. A competition policy focus on competition in the supply chain is, in fact, thoroughly consistent with a focus on the big picture of innovation and economic growth.

The business of replacing Huawei's equipment in existing networks and the rewriting of plans for future deployment in which Huawei was a prominent part of the script will cost European network operators and set back 5G deployments appreciably — perhaps even a few years. The latest U.S. sanctions may increase the transition costs and discontinuities significantly. But beyond these significant transition costs, there are substantial medium and long-term implications of not just a Huawei ban but of global technological fragmentation for competition policy.

## The Competitive Landscape Post-Huawei

Huawei, Nokia, and Ericsson have a combined 90 percent share of the European market for Radio Access Network ("RAN") equipment. Imagine the raised brows if Huawei had agreed to not compete in some markets with Nokia and Ericsson, in return for exclusivity in other markets. Yet this brazen market allocation may be very similar in economic effect to the competitive picture in the worst-case where the world splinters into distinct technological spheres of influence. Similarly, a reduction in the number of major competitors from 3 to 2 within Europe itself — with the low-cost competitor exiting the market — would normally be of substantial competition concern.

Looking at the mobile equipment industry historically, one observes the exit of once-major firms such as Lucent and Nortel. Potential non-Chinese entrants such as Samsung lack implementational expertise and network operator relationships in the European environment, so high market shares in certain regions of the world may not translate into a significant competitive threat to the remaining incumbents in Europe.[7] Governments may attempt to sponsor entry, e.g. via initiatives such as the OpenRAN initiative, but one should be cautious about the odds of success at developing solutions in a cost-effective, timely, and technologically leading-edge way.[8] It would be imprudent to assume that there will be significantly more competition to Nokia and Ericsson for an extended period of time. It is thus important to consider policy strategies to minimize the adverse effects from limited competition in the upstream part of the telecom supply chain.

**What are the Economic Costs?**

To understand what policies are needed, the competitive effects of the Huawei exit must be understood. The typical focus of competition policy is on prices and output. In this respect, merger-like simulation analysis may provide some insight, although standard oligopoly models will not capture the nature of the bargaining and contracting process between operators and equipment suppliers. The European scene is very different from the U.S. one, where there are now three very large operators. European operators who represent a substantial chunk of equipment vendors' business, and who can consolidate within-Europe procurement decisions, will enjoy more bargaining power than smaller operators with a greater geographic focus.[9] However, with a splintering of global technologies, even these operators will lack the ability to discipline European pricing by tying purchasing decisions in geographies where there may be more vendor competition to European purchasing decisions. In all, the price effects on Europe's fragmented mobile environment will be more variable and likely more adverse than on the U.S. industry.[10]

There may also be adverse innovation effects. Aghion et. al. (2005) provide a synthesis of the dueling Schumpeterian and Arrowian perspectives on the nexus between market concentration and innovation. Their results suggest that in an industry with three major sophisticated players, losing one of the major three players might relax the "escape effect" of competition by reducing the difference between post-innovation and pre-innovation rents.[11] Moreover, pervasive technology splintering may create protected environments for firms within each technological sphere of influence — with the danger that innovation in each sphere is retarded relative to today's relatively competitive and open world.[12]

These longer-term pricing and innovation effects are over and above significant short-term disruption and transition costs. All this means a significantly slower 5G rollout than envisaged just last year; lower long-term adoption levels, and potentially slower rates of improvement in network capabilities. While projections of 5G's overall economic impact are obviously highly speculative, the case for its transformative impact on sectors such as the automotive sector and the healthcare sector seems quite plausible. Further, the historical record suggests that there are substantial spill-overs from telecom infrastructure deployment: the study of Roller & Waverman (2001) suggests that the social rate of return from fixed-line deployment in the OECD in the 1970-90 time period was

about three times the private cost of capital.[13] If 5G were just about faster video streaming, Huawei's participation in European telecoms would not have been so controversial in the first place.

Business incentives to innovate around the technology will significantly drive the magnitude of the spill-overs from 5G. The price and quality of available infrastructure drive these business incentives, but so too does the ability to make technology-complementing organizational changes. European businesses have been historically more constrained than their foreign counterparts in making such changes thanks to Europe's labor market and capital market institutions. Setbacks to the deployment of high-quality infrastructure at relatively competitive prices will significantly compound Europe's inherent disadvantage.[14] This all translates into less economic growth, at a time of extraordinary governmental indebtedness.

**What is to be Done?**

The policy institutions that deal with the telecom sector — *ex post* competition policy, *ex ante* regulatory policy and institutions such as DG Connect, and individual ministries at the national level that deal with the digital economy — can play a role in mitigating the costs of the divorce. To do so merely requires a recognition that the trade-offs that have been discussed so often in the long-running debate over the optimal market structure in the mobile industry — those between short-run lower prices and long-run higher investments — do not exist in the medium and long-terms.[15] New investment and innovation drive long-run productivity gains, and endemic competition problems in the upstream equipment supply sector will translate into less investment, less innovation and higher prices (particularly on a quality-adjusted basis) downstream. So, the focus should be squarely on policies that boost investment and innovation by mitigating the consequences of this limited competition.

The traditional solution to the prospect of limited competition for a long period of time is utility-style regulation. But as the experience of the European telecom sector shows, this struggles to accommodate innovation.[16] However, creating or enabling countervailing bargaining power in the procurement process could push prices and even innovation towards the level seen with greater competition. National governments or even the EU could choose to license vendors to sell network equipment in their territory and tie license renewals to targets for reductions in quality-adjusted or "hedonic" prices for the equipment.[17] Competition authorities could enable some measure of countervailing buyer power by allowing some degree of cooperation between operators in the procurement process, or by taking a relatively benign view of collaborative efforts by operators to support or sponsor new entry.[18] All of this can be accommodated with the current scope of Article 101, re: agreements between firms.

Another set of policies can focus on alleviating bottlenecks and reducing deployment costs. The time would appear particularly ripe for spectrum policies that ensure that non-telecom-sector actors are paying the correct economic prices for spectrum, and also to ensure pan-European harmonization of spectrum policies and allocations to the maximal degree. Governments must focus on maximizing social surplus from spectrum use, and

not on maximizing short-term revenues. Additionally, siting facilities such as billboards, poles, building rooftops, and street furniture have an important role to play in the deployment of advanced mobile networks. North American regulators began regulating, on cost-based terms, the provision of space on electric utility poles for the deployment of then-nascent cable TV networks in the late 1970s. European policymakers should consider reviewing whether some or all these siting facilities are essential to deploying advanced mobile networks and, if they are, should consider similar regulation.[19]

Finally, merger review processes need to give greater weight to the medium-term and long-term picture. In particular, the risk that current developments will elevate input prices but in an asymmetric fashion, must be borne in mind — today's keenly-pricing smaller operators may be much less or no constraint in the higher-cost future. The long-term impact of Huawei's exit and limited future competition on both marginal operating costs and future network deployment costs — including any indirect impact on spectrum prices — must be incorporated into calculations of price effects and cost savings from mergers. The inherent difficulty of quantifying longer-term effects means that they are often treated with some skepticism in antitrust analysis. But given the current issues, an analysis that is based on existing and supposedly "hard" data (e.g. based on current marginal costs) and which ignores "extensive margin" decisions about exit or continued participation, will provide the illusion of precision, achieved at the cost of irrelevance.

Nothing in our discussion demands radical change at the institutional or analytical level; it only requires a recognition that competition at all levels of the supply chain matters. Competition policy and regulatory policy towards network operators and other downstream elements of the supply chain must duly recognize the significant short-term costs and the prospect of limited long-term competition created by Huawei's exit. It must also recognize that counteracting or mitigating the effects of this limited competition is thoroughly consistent with both the traditional consumer welfare perspective and the bigger picture perspective of growth and innovation. As such, it provides a welcome chance to demonstrate the alignment between the objectives of competition policy and broader economic policy.

More broadly, the competitive impacts — as they are measured in a traditional competition policy sense — of technology decoupling between the West and China should be a significant part of the policy-making calculus. Decoupling may throw the "small numbers" nature of competition in several technology sectors into sharper relief. It is thus interesting to note the reported views of European Commission officials to the effect that "two European suppliers [of telecom network equipment] can provide what is needed not only for Europe but for a large part of the world."[20] We hope that the Commission will come to embrace the view that supply chain diversification is not just about reducing or eliminating reliance on Chinese suppliers, but also about keeping the supply chain as healthy and effectively competitive as possible.

[1] Kalyan Dasgupta, Berkeley Research Group; Leonard Waverman, McMaster University; Mark Williams, Berkeley Research Group.

[2] Financial Times, "Chip and phone supply chain shaken as Huawei faces mortal threat," August 18, 2020.

[3] One possibility, which earlier this summer appeared to have stalled, is that the US government would stop US firms contributing to standards or even attending standardization meetings where Chinese firms or engineers were present. See, for example, Iain Morris, "Huawei is in even bigger trouble after US move," *Light Reading*, June 16th, 2020. The latest Huawei sanctions create a new dynamic, however. China had previously tried to encourage its own TD-SCDMA standard, but after that proved unsuccessful, Chinese firms focused squarely on global 4G and 5G standards. But the potential death of Huawei may give China strong incentives to revert to seeking out technological autonomy and to use its financial leverage in much of the emerging world to develop markets for Chinese standards.

[4] The splintering we have in mind will be quite different from what prevailed in the multi-standards era prior to 4G. In that case, the U.S. and several other countries did not mandate a single standard and this allowed competition between GSM and CDMA networks. There was no hard barrier to technology portability and the 3G successor to GSM — WCDMA — incorporated several core techniques of CDMA. In this world, there was head-on competition between standards in at least some parts of the world. This will not be true for the geo-politically splintered tech world that might arise some years down the road.

[5] Both competition policy and *ex ante* regulation of the sort applied in the telecom sector are fundamentally concerned with market power within a sector and its consequences for consumers and firms in that sector.

[6] For a discussion of these critiques see A. Douglas Melamed, "Antitrust Law and its Critics," available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3519523.

[7] Iain Morris, "Samsung in Battle to be Seen as European 5G Contender," *Light Reading*, July 13, 2020. Even a firm as well-heeled and sophisticated as Samsung would have considerable difficulty in implementing the 5G overlay solution in Europe that it has done in Korea.

[8] Katz & Shapiro (1994) remark that governments may have significant informational disadvantages relative to private parties when it comes to the development of emerging technologies. They point, for example, to the United States choosing an inferior color TV standard in the 1950s. See Katz, Michael & Carl Shapiro (1994), "Systems Competition and Network Effects," *Journal of Economic Perspectives*, Volume 8, Number 2, pp.93-115.

[9] The larger operators, taken globally, may account for a high share of any vendor's sales, and thus will have a degree of bargaining power.

[10] In Europe, spectrum allocation processes are not harmonized across countries over time, which potentially hinders multi-country operators' ability to make purchasing and deployment decisions for all European geographies simultaneously. Historically, license terms and renewal rights have also not been coordinated across member states. Harmonization of spectrum allocation and management procedures is an area that frequently invokes tension between member states' desire for autonomy and the European Commission's strong orientation towards a single market.

[11] Philippe Aghion, Nicholas Bloom, Richard Blundell, Rachel Griffith & Peter Howitt (2005) "Competition and Innovation: An Inverted-U Relationship," *Quarterly Journal of Economics*, Volume 120, Number 2, pp. 701-728. The authors find that in industries characterized by neck-and-neck competition between firms, firms will seek to "escape" competition by innovating their way out of it. In other cases, though, competition will diminish the incentives of laggard firms to catch up with leading firms by investing in innovation, as it limits the gains from doing so.

[12] It might be argued that limiting competition increases the "appropriability" of investment in R&D, and thus incentives to invest. Aghion et.al. point out that incentives to invest are driven by incremental profit gains from that investment, however. Suppose one of three firms is considering a major R&D investment that will allow it to become the only provider of a new product. The incremental profit gain, conditional on the R&D being successful, is $(\pi(m)-\pi(3))$, i.e. the difference between monopoly profits and profits in a three-firm equilibrium. By contrast, if the existing market structure was two firms not three, the incremental profit gain would be $(\pi(m)-\pi(2))$, which is necessarily smaller. Things are more complicated if firms anticipate that rivals will be able to achieve the same innovations, in which case the prospect of sharp *ex post* competition could deter innovation. Of course, high prices and a lack of competition at one level of the supply chain may hinder complementary innovation downstream, whereas sharp competition may improve it.

[13] Roller, L-H & L. Waverman (2001), "Telecommunications Infrastructure and Economic Development: A Simultaneous Approach," *American Economic Review*, Volume 91, No.4, pp. 909-923. The coefficients in this paper can be translated into an investment multiplier, which suggests that for fixed-line telecommunications social returns were roughly three times the cost of capital using sensible assumptions for deployment costs.

[14] Discussions of the role of complementary investment — and of regulation's potential to suppress or promote it — in a cross-country context can be found in, for example, Van Ark, B. & Inklaar R. (2005), "Catching Up or Getting Stuck: Europe's Troubles to Exploit ICT's Productivity Potential," Groningen Growth and Development Centre, Working Paper No. 7 and Van Reenen, J. & R. Sadun (2005), "Information Technology and Productivity: It Ain't What You Do but the Way You Do I.T.," Centre for Economic Performance, London School of Economics

[15] This tension has come to the fore in the context of the long-running debate about whether markets with four operators perform better than markets with three operators. See Genakos, Christos, Tomasso Valletti & Frank Verboven (2018), "Evaluating Market Consolidation in Mobile Communications," *Economic Policy*, Volume 33, Issue 93, pp.45-100.

[16] Cave, Valletti & Genakos (2019) state that the European regulatory framework has been more successful in squeezing out static efficiencies than incentivizing investment, and that investment levels in European lag those in the United States. Cave, Martin, Tomasso Valletti & Christos Genakos (2019), "The European Framework for Regulating Telecommunications: A 25-year Appraisal," *Review of Industrial Organization*, Volume 55, Number 1, pp.47-62/.

[17] Many countries have historically imposed roll-out obligations on mobile network operators as a condition of their licenses. Regulators have also set price cap plans for regulated firms that index permitted price increases to expected productivity improvements. Thus, there is nothing unprecedented about our proposals.

[18] We are not suggesting that enhanced buyer power is a full-fledged substitute for the competition lost upstream. In fact, buyer power that allows buyers to extract the quasi-rents from innovation will end up hurting innovation in the long-term. However, some literature certainly suggests that buyer power can sometimes boost innovation, particularly if the buyer power does not drive prices below the long-run competitive level (e.g. by expropriating quasi-rents). See, for example, Chen, Zhiqi (2019), "Supplier Innovation in the Presence of Buyer Power," *International Economic Review*, Vol. 60, Issue 1, pp. 329-353. See also Inderst, Roman & Christian Wey (2007), "Buyer Power and Supplier Incentives," *European Economic Review*, Volume 51, Number 3, pp. 647-667, and OECD (2008), *Roundtable on Monopsony and Buyer Power*, pp. 11-12.

[19] Article 57 of the European Electronic Communications Code (EECC) does oblige member states to ensure that such infrastructure is available on fair, reasonable and non-discriminatory terms. In some cases, and for some types of infrastructure, this obligation may suffice. In other cases, where there are no close substitutes to a particular infrastructure (as was the case with electric utility poles for purposes of cable TV deployment in the U.S. and Canada), tighter cost-based regulation may be warranted. The scope and intensity of regulation could easily vary across geographic markets (e.g., there may be many siting alternatives available in urban locations, and less so in rural locations).

[20] Reuters, "EU countries must urgently diversify 5G suppliers, Commission says," July 24, 2020, available at https://www.reuters.com/article/us-eu-cybersecurity-5g/eu-countries-must-urgently-diversify-5g-suppliers-commission-says-idUSKCN24P12T.