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HUAWEI RISK IS A CHINA RISK

Why Canada needs to ban Huawei's involvement in 5G

Duanjie Chen

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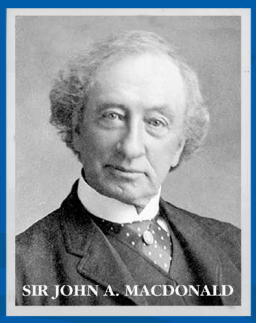
MLI 10 A DECADE OF TRUE NORTH IN CANADIAN PUBLIC POLICY



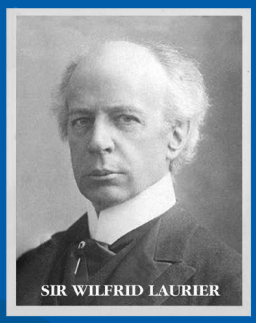


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Table of contents

Executive Summary 4
Sommaire 6
Introduction 8
Why Ban Huawei 5G Involvement? 10
The Huawei Path within the China Model 15
Huawei Risk Is a China Risk 28
Conclusion: Ban Huawei and Stop Living in Fear of China 30
About the Author 32
References 33
Endnotes 40

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Executive Summary

Should Canada ban Huawei from its 5G system? Yes, if strategic decisions concerning the safety of our national infrastructure are to be informed by national interest rather than business calculation alone.

Proponents of Huawei in Canada have a fixated view that the Chinese tech giant is purely a commercial player. Yet, Huawei's inseparable relationship with the Chinese Communist Party (CCP), its inexplicably rapid growth, and its global track record of predatory behaviour, including repeated allegations of systematic intellectual property theft, tell a different story. Dealing with Huawei is dealing with the Chinese state behind it.

This paper focuses on Huawei's relationship with the Chinese government and what it means for the issues of risk, transparency, and trust if we let Huawei into our 5G network. 5G will form the backbone of a country's critical infrastructure, connecting everything we do in the future, ranging from our cellphones to sewage to missile launch pads, not to mention personal data stored for government and private services.

Anyone who lives in the world of 5G should be wary of letting in an untrustworthy vendor.

Therefore, anyone who lives in the world of 5G should be wary of letting in an untrustworthy vendor. Do we want to hand over our national infrastructure projects to a company whose government is openly bullying Canadians?

Examples from other nations grappling with this issue are instructive. It was Australia, not the United States, that first notified its partners about the dangers of using high-risk vendors such as Huawei and banned Huawei's 5G-involvement decisively. Australian experts warn that the entire infrastructure would be vulnerable if connected to a compromised 5G network. In the US, banning Huawei's involvement is based on a bipartisan consensus, and not simply a result of Trump's deal-making tactics. US House Speaker Nancy Pelosi has even likened allowing Huawei's 5G involvement to "choosing autocracy over democracy on the information highway."

The United Kingdom famously adopted a half measure: It banned Huawei from involvement in core functions of the 5G network but allowed it to compete for some non-core functions. The UK's insistence on its ability to differentiate core and non-core functions in 5G is mystifying and has been disputed by Australia's intelligence agencies.

At the centre of Huawei's 5G threat is the Chinese party-state itself. Huawei boasts a star status in both benefiting from and contributing to China's national strategy, which is aimed at dominating the global market in accordance to the CCP state's planning.

Huawei, which had started out as a switchboard vendor with little record of innovation, could not have attained its current global dominance in 5G-network technologies without the CCP

state's helping hand. It is now well known that Huawei enjoyed substantial direct and indirect financial benefits from its government, amounting to, according to some estimates, US$75 billion in grants, credit facilities, tax breaks, and subsidized land purchases. But even this does not tell the whole story.

Less noticed is that Huawei benefited extensively from its government blocking foreign entries to the Chinese market and using diplomacy to enable Huawei's penetration of foreign markets, including the direct funding of foreign purchases of Huawei products. Huawei also benefited from the state's orchestrated theft of foreign commercial secrets. This novel CCP industry policy enabled Huawei for decades to undercut the prices of its rivals by some 30 percent, and to acquire a gigantic number of patents at an average cost below half of its rivals.

This paper raises key questions about the seemingly magical growth of Huawei to demonstrate that one cannot separate Huawei's business interests from Beijing's strategic ambitions. The limited numbers that can be drawn from Huawei's annual reports show that:

1. Huawei has been growing exceptionally fast since its founding in 1987;
2. China's 2008 stimulus package and Belt and Road Initiative (formally launched in 2014) provided Huawei with additional tailwinds for its global sailing;
3. State direct financial aid and market manoeuvrings helped Huawei to gain and maintain a competitive edge over its rivals;
4. Huawei has almost doubled its hiring and almost tripled its per-head operating expenses within 10 years immediately after the global financial crisis, while its rivals had to cut down their operating expenses and reduce hiring;
5. Huawei underspent its rivals on R&D in absolute value until 2013; yet
6. Huawei's pre-2015 acquisition of patents has topped its 5G rivals persistently with a ratio of three-to-one or higher.

By the author's static and rough estimate, Huawei's cost per patent family for 2003-2012 is about US$621,360 compared to rival Nokia's US$8.5 million; and for 2011-2014, it is US$1.1 million compared to Ericsson's US$3.3 million.

How do they do it? There is significant evidence that the so-called Huawei magic is a miniature of the so-called China model, which combines the government's commanding power and its stealth industrial policy. We must see Huawei as a tool of China's global strategy as opposed to an ordinary commercial company separate from the Chinese state.

So, if we cannot trust the CCP, then we cannot trust Huawei. Canadian policy-makers need to have the resolve to ban Huawei from our 5G network to ensure our national security and defend our Canadian way of life. Canada should also prepare for Beijing's possible retaliation, but given the alternative – providing the CCP government with one more means of leverage in the future should we find ourselves once again in disagreement with China's authoritarian leaders – that is a price worth paying.

Sommaire

Le Canada devrait-il bannir la société Huawei de son réseau 5G? Oui, si l'intérêt national l'emporte sur les calculs strictement commerciaux dans les décisions politiques concernant la sécurité de l'infrastructure nationale.

Les promoteurs de Huawei au Canada ont une image bien arrêtée du géant chinois de la technologie, à savoir que ce dernier n'est qu'un acteur commercial. Pourtant, le fait que Huawei entretienne une relation étroite avec le Parti communiste chinois (PCC), croisse et prospère à des taux étonnement élevés et présente des antécédents de conduite agressive à l'échelle mondiale – étayés par les allégations répétées de vol systématique de propriété intellectuelle – révèle une situation bien différente. Faire des affaires avec Huawei a tout à voir avec l'État chinois derrière cette société.

Cette étude met l'accent sur les relations entre Huawei et le gouvernement chinois en cherchant à définir ce qu'elles signifient pour les questions de risque, de transparence et de confiance posées par l'entrée éventuelle de Huawei dans notre réseau 5G. Le 5G sera l'épine dorsale de l'infrastructure essentielle qui reliera toutes nos actions de demain à l'échelle nationale, de nos téléphones portables au transport des eaux usées, en passant par les rampes de lancement de missiles, voire les données personnelles de sources gouvernementales et privées.

Par conséquent, toute personne qui vit dans le monde du 5G devrait appréhender l'arrivée d'un fournisseur peu digne de confiance. Il s'agit vraiment d'une question de gros bon sens : en effet, souhaitons-nous confier nos projets nationaux d'infrastructure à une entreprise établie dans un pays dirigé par un gouvernement ouvertement agressif avec les Canadiens?

Les exemples obtenus d'autres pays aux prises avec la question sont évocateurs. C'est l'Australie, et non pas les États-Unis, qui a été la première à avoir informé ses partenaires des dangers posés par l'arrivée de fournisseurs à haut risque comme Huawei et à avoir catégoriquement banni cette dernière de son réseau 5G. Selon des experts australiens, toute infrastructure devient vulnérable dans son entièreté lorsqu'elle est reliée à un réseau 5G compromis. Aux États-Unis, l'interdiction de Huawei découle d'un consensus bipartisan et non pas simplement d'une tactique commerciale du président Trump. La présidente de la Chambre des États-Unis, Nancy Pelosi, a même comparé l'action d'autoriser l'entrée de Huawei dans le 5G à celle de « choisir l'autocratie plutôt que la démocratie sur l'autoroute de l'information ».

Le Royaume-Uni, en revanche, a adopté comme on le sait une mesure mitoyenne : il a en effet interdit à Huawei de participer aux fonctions essentielles liées à son réseau 5G, mais lui a permis de concourir en vue d'accomplir certaines fonctions non essentielles. L'insistance du Royaume-Uni à estimer pouvoir différencier les fonctions essentielles des fonctions non essentielles d'un réseau 5G, étonnante par ailleurs, a suscité le doute au sein des agences de renseignement australien.

Au cœur de la menace que pose Huawei pour le G5 se trouve l'État parti chinois lui-même. Huawei jouit d'une grande notoriété, tant parce qu'elle s'investit que parce qu'elle tire parti des bénéfices définis dans la stratégie nationale chinoise qui vise à dominer le marché mondial conformément au plan d'action du PCC.

Fournisseur de commutateurs peu enclin à innover à ses débuts, Huawei n'aurait jamais pu dominer les technologies 5G à l'échelle mondiale – comme elle le fait à l'heure actuelle – sans

l'aide du gouvernement du PCC. On reconnaît maintenant que Huawei a bénéficié d'avantages financiers directs et indirects substantiels de source gouvernementale qui ont atteint, selon certaines estimations, 75 milliards de dollars américains en subsides, facilités de crédit, allégements fiscaux et achats de terrains subventionnés. Et, même là, tous ces expédients ne décrivent pas entièrement la situation.

Ce que l'on a moins remarqué, c'est que Huawei a largement profité de l'intervention de son gouvernement pour empêcher l'accès de sociétés étrangères au marché chinois et – par les voies diplomatiques – permettre l'accès de Huawei aux marchés étrangers, entre autres au moyen d'un financement direct des achats de produits Huawei. Huawei a également profité du vol orchestré par l'État de secrets commerciaux étrangers. Cette nouvelle politique industrielle du PCC a permis à Huawei d'offrir pendant des décennies des prix inférieurs d'environ 30 % à ceux de ses concurrents mondiaux et d'acquérir un nombre gigantesque de brevets à un coût moyen inférieur de moitié à celui de ses rivaux.

Cette étude soulève d'importantes questions sur la croissance apparemment magique de Huawei en vue de démontrer que les intérêts commerciaux de Huawei sont indissociables des ambitions politiques de Beijing. Les données, peu nombreuses, qui figurent dans les rapports annuels de Huawei précisent ce qui suit :

1. Huawei a connu une croissance exceptionnellement rapide depuis sa création en 1987;
2. le plan chinois de relance de 2008 et les dépenses liées au projet « Ceinture et Route » (officiellement lancé en 2014) ont procuré à Huawei des ressources supplémentaires pour accéder aux marchés mondiaux;
3. l'aide financière directe et les interventions de l'État chinois sur le marché ont aidé Huawei à gagner et à conserver un avantage concurrentiel;
4. Huawei a presque doublé ses embauches et presque triplé ses dépenses d'exploitation par tête durant les dix années qui ont suivi la crise financière mondiale, tandis que ses concurrents ont dû réduire leurs dépenses d'exploitation et réduire leurs embauches;
5. les dépenses de Huawei en recherche et en développement ont été inférieures à celles de ses rivaux jusqu'en 2013;
6. avant 2015, Huawei a pu acquérir de façon persistante un nombre trois fois plus grand de brevets que ses rivaux dans le domaine de la technologie 5G.

Selon l'estimation de l'auteur, toutefois approximative, pour la période 2003 2012, les coûts par famille de brevets ont atteint 621 360 dollars américains environ pour Huawei contre 8,5 million de dollars américains pour Nokia; pour la période 2011-2014, les coûts ont atteint 1,1 million de dollars américains pour Huawei contre 3,3 millions de dollars américains pour Ericsson.

Comment cela est-il possible? Des éléments de preuve importants indiquent que la prétendue magie de Huawei est une version miniature du soi-disant modèle chinois, à l'intersection d'un pouvoir étatique et d'une politique industrielle sournois.

Il en ressort que si nous ne pouvons pas accorder notre confiance au PCC, nous ne pouvons pas agir différemment avec Huawei. Les décideurs canadiens doivent être résolus à bannir Huawei du réseau 5G pour défendre notre sécurité nationale et le mode de vie canadien. Le Canada doit également se préparer à d'éventuelles représailles de Beijing, un prix qui vaut la peine d'être payé – compte tenu de l'alternative qui serait, dans le cas d'un nouveau désaccord éventuel avec les dirigeants autoritaires chinois, d'offrir un levier de plus au gouvernement du Parti communiste chinois.

Introduction[1]

> "We must remember we are engaged in an experiment called democracy and experiments can fail in a world still largely hostile to freedom."
>
> *– Former US Secretary of Defense James Mattis (2019)[2]*

> "Program-controlled switchboard technology is crucial to the national security and as important as the national defence. A nation without its own program-controlled switchboard is like a nation without its own army."
>
> *– Huawei Founder Ren Zhengfei (1994)[3]*

Should Canada ban Huawei from its 5G system? If we follow the thinking of former US Secretary of Defense James Mattis on democracy and that of Huawei founder Ren Zhengfei on Chinese national defence, the answer is a resounding yes.

That is, if we agree with Mattis that democracy is an experiment that we must guard carefully, then we need to take strategic decisions concerning the safety of our national infrastructure, whose future is centred on the 5G network – and do so by considering our national interest rather than solely through a commercial calculation. Furthermore, if Ren Zhengfei in 1994 saw China's control over switchboard technology in its market as an issue of national defence, then we should be highly skeptical of his current insistence that Huawei's 5G involvement is only a commercial matter rather than part of China's national strategy on the global stage.

Unfortunately, no firm consensus has been reached by Canada's two national security agencies concerning Huawei's possible involvement in Canada's 5G network. According to a *Globe and Mail* report, the Canadian Security Intelligence Service (CSIS) seems to prefer an outright ban on Huawei from any involvement in our 5G networks, while the Canadian Security Establishment (CSE) appears more inclined to accept that robust testing and monitoring could mitigate the risk of Huawei 5G equipment (Fife and Chase 2019). The latter position, if implemented, would allow Bell Canada (Bell) and Telus Communications (Telus) to continue partnering with Huawei to build their 5G networks – a critical element of Canada's future infrastructure.

The CSE perspective has two fatal flaws: First, do we want to hand over any of our national infrastructure projects to Huawei, whose government is openly bullying and coercing a wide range of Canadians? And second, while Huawei's equipment might be initially cheaper, this does not account for other additional costs – not least the costly and onerous burden[4] of "testing and monitoring" Huawei equipment. Importantly, such testing would not be necessary with more trustworthy vendors such as Ericsson and Nokia.

An outright ban on Huawei gear would reportedly result in significant financial losses for Bell and Telus – ranging from hundreds of millions of dollars to upwards of $1 billion (Fife and Chase 2019; Kjuka 2018) – from these companies having to switch out their Huawei equipment currently in use. But this sum is only a minor portion of the $5 billion in losses our

farmers have incurred so far in 2019, arising from China's arbitrary ban of their products in retaliation for Canada's lawful detention of Huawei's executive Meng Wanzhou.

Less known to the public is that Bell and Telus can potentially absorb such replacement costs, given their steady annual net profits in the billions of dollars (e.g., $3 billion for Bell and $1.6 billion for Telus in 2018) and persistent annual increase in shareholders' dividends (e.g., a 117 percent increase from 2008-2018 for Bell shareholders and 72 percent increase for Telus from 2012-2018).[5] Their shareholders (including this author) can certainly bear such a one-time financial loss so as to help secure our national long-term strategic interest – by securing our critical infrastructure, defending international order and the rule of law, ensuring solidarity with our most important allies, and safeguarding Canadian values and our way of life. As well, the public will share in their losses through reduced tax intake by the governments. If necessary, our government can step in to help mitigate the industry loss; after all, dealing with Huawei is dealing with the Chinese state behind it. It is noteworthy that Bell has announced that it would be using Nokia for its non-core 5G network and that a ban on Huawei would not ultimately affect the company's timeline for bringing 5G to Canada (Shekar 2019; Solomon 2020).

Canada's Huawei 5G debate is reminiscent of our national debate in 2012 around CNOOC's takeover of Nexen.

Canada's Huawei 5G debate is reminiscent of our national debate in 2012 around CNOOC's takeover of Nexen, not in terms of business specifics but in terms of a broad strategic picture: In both cases, we have not been dealing with an individual Chinese firm but rather one inextricably connected to the Chinese state and its national strategy. In China, state-favoured enterprises, as typified by Huawei, can be either state-owned or "private" with government support. Whenever we treat such firms as ordinary commercial entities on our soil, we open the door for China to compromise both our free-market system and our national security. After all, the Chinese Communist Party (CCP) is keen to take advantage of our open-market system for its purported goal of becoming the dominant force of the global economy. Simply put, we need to see Huawei as a tool of China's global strategy as opposed to an ordinary commercial entity ***detachable*** from the Chinese state.

Some Canadian commentators and "China experts" see our government's pending decision on Huawei 5G involvement as simply a "headache" (Ibbitson 2019, quoting Paul Evans) and bemoan the fact that Canada is "caught in the midst of this intensifying rivalry between" China and the US (Dobson 2019). One observer has even asserted that banning Huawei "would limit competition" (Ibbitson 2019, quoting Gordon Houlden). But hasn't "made-in-China" equipment already killed off our entire telecom manufacturing industry once led by Nortel? This view is quick to emphasize the pressure from the Trump administration to ban Huawei, rather than the threat Huawei and China pose to our national security. Commentators with this perspective also ignore the important fact that the CCP represents a rival to the Western value system – the cornerstone of our historical alliance with the US.

The core of Huawei's 5G threat is the Chinese party-state itself. To put it bluntly, the Huawei risk is a China risk (refer to RWR 2019). If we cannot trust the CCP, then we cannot trust Huawei because its fate has been intertwined with the Chinese Communist Party. This is true regardless of Huawei's ownership structure and Ren Zhengfei's People's Liberation Army (PLA) background. Furthermore, even without China's existing National Intelligence Law (see Canada 2018) that obliges all Chinese entities and citizens to assist in the CCP's intelligence gathering, "the party's word is law" under China's legal system (Nakazawa 2018).

Despite his promise, Ren Zhengfei cannot be trusted to safeguard the integrity of Huawei's 5G installations and to defy China's espionage law. For proof of this, just consider the five years (from 2012 to 2017) of hacked data transmission from the African Union headquarters in Addis Ababa to servers in Shanghai through a Huawei manufactured transmission network "gifted" by China. When Ren told the media that the hack had nothing to do with Huawei, he belied this fanciful notion that the company was a responsible vendor. Huawei is clearly unable or unwilling to ensure the safety of its products (Huawei n.d.).

This paper focuses on Huawei's relationship with the Chinese government. It begins by exploring the major arguments for banning Huawei involvement in 5G. Attention will be paid to the nature of 5G technologies and how some of our key allies have dealt with this matter. The subsequent section will illustrate the connection between the growth of Huawei and the China model, review its founder Ren Zhengfei's words and deeds, and comb through Huawei's published financial data to discern the secret to Huawei's seemingly magical expansion in recent years.

Despite its hyped humble beginnings and veil of "private" ownership, Huawei would not have grown so miraculously without full protection and support from the Chinese state (Pearlstine et al. 2019; Yap et al. 2019). The last section of this paper will demonstrate Huawei's risk, despite its numerous denials made after being caught colluding with the CCP at home and violating foreign laws abroad.

In summary, Huawei might want to appear like an ordinary commercial player on foreign soil and even an admirable one because of its extraordinary business success. But, given its inseparable relationship with the CCP party-state, our government should be determined to ban Huawei to ensure our national security and defend our Canadian way of life. We cannot afford to hand over our 5G networks – the infrastructure of our future – to a company that has both benefited from and contributed to the CCP's national and international strategies that are aimed to rival the democratic world as a whole.

Why Ban Huawei's 5G Involvement?[6]

When considering whether to ban Huawei, we must start with our understanding of 5G, or the 5th generation of wireless technology.[7] A quick review of the evolution of pre-5G wireless technologies reveals an incremental path over a 40-year span from 1G to 4G. From first providing only voice services, it has since evolved to a broad range of voice and data services at ever-increasing speeds that today enable smartphone applications, faster web browsing, high quality voice-over IP (internet protocol), HD (high definition) multimedia streaming, 3D gaming, HD video conferencing, and worldwide roaming. These may sound like they are mostly for fun, but they bear on the increasingly crucial role of wireless telecommunications in our national security.

5G is a game changer – its network is said to be 1,000 times faster than 4G (Urban Developer 2017). It features incredibly fast mobile Internet that is optimized for minimal latency (i.e., minimal delays in processing), which would be applied to "the Internet of Things, security and surveillance, HD multimedia streaming, autonomous driving, smart healthcare applications," (Rajiv 2018) and so on. The key word here is the "Internet of Things" (ioT; Morgan 2014), which will determine that anything with an off-and-on switch will be connected through 5G networks, ranging from our cellphones and jet engines to power grids and missile launch pads, not to mention personal data stored for services provided by both government and private institutions.

In other words, 5G will be the critical infrastructure connecting everything we do in the future, and it will be upgraded regularly through vendors' software. Therefore, anyone who lives in the world of 5G would not want to let in an untrustworthy hand.

5G will be the critical infrastructure connecting everything we do in the future.

The foremost argument *against banning* Huawei 5G involvement is a fixated view that Huawei is a purely commercial entity and should be treated as such. The secondary argument is that our government can monitor Huawei equipment effectively (which ironically acknowledges the Huawei risk as a precondition). The third one is the "unaffordable cost" of replacing Huawei gear already in use for upgrading to 5G networks. A deeper hidden fear is that banning Huawei may cause ever more severe retaliation from China including greater financial losses to our business sectors, which is certainly not baseless. But what about our national security and way of life? And how long does our government want to live in fear of China because of the (overstated) financial calculations made by some of our business and political elites?

An examination of how other countries have approached Huawei's potential involvement in 5G would provide useful insight for Canadian policy-makers now confronting this decision.

Australia

A common perception, often propagated in the media, is that the US has been primarily responsible for applying pressure on its allies to ban Huawei from 5G. Yet the reality is more complex. In fact, Australia took the first step in notifying the Americans about the dangers of firms like Huawei in these networks, which arose from a test in early 2018 that showed the vulnerability of a country's critical infrastructure if connected to a compromised 5G network (Bryan-Low and Packham 2019). The country's leaders, including former Prime Minister Malcolm Turnbull, have taken time to explain the reasons behind the government decision to effectively ban Huawei from 5G (Neil 2019).

With its early awakening to China's "silent invasion" (Hamilton 2018), it should be no surprise that Australia moved quickly to secure its telecommunications network – first by passing its *Telecommunications Sector Security Reforms* (TSSR) in 2017 and later decisively banning Huawei's 5G involvement in 2018 (Australia 2018b; BBC 2018). The reasons for these actions can be attributed to three overlapping issues: risk, transparency, and trust (Cave 2019).[8]

Risk: Assessments by Australian intelligence have pointed out that 5G could be "exploited for spying and to sabotage critical infrastructure" (Bryan-Low and Packham 2019) and eliminates the distinction between core and non-core (or edge) functions in the network, meaning that "a potential threat anywhere in the network will be a threat to the whole network" (Australia 2018a). As noted by Mike Burgess, Director-General of the Australian Signals Directorate, this directly threatens the "integrity and availability of the data and systems on which we depend" (Australia 2018a).

Indeed, credible accusations suggest Huawei has a global track record of predatory behaviour – from systematic intellectual property theft to unethical business practices to having a role in enabling espionage, data theft, and cyber hacking.[9] Another related risk concerns the issue of public relations. Do governments, for example, want to be seen to "associate with a company that is complicit in enabling human rights abuses in Xinjiang through its work with the region's public security apparatus?" asks Danielle Cave (2019) from the Australian Strategic Policy Institute.[10]

Transparency: It is difficult to get a straight answer out of Huawei on a range of important issues. Its ownership structure remains highly opaque, with recent reports raising important questions on its claims of being an employee-owned company (Balding and Clarke 2019; Zhong 2019). Questions also abound about Huawei's connections with China's party-state. Like many other Chinese tech giants, Huawei has established CCP organizations within the company itself, including roughly 300 CCP branches alongside more than 12,000 party members. One should remember that CCP organizations are not mere government relations or human resources groups, but function consciously under CCP discipline (Cave 2019; Cave et al. 2019). This lack of public transparency obliges governments to conduct their own investigations to inform 5G policy-making.

Trust: 5G will form the backbone of "a country's critical infrastructure – everything from electric power to water supplies to sewage" (Bryan-Low and Packham 2019). As a result, governments need to trust the companies that supply the equipment to this next-generation telecommunications network. Yet, while governments would be forced into constantly monitoring high-risk vendors like Huawei, that is a burden they do not have to carry with more trustworthy 5G vendors such as Ericsson and Nokia.

United States

Following Australia's warning, the United States began a concerted effort to pressure its allies to refrain from accepting Huawei in their 5G networks (Doffman 2019; Barnes and Satariano 2019).

Domestically, the Trump administration also first banned Huawei from government systems and contractors in 2018 and, a year later, signed an executive order that barred telecommunications companies from using equipment made by companies posing a national security risk, which would include Huawei (Kastrenakes 2018). The Federal Communications Commission has since made moves to prevent Huawei's involvement in rural wireless system, with plans underway to strip its equipment from existing telecoms networks (Klein 2020). Other measures, such as placing Huawei on a Commerce Department blacklist, are meant to restrict domestic firms from working with Huawei. Yet this has not stopped some companies from either lobbying on Huawei's behalf or attempting to circumvent the blacklist (Strumpf, Fitch, and Kubo 2019).

For the United States, China has become increasingly recognized as a geopolitical rival and a near-peer competitor – one that would only become more threatening if it gained control over the next generation of telecommunications technology. In that regard, Beijing's "geopolitical objectives and Huawei's commercial activities are fully intertwined." And 5G will enable a host of new technologies, ranging from "autonomous vehicles [and] smart cities" to "advanced military communications and situational awareness" (CSIS 2019). Cyber espionage and the disruption of critical infrastructure are among the key threats that would endanger not only US security but also the security of allies and partners around the world.

The Trump administration may have taken the lead in trying to convince its allies to ban Huawei from 5G, though with only a modicum of success (as shown below). Yet it is important not to overlook the extent to which this concerted effort has been bipartisan in nature. Indeed, back in 2012, a bipartisan Congressional panel had brought attention to the dangers of Chinese companies like Huawei and ZTE (Schmidt, Bradsher, and Hauser 2012) – and this remains one of the few areas of Democratic and Republican agreement visible in the US capital today. As US House Speaker Nancy Pelosi has warned about Huawei and 5G, "This is about choosing autocracy over democracy on the information highway" (Macias 2020).

Of course, as it moves to ban Huawei from 5G, the United States would also incur costs, whether it's the timeline for 5G rollout, the cost to firms that were eager to purchase cheaper Huawei equipment, or the cost in possible government subsidies for companies to replace existing Huawei equipment (Klein 2020). Yet, as Martijn Rasser from the Center for a New American Security concludes, "This, however, is a price worth paying" (CSIS 2019). More fundamentally, as pointed out by Dan David, the founder of Wolfpack Research, an investigative and due diligence firm:

> *[W]e must stop trying to make China more like America by giving them America.* Globalism at any cost is to know the price of everything today and the value of nothing in the future. China is willing to pay any price today for their future values. When will our future values be worth paying for again? (emphasis added; CSIS 2019)

United Kingdom

The UK represents an interesting case when it comes to Huawei's involvement in 5G. On one hand, it has significant reservations about the possible risk that Huawei could pose to national security. This should come as no surprise given Britain's role – alongside the United States, Australia, Canada, and New Zealand – as a member of the Five Eyes intelligence partnership.

Concerns over Huawei led the UK's National Cyber Security Centre to establish a Huawei Cyber Security Evaluation Centre (HCSEC) Oversight Board, which evaluated whether Huawei posed a security risk to the country's telecommunications networks. And the HCSEC's reports provided some sobering warnings on the vulnerabilities of Huawei equipment, with the board even noting that it could only provide "limited assurance" that such risks can be managed (Porter 2019).

On the other hand, despite such warnings, the UK has also made the decision to allow Huawei into its 5G network. Specifically, they banned Huawei from involvement in the core functions of the 5G network but allowed the company to compete for up to 35 percent of the non-core access network – a half-measure that has done little to quell the surprise of seeing a member of the Five Eyes break ranks from its key allies on this issue.

The fact that the UK government still classifies Huawei as a "high risk vendor" – similar to how it classified the Chinese company ZTE, which led to the latter's ban from the British next-generation network – raises important questions on the wisdom of its decision. So too does the UK's insistence that it can differentiate core and non-core functions and keep them separate in 5G networks, which has been disputed by Australia's intelligence agencies, for example (Gilding 2020). Given such uncertainties, is it really wise to assume that such risks can indeed be managed for the foreseeable future?

The UK may point to its technical justifications for this decision. But, as Thorsten Brenner (2020) notes, a more probable reason can be found in the fear of China's economic retaliation: "After Brexit, London sees itself as dependent on Beijing's goodwill." In that sense, the UK's decision should be seen as an important warning for countries like Canada still mulling this decision, rather than an example to follow.

Germany

In October 2019, German Chancellor Angela Merkel seemed to have settled on allowing Huawei to bid on Germany's 5G rollout (Germano and Pancevski 2019). But there has been "no shortage of outright criticism" (Becker 2019). The Federal Intelligence Service (BND) has been clear that infrastructure "was not an area where one should take on board a company you can't fully trust" (ibid.). The chancellor's own conservative Christian Democratic Union (CDU) overwhelmingly approved a motion to take the decision out of the hands of the executive branch and debate it in the Bundestag (the parliament). Yet Chancellor Merkel has moved to try to sideline the hardliners by proposing a motion that stops short of a full ban; some see Germany poised to follow the UK's lead by adopting a partial ban on Huawei (Bloomberg 2020).

Some high-ranking CDU members have argued that "no Chinese company is an independent company," and Huawei's involvement is principally "an imminent question of national security" and hence "the responsibility of policymakers and the state" (Davis 2019). Germany's other parties also ruled out Huawei. Nine security and foreign policy experts with the centre-left Social Democrat Party (SPD) openly called for Germany to exclude "non-trustworthy manufacturers, especially if unconstitutionally controlled interference, manipulation or espionage cannot be ruled out" (ibid.).

Even before the chancellor's plan on Huawei became public, Peter Limbourg, the director-general of Deutsche Welle (DW) – the German state-owned international broadcaster – concluded that letting Huawei build Germany's 5G network would be "a very bad deal."[11] Limbourg made two indisputable arguments for banning Huawei:

First, freedom of speech is a universal human right and non-negotiable. China is the champion of censorship and its Great Firewall blocks DW and all major Western media outlets such as the BBC.[12] China will continue to trample on freedom of the press unless its actions lead to real consequences. That is, banning Huawei should be a consequence of Germany's uncompromising stand against China's censorship.

Second, Huawei's 5G involvement will have serious security ramifications. Huawei must be "held accountable for Chinese policymaking," says Limbourg. He is adamant that Germany should "stick to our principles and prevent Huawei from building up our 5G network" even if it would take longer for Germany to build its 5G network on its own.

A Chinese reference[13]

Chinese scholar Zheng Ye-fu (2019) does not openly endorse the American ban on Huawei. But he does reason that such a development would be good for the Chinese people. In his view, the central issue is trust – and that is difficult to have when one combines the unlimited surveillance capabilities of 5G networks, Huawei's role as a near-monopoly provider of information gear, and China's history as a country with over two thousand years of centralization. This is why people are concerned about the nature of Huawei, which Huawei seems incapable of clarifying. The nature of 5G networks gives us pause about Huawei's trustworthiness: Could there be backdoors in its equipment?

Of course, all vendors of 5G gear face the issue of trustworthiness. The fundamental difference, however, is that a democratically elected government can be held accountable for any breach-of-trust matters. This is impossible in China, where many domestic problems (e.g., the government's previous denial of air pollution) cannot be properly addressed without international initiative or pressure. With Huawei 5G networks, the Chinese people might want to again utilize international pressure to ensure the safety of their communication.

Therefore, to Zheng, it would be ideal to have a future global 5G ecosystem in which Huawei is a strong competitor rather than a dominant force. With such an outcome, Huawei would benefit from the increased vitality arising from competition, while the Chinese people would be in a better position to guard their right to privacy and secure communications. In his view, the day that Huawei dominates the whole world will be the day when the Chinese people completely lose their say over their personal information.

In summary, Huawei has very legitimate trust, transparency, and rule of law issues. Letting it in and mitigating its risk is just too risky of an option to pursue. Once they are in, we're down the road and it's too late (refer to CSIS 2019).

The Huawei Path within the China Model

Huawei's founder Ren Zhengfei has repeatedly portrayed Huawei as a self-starter with no government connection and a hard-working company with no state support (Pearlstine et al. 2019). But his own words and deeds, as recorded in numerous Chinese publications,[14] prove that he, as both a loyal CCP member and a shrewd businessman, "was able to parlay his connection to the Chinese government to make it work. If it wasn't for Chinese government support, there wouldn't be a Huawei" (Pearlstine et al. 2019). Indeed, one can identify a direct link between Huawei's growth path and the Chinese national strategy, most notably with its US$586 billion stimulus package unveiled in late 2008[15] and the Belt and Road Initiative (BRI) formally launched in 2014.

In this section, I will first categorize the link between Huawei's growth path and the China model. I will then review, based on Chinese publications, how Ren Zhengfei interacted with the government in formulating the Chinese national strategy to gain market share both domestically and abroad. And finally, I will illustrate, by comparing Huawei's financial numbers with those of its global rivals Ericsson and Nokia, the role of state support in Huawei's global success.

Huawei and the China model

While opinions vary, there is a widespread misperception that the decades-long Chinese economic growth "miracle" was the result of the success of a unique China model.[16] Not so fast. The prominent Chinese economist Zhang Wei-ying attributes the Chinese "growth miracle" to the "universal model" that relied on marketization, entrepreneurship, and the three-century accumulation of Western technologies (Gan 2018). He further warns that blindly pursuing the so-called China model – featuring a commanding government, a colossal sector of SOEs (state-owned enterprises) and a "wise" industry policy – will not only destroy the Chinese economy but also cause confrontation with the Western world (Zhang 2018). I cannot agree more with Zhang on his insights here.

Ren Zhengfei knows the public resentment against SOEs – one of the three pillars of the so-called China model. Therefore, he enjoys talking about Huawei's "private" ownership and its early-days competitive "disadvantage" against its SOE rivals within China. But his arguments ignore some basic facts.

Huawei has benefited tremendously from the state control of the domestic market.

First, at minimum, all Chinese entities are at least partially state-owned in terms of the absolute state ownership of land and natural resources they use. Second, the size of the state share in any Chinese company is fundamentally determined by the company's role in the national strategy: the greater a company's strategic role, the more the company is entitled to state support, which in turn gives the state a virtual voting share in the company. Huawei cannot deny its star status in China's national strategy and the state support it has received, which ranged from direct government grants for the company and the state bonus for Huawei employees to cheap land and gigantic lines of credit provided by state-owned banks (as further explored in subsequent sections).

Finally, since its early days, Huawei has benefited tremendously from the state control of the domestic market: when to open which sector, to whom, by how much, and on what condition. Examples of such tight market control can be seen through the regular updates on the government's blacklist of sectors that were closed to foreign entries.[17] The market share Huawei has gained through its partnership with the government agencies and its near monopolistic sales to state-owned carriers have been Huawei's most powerful competitive edge over its rivals, and this competitive edge is bestowed by the CCP party-state.

In other words, Huawei is not a private company as normally defined in the West. Huawei has been well fed by the Chinese state – through its central commanding power and industry policy – to do the country's bidding on the global stage. More broadly, Chinese non-SOEs are not real privately owned companies like ours; they are caged birds: How high and how far they can fly depends on the degree of their usefulness to implementing the CCP government's national strategy. Huawei is by far the most lauded national champion precisely because of its most critical contribution to China's national strategy that is aimed at dominating the global market, as stated in "Made in China 2025."[18]

Huawei and China's national strategy[19]

Numerous Chinese publications idolize Huawei founder Ren Zhengfei as both a patriotic entrepreneur and a loyal CCP member who has skilfully matched his political judgment with his business drive for Huawei. One such book has a chapter titled "Entrepreneur and Politics" (Yang 2014: 56-68), within which there is a section called "Dance to the Political Tune" (与政治亦步亦趋; ibid.: 57-59). Drawing from this book, the following examples showcase how Ren led Huawei to both support and take advantage of the CCP's national strategy on its path to global dominance.

- 19 April 1994: When then CCP Chairman and Chinese President Jiang Zemin visited Shenzhen, Ren Zhengfei stunned the audience at the meeting with Jiang by saying that "program-controlled switchboard technology is crucial to the national security and as important as national defence. A nation without its own program-controlled switchboard is like a nation without its own army" (ibid.: 57). He went on to complain about the then preferential tax treatment for imported switchboards that disadvantaged domestic firms. Being moved by Ren's speech, Chairman Jiang instructed on the spot to consider changing the policy. Shortly after, China cancelled its preferential tax treatment for foreign makers of switchboards, which helped Huawei secure a share of the domestic market using its usual price-war tactics.

Note that levelling the playing field is the right thing to do for the sake of competitive neutrality. But making a political fuss about switchboards marked Ren Zhengfei's star status in China's political arena.

- 1996: Amid the political tension related to the first Taiwanese democratic election (with the American aircraft carriers sailing near Taiwan as protection) and eruption of the Sino-Japanese dispute around the Senkaku/Diaoyu Islands, Ren published several nationalist speeches stating that the government policy of "exchanging market for technology ended up losing all our market but gaining no technology" (ibid.: 58). In the meantime, equipped by his nationalist rhetoric, he successfully lobbied 12 provincial government telecommunications bureaus to set up joint venture with Huawei, which ushered in the company's dominant position within the Chinese market for telecom equipment (ibid.: 57-58).

As we see now, Huawei is among the Chinese pioneers who took back their market shares after gaining technologies from their foreign partners.

- 1 June 1996: When Chinese Premier Zhu Rongji learned that the company was short of funding for its global expansion plan during his visit to Huawei, he immediately instructed the accompanying heads of the four major commercial banks: "In order for the Chinese program-controlled switchboard to compete on the global market, we must provide buyer's credit" (ibid.: 61). He also instructed the bankers to provide direct financial support to Huawei. The buyer's credit immediately provided Huawei with direct access to bank funding for receivables from its sales (refer to Lu 2004). And the direct bank loans from all major banks in Shenzhen immediately relieved Huawei from past funding hurdles and helped pave its way for skyrocketing growth till this day.

Note that Huawei's annual sales value was barely US$0.18 billion (RMB1.5 billion) in 1995[20] but reached US$2.1 billion in 2002, with an average annual growth rate of 42 percent over seven years.

- 8 May 1999: After the news breakout that American bombers mistakenly killed three Chinese journalists at the Chinese embassy in Serbia, Huawei distributed Ren Zhengfei's

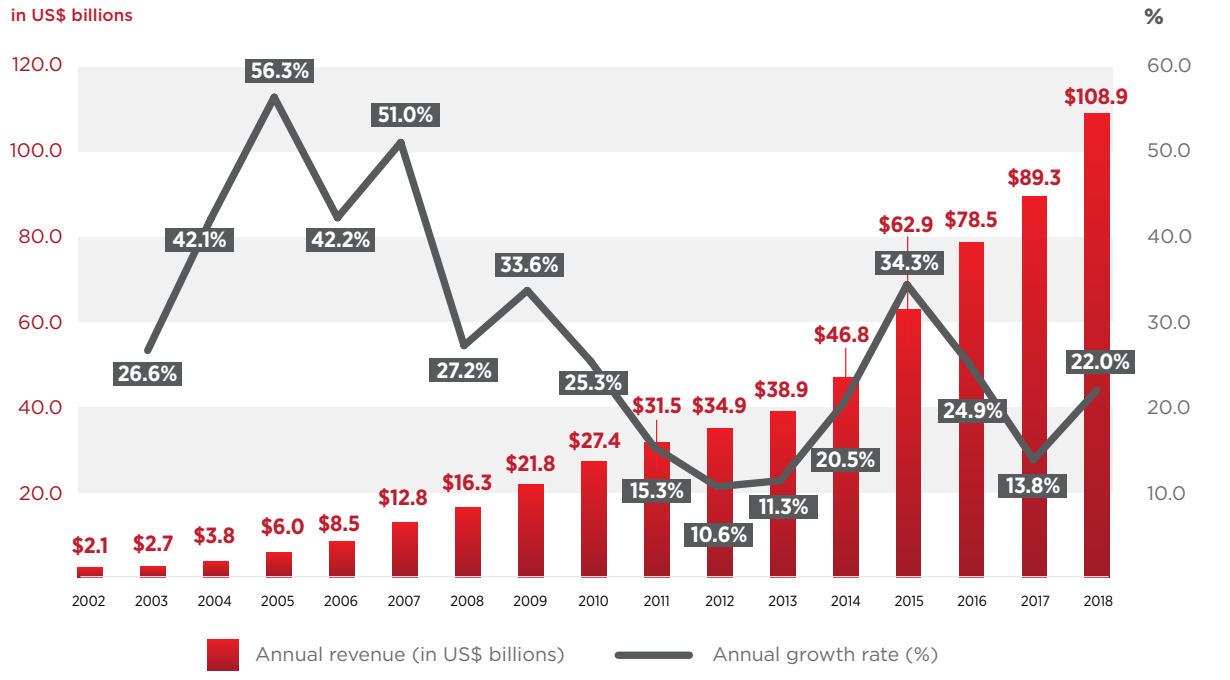
speeches to various government bodies and to its customers publicizing his anti-American rhetoric that "the American imperialist's will to destroy China never dies" (美帝亡我之心不死). Such speeches from Ren earned immediate nationwide praise and garnered support for Huawei. In August 1999, China Mobile, moved by Ren's patriotism, made an instant order for a single delivery of Huawei's GSM (global system for mobiles) worth US$10 million. This contract at the time smashed the dominance of foreign telecom manufacturers, such as Motorola, Ericsson, and Nokia, in the Chinese market. It also laid the foundation for Huawei to enter the global GSM market (ibid.: 59).

The examples displayed above are limited to Huawei's initial growing years before the 21st century. Ren Zhengfei's own words clearly showed his close personal political alignment with the CCP national strategy, which is in open conflict with both free-trade principles and WTO rules.

Huawei's "magic" in numbers

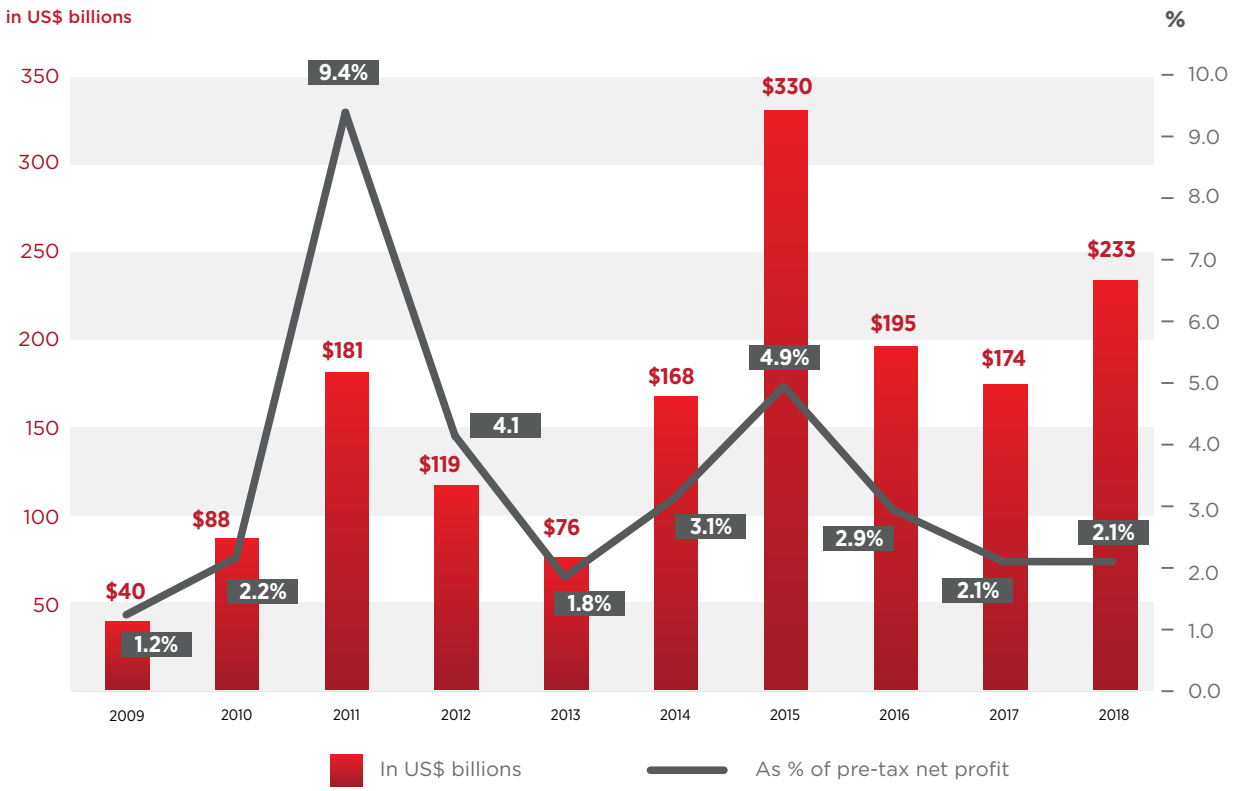
Ren Zhengfei has been a strong protectionist voice in China since Huawei's early years, which helped him to secure the large government contracts and direct financial support needed for Huawei to take on its rivals both domestically and abroad. As a result, the high double-digit annual growth rate became a routine to Huawei. Chart 1 shows such "magic" in Huawei's growth path from 2002, the very first year for which Huawei revealed its financial data, to 2018.[21]

CHART 1: HUAWEI ANNUAL REVENUE (US$B) AND GROWTH RATE (%): 2002-2018



Source: Based on Huawei Annual Reports 2006–2018. Note that the 2006 Report provides the five-year financial highlights for 2002–2005.

CHART 2: THE CHINESE GOVERNMENT GRANTS TO HUAWEI: 2009-2018



Source: Based on Huawei Annual Reports 2006–2018.

Chart 2 further displays the government annual grants to Huawei from 2009 to 2018 both in absolute dollar amount, ranging from US$40 million (2009) to US$330 million (2015), and as a ratio to pre-tax net profit margin, ranging from 1 percent (2009) to 9 percent (2011). The government grants to Huawei totalled US$1.6 billion within 10 years.

The numbers seem small given Huawei's gigantic size, as measured by its sales and profits. However, according to the *Wall Street Journal* (*WSJ*), Huawei had access to as much as US$75 billion in state support over the past 25 years, including grants (US$1.6 billion – as outlined in chart 2 above), credit facilities (US$46.3 billion), tax breaks (US$25 billion), and subsidized land purchases (US$2 billion), which enabled Huawei to offer generous financing terms and undercut rivals' prices by some 30 percent (Yap 2019).[22]

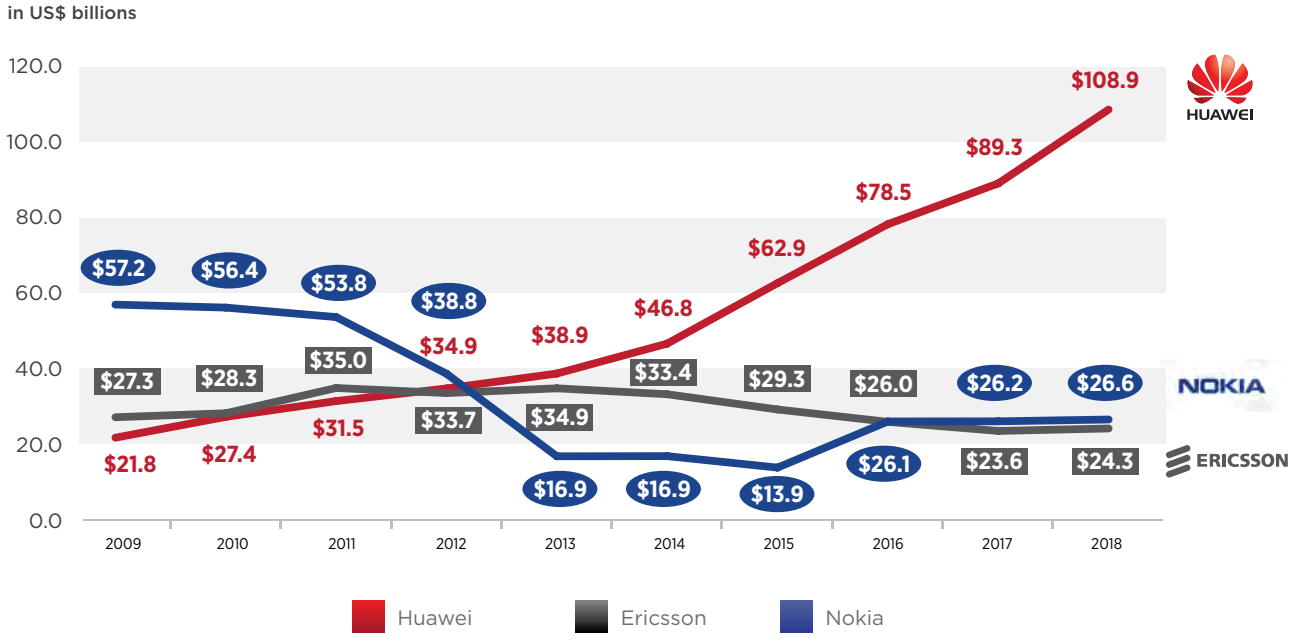
And this *WSJ* review excluded other forms of policy support to Huawei, including salary tax benefits, property tax abatements, subsidized raw materials, direct preferential procurement, free foreign marketing services, and diplomatic manoeuvring, as shown in the Pakistan case below. It also does not include other ways the state had a direct hand in helping Huawei grab its share of both domestic and global markets, such as the alleged government-orchestrated hacking on foreign technologies that benefited Huawei directly.[23]

It is useful to compare Huawei's business scope to its two main rivals in 5G – Nokia and Ericsson. Like Huawei, both Nokia and Ericsson are significant providers of telecommunications equipment and all three companies are on the frontlines of developing 5G networks around the world. In sharp contrast, Huawei is also distinctive as a global leader as a relative latecomer in the mobile phone business – a line of business that Ericsson had dropped decades ago and Nokia dropped in 2013. Another difference is their respective geographic footprint, with Huawei having a sizable presence in Europe, Asia, and Africa but only a modest footprint in North America, while its two rivals primarily rely on their revenue from Europe and North America (Townsend 2017).

Chart 3 compares Huawei's growth path, as measured by the annual sales over the ten years from 2009 to 2018, with that of its as. Nokia and Ericsson have experienced sluggish economic growth in the last several years, though Nokia's growth did pick up in 2016 when it acquired Alcatel-Lucent. As the chart shows, 2014 was the year when Huawei decisively surpassed Ericsson and Nokia in terms of annual sales. It was also in 2014 that China started implementing Xi Jinping's Belt and Road Initiative (BRI) as a national strategy. In a 2016 speech, a senior Chinese official, Zhang Yansheng, even noted: "If it wasn't for the Belt and Road Initiative, there wouldn't be Huawei" (Liu 2016).

Zhang's comments hint at a direct link between Huawei's growth path and the Chinese national strategy, of which the BRI is a global component. As he further explained, Huawei's foreign sales "were all started from Asia, Africa and Latin America…the poorest places in the world. Whenever there was an official meeting for the Chinese companies, there were always attendee(s) from Huawei. Because BRI covers the weakest spots for global competition among the multinational

CHART 3: ANNUAL SALES TREND IN US$ BILLION: 2009-2018, HUAWEI IN COMPARISON WITH ERICSSON AND NOKIA



Source: For Huawei, based on its Annual Reports 2009–2018; for Ericsson, based on Ericsson Income Statement 2005–2020, and for Nokia, based on Nokia Financial Statements 2005–2020.

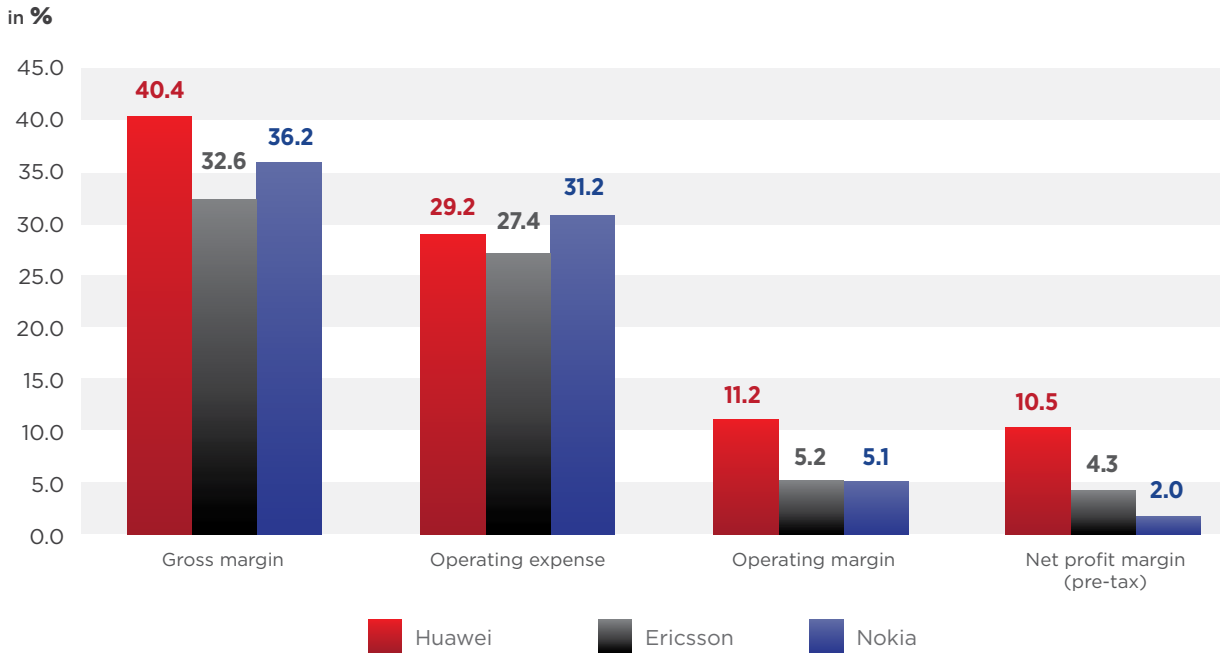
companies, it provided the best turning point for the Chinese companies to grow and go global" (ibid.). The BRI has since even extended towards Europe, further helping Huawei make headway into that developed market (Stolton and Fortuna 2019). Italy stands out in this case, but it is certainly not the only one (Reuters 2019).

This is not to deny Huawei's "genuine" business strengths, such as its so-called "wolf culture" (Ghoreishi 2019) that forced its employees to work twice as hard as their international peers, and its rivals' strategic failures, such as Nokia's mobile phone downfall (Doz 2017). Instead, it demonstrated how the government BRI outlays since 2014, reportedly over US$100 billion annually,[24] have provided Huawei with a powerful tailwind for its global sailing.

Less known to the public is that some of Huawei's foreign sales financed by the Chinese government directly violated rule of law and killed fair competition abroad. For example, in summer 2009, Huawei pitched to Pakistan a surveillance system for its capital, Islamabad. Pakistan's prime minister accepted, but Islamabad lacked funds and its procurement rules required competitive bidding. The Chinese offered a solution: the Export–Import Bank of China would lend Pakistan US$124.7 million for the project and waive most of the 3 percent annual interest on the 20-year loan, provided that Pakistan could choose *only* Huawei. The end story was: "The Chinese government funded it and Huawei built it," as admitted by the Chinese embassy (Yap 2019).

Chart 4 compares some of Huawei's key financial ratios with those of its two rivals over the past decade. It reveals a number of important findings.

CHART 4: SELECTED INDICATORS AS RATIO TO TOTAL SALES REVENUE: SIMPLE AVERAGE FOR 2009-2018, HUAWEI IN COMPARISON WITH ERICSSON AND NOKIA



Source: For Huawei, based on its Annual Reports 2009–2018, for Ericsson, based on Ericsson Income Statement 2005–2020, and for Nokia, based on Nokia Financial Statements 2005–2020.

First, Huawei's gross margin of 40 percent (i.e., net of cost of goods sold as a ratio to revenue) is 8 percentage points higher than Ericsson's and 4 percentage points higher than Nokia's. This might be acceptable if Huawei's persistent 30 percent discount on its products, compared with the same products of its competitors, had matched its true "cost of goods sold" without government support. However, since telecom gears are capital-intensive products, Huawei's consistent 30 percent discount cannot be explained by China's relatively lower labour cost; not to mention that both Ericsson and Nokia also make their products in China.

So, what are the financial backups for Huawei's "low-price sharp weapon"?[25] The aforementioned state financial support of US$75 billion tells only part of the story. The other part has to do with Huawei's mystically low R&D (research and development) cost as a ratio of its gross margin.

Second, Huawei's operating expense ratio of 29 percent is about the average of its rivals. Note that operating expense includes mainly R&D spending, non-R&D operations, expenses on marketing, rent, and equipment, and inventory cost. Also recognize that R&D spending includes not only payroll to R&D personnel but also the cost of using foreign intellectual properties. As further shown in charts 5 and 6, compared to its rivals, Huawei's operating expense per head is much higher and its R&D ratio to gross margin much lower, which implies that Huawei spends a much bigger proportion in non-R&D activities. A natural question is: How did Huawei gain its technology edge without an R&D ratio to gross margin comparable to its rivals over its prolonged period of growth?

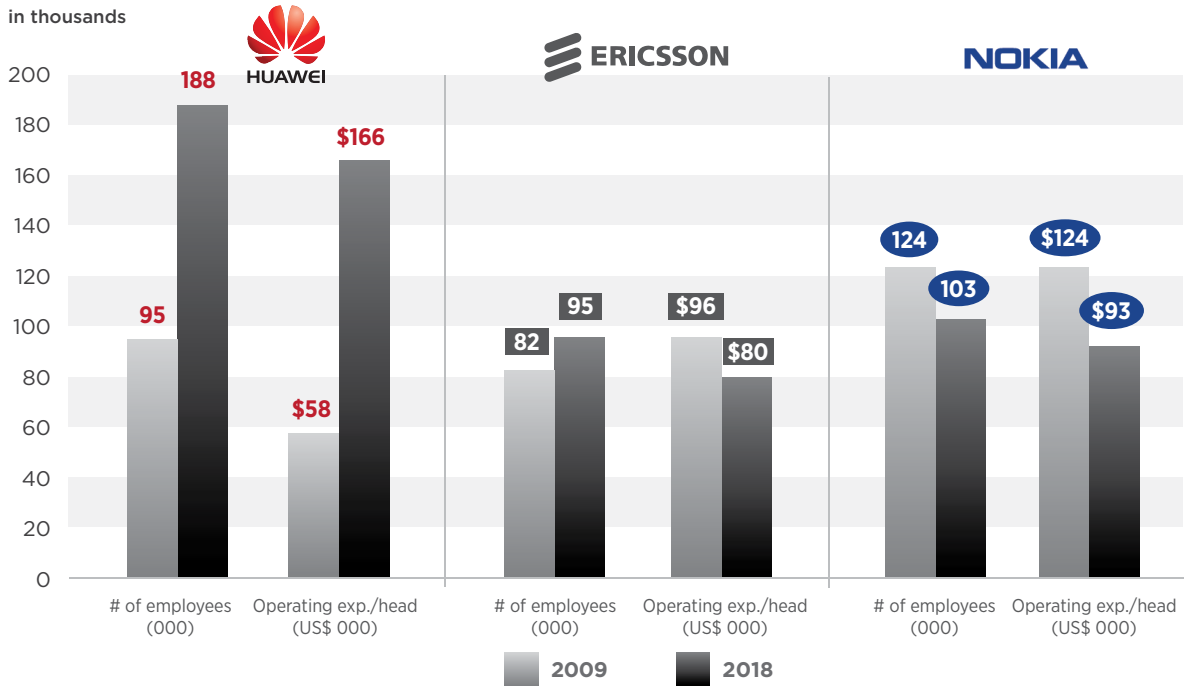
Huawei's consistent 30 percent discount cannot be explained by China's relatively lower labour cost.

Third, Huawei's operating margin is much higher than Ericsson's and Nokia's. This is only natural given its rather high gross margin and average operating expense ratio.

Finally, Huawei's net profit margin deviated only narrowly from its operating margin compared to its rivals. The usual gap between the operating margin and net profit margin arises from non-operating incomes and expenses related to financial handling, such as financial investment and borrowing, currency fluctuation, and capital restructuring including assets revaluation. A unique item to Huawei is the government grants that were unavailable to its Western rivals. Other things being equal, the greater the government grants as a non-operating income to offset the non-operating expenses, the narrower the gap between operating margin and net profit margin. The other main factor that helped minimize Huawei's non-operating expenses is the cheap loans and purchaser's credit provided by the Chinese banks.[26]

Chart 5 shows a striking growth over the past decade in Huawei's total number of employees, which increased from 95,000 in 2009 to 188,000 by 2018, and per-employee operating expenses that increased from US$58,000 to US$166,000. The counterpart changes in Ericsson were an increase from 82,000 employees to 95,000 and a decrease in per-employee operating expenses from US$96,000 to US$80,000, and those for Nokia were a decrease from 124,000 employees to 103,000, and a decrease in per-employee expenses from US$124,000 per head to US$93,000.

CHART 5: NUMBER OF EMPOLYEES AND OPERATING EXPENSE PER HEAD (IN US$): 2009 VS. 2018, HUAWEI IN COMPARISON WITH ERICSSON AND NOKIA



Source: Author's estimates based on companies' annual number of employees and operating expenses. For Huawei, see its annual reports; for Ericsson, Ericsson Financial Statements 2005–2020 and Ericsson: Number of Employees 2006–2019, and for Nokia, Nokia Income Statement 2005–2020 and Nokia: Number of Employees 2006–2019

There are certainly many details behind these wide gaps between the three companies, possibly small factors like currency fluctuation and significant factors like company restructuring. However, it is likely that behind Huawei's almost tripling of per-head operating expense is the company's lavish spending on global operations and lobbying. On global operations, since early 2001, Huawei has *pushed*[27] its employees to work overseas using a whole list of financial awards, such as daily allowances of up to US$200 and three free annual visits by spouse (or next-kin family members; Yang 2014: 215-216). On foreign lobbying, Huawei has paid high-ranking former foreign government officials or business executives willing to work on Huawei's behalf, often directly against their own country's national interests and public opinions.[28]

In the meantime, Huawei has in recent years boasted of its high spending on research and development. This is true only in absolute monetary terms, which reached the global top six of corporate R&D spenders in 2018 (Idea to Value 2019).

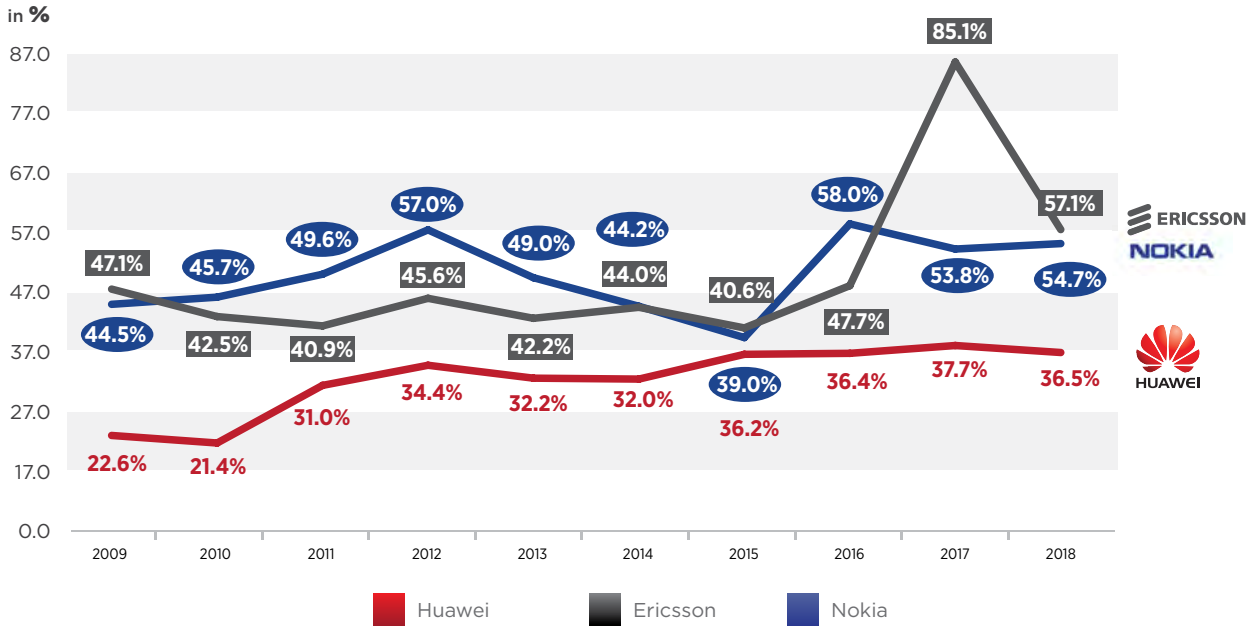
At a first glance, Huawei's self claim and global ranking as a big R&D spender might give it some credence when it comes to its success as a telecommunications company – that it is earned rather than unfairly acquired through deceptive, unethical practices and CCP support. And there is no denying its significant hoard of intellectual property patents, with Huawei being "the number-one contributor to 5G standards, and…[holding] the second-most standards-essential patents (SEPs) in that category" (Malkin and Hinton 2019).

Yet a closer look at Huawei's approach to R&D spending raises some significant concerns. First, as shown in chart 6, Huawei's R&D spending ratio to gross profit (i.e., sales net of "cost of goods sold") has been always the lowest compared to its major rivals – Ericsson and Nokia. Some might say that this is because of Huawei's rather high gross profit margin, compared to its two rivals. But chart 7 rebuts this observation; it shows that both Ericsson and Nokia maintained a higher ratio of R&D to gross-profit than Huawei even when they had a higher or roughly similar profit margin compared to Huawei in 2009–2011.

Second, when it comes to absolute R&D spending (chart 8), Huawei finally reached a rough parity with its two rivals in 2012 and only started to outspend them beginning in 2013. Prior to that time, Huawei's spending on R&D – whether measured in absolute terms or as a spending ratio to gross profit margin – has been consistently and significantly less than Nokia's and Ericsson's. For example, in 2009, Huawei only spent US$2 billion and had a ratio of 23 percent compared to Ericsson's US$4.3 billion (with a 47 percent ratio) and Nokia's US$8.2 billion (with a 45 percent ratio).

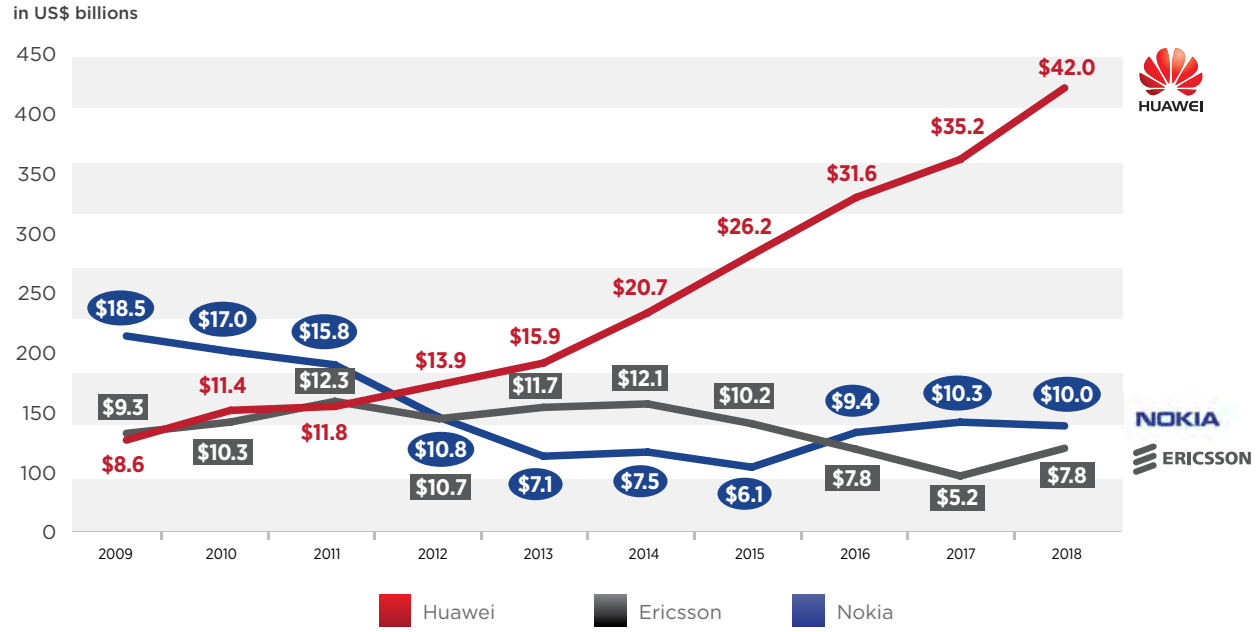
Huawei's exact R&D expenditures in earlier years are more difficult to determine. But in Huawei's 2006 to 2008 reports, the company declared that R&D spending constituted 10 percent of its revenues, which implied an R&D ratio to gross profit hovering around 25 percent assuming a 40 percent gross profit margin (Huawei 2006; 2007). That is, Huawei's annual R&D spending during those early years would remain substantially and consistently lower than either Nokia's or Ericsson's, due to Huawei's significantly lower revenue stream at the time – and one can surmise that this trend goes back even further.

CHART 6: RATIO OF SPENDING ON RESEARCH AND DEVELOPMENT TO GROSS PROFIT (IN %): 2009-2018, HUAWEI IN COMPARISON WITH ERICSSON AND NOKIA



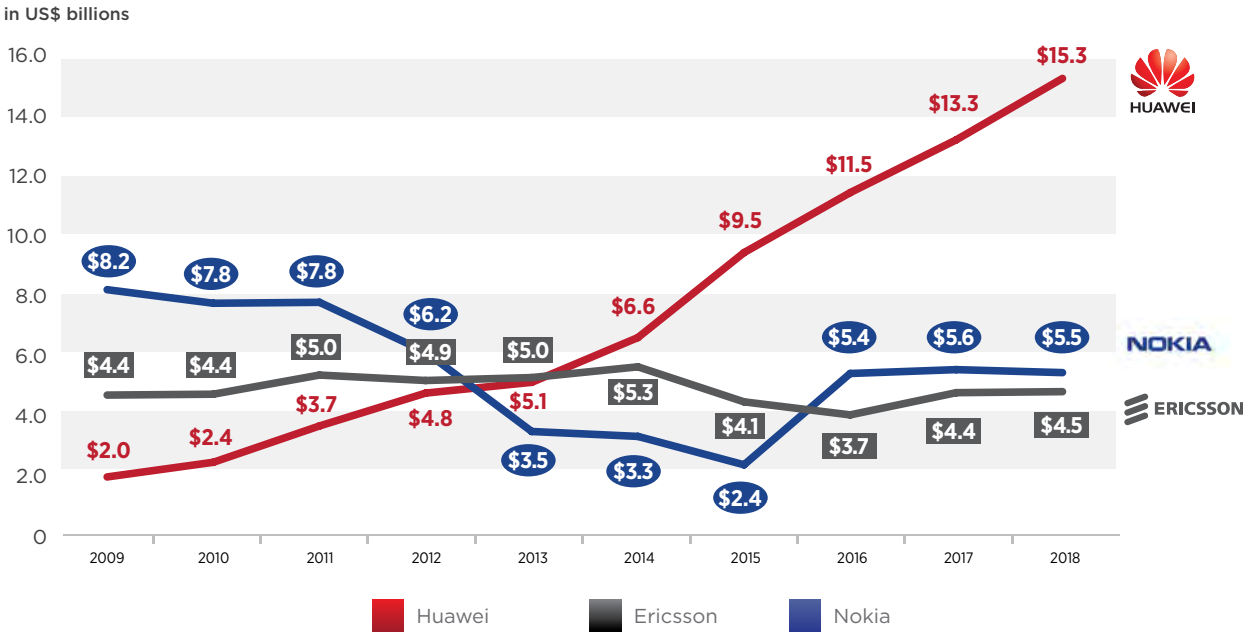
Source: Huawei's annual reports, Ericsson Income Statement 2005–2020, and Nokia Financial Statements 2005–2020.

CHART 7: GROSS PROFIT (IN US$ BILLION): 2009-2018 HUAWEI IN COMPARISON WITH ERICSSON AND NOKIA



Source: Huawei's annual reports, Ericsson Income Statement 2005–2020, and Nokia Financial Statements 2005–2020.

CHART 8: SPENDING ON RESEARCH AND DEVELOPMENT (IN US$ BILLION): 2009-2018, HUAWEI IN COMPARISON WITH ERICSSON AND NOKIA



Source: Huawei's annual reports, Ericsson Income Statement 2005–2020, and Nokia Financial Statements 2005–2020.

With these data points in mind, we need to examine how these companies have approached the acquisitions of patents. And it is here that Huawei's story of being a stellar R&D spender with an unprecedented number of patents starts to fall apart. As mentioned, Huawei's R&D spending was *significantly* less than Nokia's and Ericsson's in absolute value prior to 2012 and *persistently* lower as a ratio to gross profit. Yet, incredibly, Huawei had over 3.7 times the number of patent families as Nokia's from 2003-2012, or 28,726 patent families compared to Nokia's 7,675 (WIPO 2015),[29] and three times as Ericsson's from 2011-2014, or 18,177 patent families compared to Ericsson's 6,107 (WIPO 2017).[30]

Acknowledging the common time lag between R&D spending and patent application and confidently assuming a similar R&D spending pattern comparing Huawei with Ericsson and Nokia for pre-2009 years, my *simple and static* estimates drawn from these companies' acquisitions of patents and the corresponding accumulative R&D spending provides a *starting point* for examining the integrity of Huawei's way of acquiring its patents: Huawei's per patent cost for 2003-2012 is about US$621,360 compared to Nokia's US$8.5 million;[31] and Huawei's per patent family cost for 2011 - 2014 is US$1.1 million compared to Ericsson's US$3.3 million.[32] That is, Huawei's per-patent cost has been only a third of Ericsson's and 7.3 percent of Nokia's.

How could Huawei have acquired so many patents with relatively weak R&D spending?

My rough estimates here are only to provide a starting point for further investigation: How could Huawei have acquired so many patents with relatively weak R&D spending, both as a ratio of gross profit margin and in absolute monetary terms? To answer this question, it is useful to recall the many credible accusations of copying and theft that have dogged Huawei for decades. These centre around claims of the company stealing trade secrets and IP, forcing technology transfers, and reverse-engineering equipment from its tech rivals – a long list that includes Cisco, Motorola, Quintel Technology, T-Mobile, Nortel, and others (Yap et al. 2019).

According to the *Wall Street Journal*, for instance, Huawei researchers in Stockholm even "stashed foreign-made equipment in an electronically secured basement…[that] were shipped to China to be dissected by engineers." As the report goes on to say, "The secretive chamber had counterparts elsewhere in Huawei's empire" (Yap et al. 2019). This seems to reflect the general pattern of China's R&D "operations" around the world. As James Lewis (2017) from the Center for Strategic and International Studies notes, "They wish to extract technologies from Western companies; use subsidies and nontariff barriers to competition to build national champions; and then create a protected domestic market for these champions to give them an advantage as they venture out in the world." The final step then becomes applying for international patents for taking over the global market.

Huawei may have increased its R&D spending in absolute monetary terms in the last few years. Yet, given its reported history of forced technology transfer and IP theft from major

tech companies in previous years, its past success seems to have been largely generated from flagrant copying and theft from its tech rivals – and, based on the almost monthly articles detailing a new accusation of IP theft or a new lawsuit filed against Huawei,[33] it does not look like the company's behaviour has changed. As the *Wall Street Journal* concludes, Huawei has "a corporate culture that blurred the boundary between competitive achievement and ethically dubious methods of pursuing it" (Yap et al. 2019).

In addition, expenditures on R&D include not only compensation for R&D personnel but also payment for using outside intellectual properties. Given Huawei's notoriety in poaching foreign talents by excessive financial compensation, one can only imagine that within its rather low ratio of R&D to gross profit margin, Huawei has not incurred much cost for purchasing foreign intellectual properties.

In summary, the limited numbers that can be drawn from Huawei's annual reports show that:

1. Huawei has been growing exceptionally fast since its founding in 1987;
2. China's 2008 stimulus package and the Belt and Road Initiative (formally launched in 2014) provided Huawei with additional tailwinds for its global sailing;
3. the state direct financial aid and market manoeuvrings helped Huawei to gain and maintain competitive edge over its rivals;
4. Huawei has almost doubled its hiring and almost tripled its per-head operating expenses within 10 years immediately after the global financial crisis, while its rivals had to cut down their operating expenses substantially by either reducing per-head expenses or reducing both hiring and per-head expenses;
5. within the given operating expenses and measured by proportion, Huawei underspent its rivals on R&D and outspent on non-R&D operations as measured by their respective ratios to gross profit margin; yet
6. Huawei's pre-2015 acquisition of patents has topped its 5G rivals persistently in a ratio of three-to-one, or higher.

Given Huawei's "low-pricing" tactics for overtaking its rivals on the one hand, and lavish spending on poaching overseas talents, marketing, and lobbying on the other, an issue that has puzzled outsiders has been: Where did Huawei get the money to spend with no limit? Unfortunately, no clue can be drawn from Huawei's annual reports – the only Huawei financial books accessible to outsiders. We could only watch as Huawei's magic has played out year after year since Ren Zhengfei contemplated Huawei's global expansion in mid-1990s (Yang 2014: 197-216), which was long before the CCP government's formal call for its "going out" (走出去) strategy in 2000. This is not to say that Huawei led the formulation of China's global strategy, but it has definitely been an intended pilot project for such formulation.

In other words, the so-called Huawei magic is a miniature of the so-called China model, which combines the government's commanding power and its stealth industrial policy.

Huawei Risk Is a China Risk[34]

China had for a long time been perceived as a peaceful riser around the globe thanks to both a wide range of genuine well-wishers and a small group of co-opted pro-China elites from the free world. However, the Chinese government's aggressive use of its economic power and sharp power,[35] alongside its persistent violation of international order and norms, has opened the eyes of most democratic countries.

The Chinese government never accepted our beliefs and only acted against the very values of our society.

In Canada, the decisive turning point for this awakening came in late 2018 and early 2019, when the Chinese government unfolded its full scale retaliation against Canada's lawful detention of Huawei's CFO Meng Wanzhou by detaining Michael Spavor and Michael Kovrig and banning a number of Canadian agricultural products till this day. In the meantime, Beijing has not stopped either its bullying of our government or its orchestrating pro-China campaigns from campuses to the streets (Postmedia News 2019; Glavin 2019b).

Many in Canada were reluctant to acknowledge the China risk. We (including this author[36]) kept hoping China would be willing to adopt our democratic values and free-market system because they are superior to China's authoritarian regime and centralized planning, hence benefiting the Chinese people. Unfortunately, the Chinese government never accepted our beliefs and only acted against the very values of our society: human rights, democracy, and rule of law. It is time to openly acknowledge the China risk so we can formulate a China policy based on our conviction and pragmatism rather than groundless wishful thinking.

The China risk has three main components, and Huawei has both contributed to and benefited from each of these three components through its close ties to China's CCP government.

First, China's trade policy has nothing to do with free trade and everything to do with Beijing's determination and calculation to attain global market dominance by exploiting its trade partners and their free-market system (Chen 2019a). Beyond its infamous forced technology transfer, China has "a worrisome track record in the cyber domain on state-sponsored corporate/economic espionage, intellectual property theft, surveillance, censorship and other areas of cyber concern" (RWR 2019: 4). In December 2018, the US Justice Department – in coordination with 11 other countries, many of which offered statements of support – even went so far as to denounce the Chinese government's complicity in hacking and intellectual property theft (ibid.: 7-10).

Correspondingly, Huawei has "a corporate culture that blurred the boundary between competitive achievement and ethically dubious methods of pursuing it" (Yap et al. 2019). On one hand, Huawei benefited directly from the Chinese government that both provided Huawei

with trade secrets obtained from state-sponsored IP theft and coerced Huawei's foreign competitors to give up their lawsuits against Huawei's IP infringement.[37] On the other hand, Huawei openly urged its employees to steal foreign technology (RWR 2019: 16-17) and awarded them for success in stealing or fired them if they disobeyed the order or if they were caught spying (Yap et al. 2019).

It appears that stealing and "reverse-engineering" has been a systematic secret weapon from Huawei's early years to its present (e.g. Yap et al. 2019).[38] And its founder, Ren Zhengfei, has never relented when it comes to his military-style vision. As Ren himself has said (as quoted in Yap et al. 2019), "Our carrier network business group will be fighting a ferocious war in the next 10 years…we must be psychologically prepared."

Second, China has used its economic power, in the manner of both carrot (such as investment and trade deals) and stick (such as arbitrary bans on its imports and exports), to advance its leadership, influence, and illiberal governing principles on the world stage. The more eager a country is in pursuing the Chinese market, the weaker the country is positioned to counter China's economic coercion and policy manipulation (Chen 2019b).

Huawei, with a notorious nickname "price killer" (价格杀手; Yang 2014: 244) in China, is the most effective tool of China's "low-cost technology trap diplomacy" to influence other countries' China policy (RWR 2019: 5). How has Huawei been able to underbid its competitors by 30 percent or more for decades around the globe? This is a mystery for every outsider to guess. In Canada, it appears that the camp of naysayers in our national debate on whether to ban Huawei's 5G involvement is heavily influenced by a business community that benefited from Huawei's low-pricing schemes. How long do we want to trade Huawei's low-cost equipment for our right and capacity to defend our national security at home and exercise our diplomacy on the global stage?[39]

Third, China has deployed its sharp power to infiltrate its targeted countries to manipulate and influence the public attitude towards China and to compromise the democratic way of life in such countries. The more naïve and open a country is towards China, the more susceptive the country is to China's sharp power infiltration in its society.[40]

Huawei has been both the beneficiary of and the contributor to China's sharp power. Huawei used China's economic power and image to influence its existing and potential clients to expand its foreign market. For example, since 2001, Huawei branded its promotion scheme as the "New Silk Road," more than a decade ahead of Xi Jinping's launch of the BRI. Under this scheme, Huawei invited its foreign customers regularly to visit China and tour flashy Chinese cities like Hong Kong, Beijing, Shanghai, Xi-an, and Dalian to show them China's "brilliant achievement." The final stop of such tours is the splendid Huawei campus in Shenzhen with its vast exhibition hall, which can accommodate five helicopters to simultaneously take off and land (Yang 2014: 208-209). Such tours rarely fail to convert all the visitors into Huawei's clientele. A natural question is: Who pays for such regular lavish tours while enabling Huawei's persistent 30 percent discount for underbidding its global competitors?

Huawei has also burnished China's image and advanced China's global strategy by providing its advanced technology service at a low cost thanks to the Chinese state's financial support, infiltrating Western R&D communities,[41] helping spread China's mass surveillance technology globally (Kharpal 2019), defending China's authoritarian values on the global stage (Vanderklippe 2019), and doing business with countries that are under international sanctions for their nuclear weapon developments (Nakashima, Shih, and Hudson 2019).[42]

Understanding the chrysanthemum and sword

In 2006, Huawei adopted a new logo made up of eight blade-like chrysanthemum petals. According to Ren Zhengfei, this logo was symbolic of Huawei's ambitions: "To make Chinese chrysanthemums bloom permanently in *every corner* of the earth, we not only need to be compatible, inclusive, cooperative and open, but also must maintain for the long-term a hard-working morale and a blade-like spirit." Yet a Huawei senior manager has also revealed another meaning to this logo: symbolizing Ren Zhengfei's dual character as both "chrysanthemum and sword." In this formulation, Huawei might want a peaceful external environment, but if anyone spoils the flowers, then Huawei would "raise a knife and draw the blood."[43]

Huawei launched several lawsuits in 2019 against the US ban on using its own government funds to allow domestic telecommunications companies to buy Huawei equipment, arising from national security concerns (BBC 2019; Brodkin 2019). Washington's ban on the use of its own government funds is totally different from the Chinese government's blanket ban on any foreign firm's entry to key sectors in its periodically updated blacklist. Are these aggressive lawsuits from Huawei against the US government akin to what Ren Zhengfei meant by "raising a knife and drawing the blood"?

Huawei and the Chinese government have no right to intervene in foreign governments' decisions on their infrastructure construction (i.e., rolling out their 5G networks in this case) by threat of retaliation. Canadians should be alarmed too: What if our government decides not to allow Huawei's chrysanthemums to bloom on Canadian soil? Would Ren Zhengfei raise his knife and draw our blood, like his government has done by jailing Canadians and banning our farmers' products? There have already been warning signs. For example, Beijing's envoy to Berlin warned Germany that China would retaliate if Huawei were to be excluded from the German market (Czuczka and Arons 2019). China's former ambassador to Canada, Lu Shaye, had also warned of similar consequences if our federal government proceeded to ban Huawei from 5G.

Conclusion: Ban Huawei and Stop Living in Fear of China

Huawei's rapid rise to the global dominance was never a result of its "independent hard work (独立奋斗)" alone, contrary to what its founder Ren Zhengfei and other Huawei executives have repeatedly boasted (Pearlstine et al. 2019). No doubt, Ren Zhengfei and his team played an exceptional role in building Huawei to its current global dominance. But such success, with few ingenious inventions to underpin it, in just a short three-decade span would not have been possible without the Chinese government's multifaceted support. In other words, Huawei has taken full advantage of the institutional asymmetry between China, where the government dictates the market,[44] and the democratic and free-market economies, where competitive neutrality is guarded by the rule of law.[45]

To support its "national champion," the Chinese state provided Huawei with significant direct and indirect financial support, blocked foreign companies at home, which allowed Huawei to dominate the Chinese market guarded by the state, and helped to propel Huawei – and other na-

tional champions – to go abroad. For these reasons, Huawei has been able to conquer the foreign market using its "commercial" veil and following China's "low-cost technology trap diplomacy."

We need to reject the China model and prevent its national champions such as Huawei from entering and dominating our free-market system. This is especially true when it comes to Huawei's involvement in 5G, given the potentially expansive role of the "Internet of Things" both in the everyday lives of people and in our critical infrastructure. Doing so, however, requires concerted government action, including possible support for non-Chinese telecom companies that otherwise cannot compete with Huawei – and that has so far been limited.

Yet this does seem to be finally changing. A good example is the US government's recent plan (Barr 2019) for its newly established International Development Finance Corporation (DFC) to provide financial aid to developing countries and businesses for purchasing equipment from Huawei's foreign rivals. Although the CEO of DFC stated that the issue of Huawei is not about China but security of data, it is clear that only telecom companies headquartered in a democratic society, where rule of law governs, can be trusted to ensure our data security. Other examples include the Swedish government's provision of "some [US]$10 billion in credit assistance for its tech-and-telecom sector in 2018" and Finland's authorization of "[US]$30 billion in annual export credit guarantees economywide since 2017" (Yap 2019). Yet more still needs to be done, and democratic countries around the world – including Canada – should consider expanding efforts to finance a 5G alternative to Huawei.[46]

Canadian policy-makers need to have the resolve to outright ban Huawei from our 5G network, taking the cue from countries such as Australia and the United States on the national security implications of allowing Huawei unfettered access to our next-generation networks. Canada should also prepare for Beijing's possible retaliation if it makes such a decision. Irrespective of China's reaction, however, we would at least be confident that we are not providing the CCP government with one more means of leverage in the future, in the event that we find ourselves once again in open disagreement with China's authoritarian leaders.

About the Author

Duanjie Chen, an independent scholar with a PhD in economics, is a Munk Senior Fellow at the Macdonald-Laurier Institute. Previously, she was a Research Fellow at the School of Policy Studies, University of Calgary and Research Associate and Associate Director with the International Tax Program at the Rotman School of Management, University of Toronto. For nearly three decades, she served as a consultant to various international organizations, national government bodies, and business and non-profit organizations. She has published extensively in the area of public finance.

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Endnotes

1 The author would like to thank David McDonough for his many contributions to the writing, research, and editing of this paper. His hard work and support have been greatly appreciated.

2 Mattis and West (2019).

3 Refer to Yang (2014).

4 For the example of such onerous burden, refer to Bond and Fildes (2018).

5 Refer to the 2018 annual reports released by Telus and Bell Canada respectively. Both are available online.

6 My presentation below is *highly selective* and drawn only from the Yes camp for banning Huawei's 5G involvement, to which I belong. The No camp of naysayers can certainly make their case if they can prove Huawei's trustworthiness.

7 The explanation here is adopted from Rajiv (2018).

8 The article is the best summary of the Huawei debate in Australia and is embedded with rich references to satisfy a broad range of audiences in both depth and breadth.

9 A great overview of these many accusations can be found at RWR Advisory Group's Huawei Risk Tracker available here: https://huawei.rwradvisory.com.

10 The announcement of one Huawei public security project in Xinjiang in 2018 even quoted Huawei director Tao Jingwen as saying, "Together with the Public Security Bureau, Huawei will unlock a new era of smart policing and help build a safer, smarter society." Cited in Vanderklippe (2018).

11 The content here is drawn from Limbourg (2019).

12 For an incomplete list of Western media outlets being blocked by China, refer to https://cyber.harvard.edu/filtering/china/China-highlights.html.

13 The content here is drawn solely from a cool-headed scholarly discussion by Zheng (2019).

14 Googling "Huawei books" in Chinese (华为书籍) will turn out 13.6 million results, which are largely a compilation of official materials that idolize Huawei founder Ren Zhengfei.

15 According to the *Economist* (2008), this two-year spending initiative would inject funds into ten sectors including "schemes to promote technological innovation, and transport and other infrastructure projects."

16 For recent various opinions on the so-called China model, refer to PBS (2019).

17 These documents can be found on the website of China's Ministry of Commerce. One of the principles for guiding the updates on such a blacklist is whether a domestic sector has mastered the most advanced technology and attained the capacity of meeting the domestic demand.

18 For a thorough explanation of "Made in China 2025," refer to Kania (2019).

19 The main Chinese reference for this section is Yang (2014). The bulleted points in this section are based on the author's rewriting of key points from that volume, with the passages in quotations being directly translated.

20 https://www.huawei.com/en/about-huawei/corporate-information/milestone.

21 Huawei did meet its "Waterloo" in 2001 and 2002, when its total sales dropped slightly. There are many different alleged stories about this period, which are beyond the focus of this paper. My guess is that those hidden stories might be a reason that Huawei chose 2002 as a starting point for opening its financial books.

22 According to this article, the *Wall Street Journal* used third-party loan databases, company records, and state media reports to calculate the face value of state loans made available to Huawei. For grants, it relied on Huawei's disclosures in annual reports since 2008. For land acquisitions, it examined available state records, compared with prices of similarly zoned nearby property, according to Chinese property-value databases.

23 For the latest investigative report on China's corporate hack that is aimed to benefit its own companies, refer to Barry and Volz (2019).

24 According to Derek Scissors (2019) at the American Enterprise Institute, who tracked the Chinese official data, China has maintained its annual BRI outlays at over $100 billion for 2014–2018, including both capital investment and contracted construction services (which were largely funded through the Chinese loans).

25 The term "low-price sharp weapon" is my direct translation from "价格利器" in Chinese, which is an open praise of Huawei's pricing strategy in Yang (2014: 209).

26 For example, when the Indian wireless provider (RCom), a customer of both Huawei and Ericsson, went bankrupt recently, the China Development Bank (CDB) assumed its lending risks for Huawei, but Ericsson has been left battling in court for its receivables owed by RCom. That is, with the state backing, Huawei does not need to deal with financial risks encountered by its rivals who operate in free market with no state backing. Refer to Chen (2019b: 22).

27 Huawei "pushed" rather than merely "encouraged" its employees to work overseas because those who were unwilling or unable to work overseas were not considered for promotion at Huawei. Refer to Yang (2014: 215-216).

28 For a reported list of former Canadian politicians who were on Huawei's payroll, refer to Glavin (2019a). And according to the *Wall Street Journal*, the Huawei American recruits once even included the former vice chairman of the Joint Chiefs of Staff, former president of the World Bank, former US congressional leader, etc. (Ante and Raice 2010).

29 This is from a list of top 100 patent applications worldwide, and there is no figure for Ericsson during that period.

30 This is from a list of top 100 patent applications worldwide, and there is no figure for Nokia during that period.

31 These are static estimates that were made by dividing each company's total R&D spending for 2003-2012 by the corresponding total patent applications. In addition to data sources noted in Chart 8, the pre-2009 R&D for Huawei is estimated as 10 percent of its annual revenue according to the statement made in its 2006-2008 annual reports. For Nokia, the pre-2009

annual R&D spending is readily available from Nokia Financial Statements 2005-2020 and Nokia's expenditure on research and development from 1999 to 2019. On the latter, see https://www.statista.com/statistics/267821/nokias-expenditure-on-research-and-development-since-1999/.

32 Similarly, these are static estimates by dividing each company's total R&D spending for 2011-2014 by the corresponding total patent applications.

33 https://huawei.rwradvisory.com/.

34 This heading is directly borrowed from RWR (2019: 2). And the content of this section is also inspired by RWR's categorization of the Huawei-China risk.

35 The term "sharp power" was coined in November 2017 by the National Endowment for Democracy, to describe aggressive and subversive policies employed by authoritarian governments as a projection of state power that cannot be described as either hard or soft power. Such authoritarian influence efforts is "sharp" in the sense that they pierce, penetrate, or perforate the information and political environments in the targeted countries" to influence their audiences by manipulating or distorting the information that reaches them (Walker and Ludwig 2017).

36 For example, in November 2013, after reading the CCP's Eighteenth Central Committee's Third Plenum's "Decision on Major Issues Concerning Comprehensively Deepening Reforms" (http://www.ce.cn/xwzx/gnsz/szyw/201311/18/t20131118_1767104.shtml, in Chinese), which called for the market to play a "decisive" role in allocating resources, I was so optimistic that I predicted a greater opportunity for Canadians to do business in China. I could not imagine that China today would have banned Canadian agriproducts to coerce our government to reverse its lawful arrest of Huawei's CFO Meng Wanzhou. See https://www.policyschool.ca/what-chinese-say-and-will-do-about-their-soes/.

37 For example, according to Yap et al. (2019), China's commerce ministry prolonged its antitrust probe of Motorola's US$1.2 billion sale of its network equipment business to Nokia until after Motorola dropped its lawsuit against Huawei's stealing its technology for a compact base station SC300. And the executive implicated , Pan Shaowei, is a relative of Huawei founder Ren Zhengfei.

38 According to a former contract engineer from 2002 to 2003 in Huawei's Sweden office, Huawei's staff "spent all their resources stealing technology"; they'd "steal a motherboard and bring it back and they'd reverse-engineer it."

39 This is a question our government cannot escape when it promptly (and rightly) granted asylum to a Saudi teen upon her online plea and sent our foreign minister to greet her at the Toronto Airport but avoided speaking up on Hong Kong's protest movement like avoiding a "minefield."

40 For a thorough study of the Canadian case, see Manthorpe (2019) and Cole (2018); for the Australian case, see Hamilton (2018). And for the European case, see Benner et al. (2018).

41 For Huawei's invasive infiltration in Canadian R&D communities, refer to Silcoff et al. (2018).

42 In addition to its complicit business dealings with Iran, mainly for which Huawei's Meng Wanzhou was detained in Vancouver, Huawei also started working with North Korea after its former leader visited Huawei's Shenzhen quarter in 2006.

43 This paragraph is based on Chinese texts in two consecutive paragraphs in Yang (2014: 246–247). The original Chinese texts are quoted here: "2006年5月8日，华为把沿用了18年的商标中的'15道太阳光柱'换成了美丽温馨的'八瓣菊花'",通过此次换标任正非还表达了一层更为深刻的含义，那就是要让中国的菊花在地球上的每个角落永久地盛开，不仅需要兼容并蓄、合作开放，更需要具备长期艰苦奋斗的精神和刀锋般的斗志。" "一位长期在任正非手下工作的干部透露，新标示体现的正是任正非'菊与刀'的双重性格，意思是华为渴望和平的生存环境，但谁若辣手摧花，那么华为将手起刀落，刀刀见血。"

44 A typical example is how the Chinese government in the early 2000s forced foreign companies to transfer their high-speed railway technologies to its national champions through "joint ventures" and then drove out these foreign companies within five years from the Chinese market and took over their global market shares shortly after through its worldwide "patent applications." See Dickie (2010) and China Daily (2011).

45 Take, for example, Huawei's decision to launch lawsuits challenging the US government's ban on companies taking federal money for Huawei equipment. Can anyone imagine a foreign company challenging the Chinese government like that?

46 For example, the US industry is developing a virtual network, as an alternative to Huawei's hardware-based control of its networks. A key consideration for this virtual network is that the leaders in these component fields are American, Japanese, Korean and European. And the other is that, "unlike Huawei's system that blocks new applications from outsiders, not part of the virtual network's system would be closed to innovators." See Duesterberg 2020.

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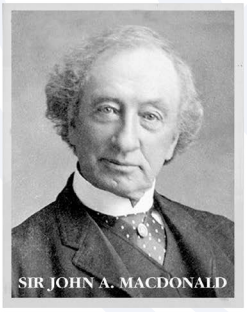
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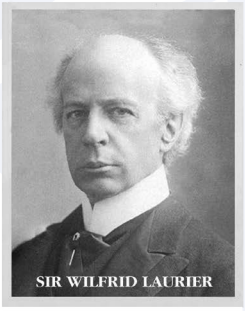
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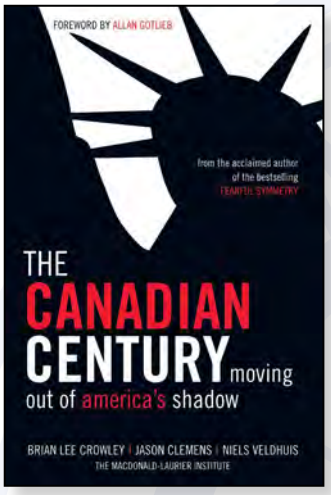

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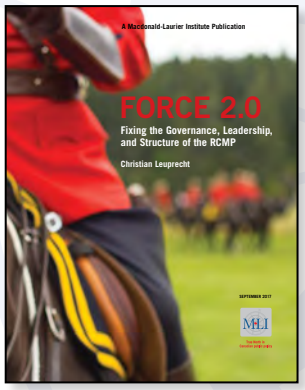

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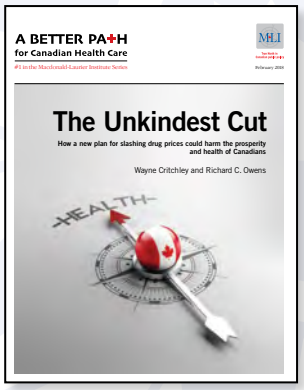

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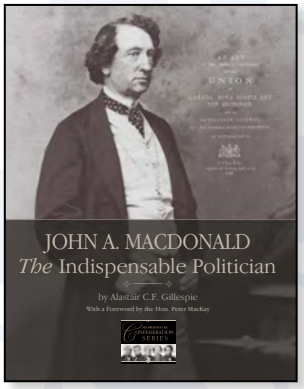

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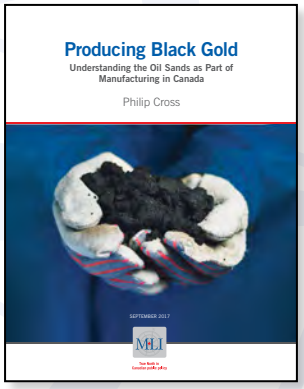

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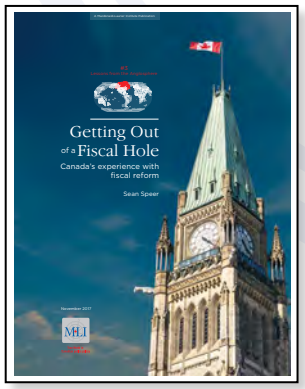

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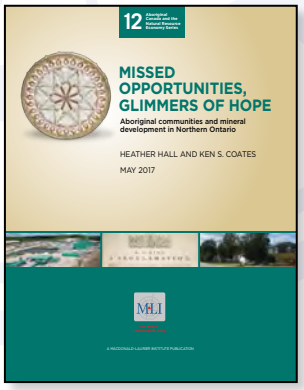

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What people are saying about the Macdonald-Laurier Institute

In five short years, the institute has established itself as a steady source of high-quality research and thoughtful policy analysis here in our nation's capital. Inspired by Canada's deep-rooted intellectual tradition of ordered liberty – as exemplified by Macdonald and Laurier – the institute is making unique contributions to federal public policy and discourse. Please accept my best wishes for a memorable anniversary celebration and continued success.

THE RIGHT HONOURABLE STEPHEN HARPER

The Macdonald-Laurier Institute is an important source of fact and opinion for so many, including me. Everything they tackle is accomplished in great depth and furthers the public policy debate in Canada. Happy Anniversary, this is but the beginning.

THE RIGHT HONOURABLE PAUL MARTIN

In its mere five years of existence, the Macdonald-Laurier Institute, under the erudite Brian Lee Crowley's vibrant leadership, has, through its various publications and public events, forged a reputation for brilliance and originality in areas of vital concern to Canadians: from all aspects of the economy to health care reform, aboriginal affairs, justice, and national security.

BARBARA KAY, NATIONAL POST COLUMNIST

Intelligent and informed debate contributes to a stronger, healthier and more competitive Canadian society. In five short years the Macdonald-Laurier Institute has emerged as a significant and respected voice in the shaping of public policy. On a wide range of issues important to our country's future, Brian Lee Crowley and his team are making a difference.

JOHN MANLEY, CEO COUNCIL