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5G: Amplifying or Bridging the Rural-Urban Divide?

Research Brief

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The centuries-long move from rural areas and small towns to large cities is an excellent example of opportunity costs. As career opportunities and amenities have grown in cities, so too have the implicit costs of remaining in small towns, leading more and more people to flock to the nearest metropolis.

Urban opportunity and amenity growth were put into hyper-drive by the Industrial Revolution, which brought labor-intensive factories and entrepreneurial opportunities to cities. As manufacturers grew, more people moved to cities for jobs and urban populations ballooned. As the populations grew, so too did the return to anyone whose invention would benefit the masses, leading cities to obtain some of the world's favorite inventions long before rural areas. Examples include electricity and telephone services.

A more recent example has been the internet, which, much to the consternation of rural America, still underserves the less populous areas of the country. 5G, the fifth generation of wireless communications, has the potential to make this opportunity cost of rural living much larger, maybe insurmountably so. That's because 5G is tailor-made for cities: it does not involve large, wide-broadcasting towers, but instead requires hundreds of small, wired antennae just to cover a single town or city.[i] All that infrastructure will still see excellent net returns in areas where thousands of people will harness the benefits, but what about in a town of a few hundred people?

One of the anticipated perks of 5G is the ability to enjoy the internet speeds now reserved for fixed broadband, the internet services that power our devices at home and in the office, anywhere 5G is available. However, if this was simply an issue of small towns' and rural areas' connective potential being limited to the slower internet speeds of 4G LTE – the generation of wireless services our smartphones are currently optimized around – and being more reliant on fixed broadband internet, there wouldn't be much cause for concern. Most of us would agree that current fixed broadband internet and 4G LTE are plenty fast. Unfortunately, 5G allows for something that 4G LTE and fixed broadband cannot, or at least cannot to the degree that 5G can. That something is the expansion of the internet of things (IoT).

Put simply, IoT is the web of communicative connectedness, via the internet, among the objects surrounding us. IoT products currently include smartwatches, smart TV's, and Amazon's Echo, which our smartphones are able to exchange information with. They also include the newer home A/C units that let us adjust the temperature on our phone, and the newer cars that allow us to stream music from our phones and answer phone calls from our steering wheel. 5G is capable of allowing more devices to be interconnected, while also allowing those devices to communicate more quickly. 5G may allow our toothbrushes and mirrors to be embedded with health-monitoring microchips, enabling them to identify any abnormalities. It will allow cars to communicate with each other within milliseconds, preventing accidents and making autonomous cars more effective.[ii]

What this could mean for rural areas is that smartphones and smart TV's won't be the only devices unable to be fully utilized. The majority of objects around us may have untapped potential to be easily controlled, to identify health problems, and to safely transport us. Fixed broadband technologies may reach the point that many non-urban citizens can enjoy IoT devices while at home, but, without 5G, these citizens could lose such capabilities as soon as they walk out of the door. Thus, at the very best, these citizens will enjoy only a portion of the benefits of IoT. This leads to the following questions: Will the future involve a large bundle of goods that non-urban citizens won't find useful at all, or at least not useful enough to pay the price driven up by demand in urban areas? How many more people will be drawn to our cities because 5G and IoT finally made the opportunity cost of non-urban living too high?

The concerns don't stop with these consumer economics and migratory dynamics questions. Many experts tout the industrial benefits of 5G and IoT.[iii] To the extent that 5G really can revolutionize manufacturing with improvements in automation and assembly line diagnostics, how many manufacturing plants will be drawn out of small towns and into big cities both domestic and foreign?

Further, just how far behind will young adults from rural areas be in their understanding of technology and their ability to innovate? Having grown up in rural Alabama, my first year of college, in 2011, was a crash course on Wi-Fi, Netflix, and Google Chrome. The likelihood of me becoming the next youthful creator of a viral app was slim. The likelihood of someone from my hometown creating the next great IoT device, probably even slimmer.

To clarify, a market-driven spread of 5G is bad for rural America. However, the inability of federal and state governments in incentivizing companies to close the rural-urban fixed broadband and 4G LTE divides is well-documented.[iv] It seems creativity is needed to prevent the same impotence in spreading 5G. As the Brookings Institute pointed out in a similar discussion of 5G, a single network shared by the communications industry and government may work best. It could create ubiquitous[v] US access to 5G instead of a 4G LTE-like system of large signal gaps in rural areas and overlapping signal bands in densely populated areas.[vi]

Even with a single-layer network, the requisite infrastructure will make widespread 5G deployment very expensive, with the government bearing much of the cost. One may ask why the government should take such extreme measures to simply stall the decline of rural America relative to its urban counterpart. The answer is that widespread 5G could actually reverse the trend and let rural America thrive. 4G LTE and high-quality fixed broadband have always promised benefits to rural America if the two technologies could ever fully spread, and 5G is a single bundle of improvements upon almost every one of those benefits.

Let's consider the benefits of widespread 5G in rural America: First and foremost, it could remove the lack-of-quality-internet disincentive for companies to move to non-urban areas. Many companies would benefit significantly from the lower operating costs found outside of cities, but a lack of reliable, let alone comparable, internet service is difficult to overcome with companies and prospective employees increasingly reliant on the technology. Further, the internet has shown potential to make geographic orientation inconsequential. To the extent that ubiquitous 5G helps to realize some of this potential, rural America will compare better with tech hubs in the eyes of new and relocating businesses.

Widespread 5G would also benefit a relatively new type of worker, the remote worker; many remote workers need to be constantly connected to their company's internal network, which requires a stable internet connection. Ubiquitous 5G would let remote workers live effectively anywhere, enjoying the affordability and tranquility of non-urban areas if they wish to.

With access to 5G, rural children would understand the world's technological capabilities from the same young age as urban children. When it came time for college, these rural youth could stay home and enjoy the ever-growing breadth of online degree programs. Upon graduation, this cohort would have two decades of unique perspective on what technology can do for their communities and what inventions are still needed.

To the extent that ubiquitous 5G can reduce the opportunity cost of living in a non-urban area, there are also benefits to urban areas. Every development that draws more people to America's cities is only going to make the affordable housing crisis worse. If 5G really does have the revolutionary impact on technology that many think it will, and if 5G is limited to large cities, then this revolution could severely worsen a problem the country hasn't even come to terms with yet. Ubiquitous 5G has the potential to not only prevent the affordable housing crisis from worsening but also relieve the situation.

The US is at a precipice. We have long allowed the free market to dictate the spread of technology to the detriment of our rural communities, and following the status-quo with 5G is likely going to exacerbate the extent of the rural-urban divide. So I think we need to ask ourselves, how much do we cherish those small towns that so many of us associate with America itself? Do we want to further restrict the potential and standard of living of kids growing up in rural America? Isn't the beauty of the internet that it can connect us no matter the physical distance? Isn't it time everyone in this country fully enjoyed that connection?

Endnotes

i Hart, K. (2018, July 25). How 5G May Widen the Rural-Urban Digital Divide. Retrieved from https://www.axios.com/5g-digital-divide-19b70d34-4978-44df-a1cb-ae9222d113ef.html

ii Downes, L. (2018, June 05). 5G: What is It Good For? Retrieved from https://www.washingtonpost.com/news/innovations/wp/2018/06/05/5g-what-is-it-good-for/?utm_term=.afe8e97023a2

iii 5G for Manufacturing and Industrial Automation Technology. (2018, June 05). Retrieved from https://www.ericsson.com/en/networks/trending/insights-and-reports/5g-for-manufacturing

iv West, D. M., & Karsten, J. (2016, July 29). Rural and Urban America Divided by Broadband Access. Retrieved from https://www.brookings.edu/blog/techtank/2016/07/18/rural-and-urban-america-divided-by-broadband-access/

v I refer to ubiquity within reason. One could not expect large swathes of pastureland and forest to have 5G access.

vi Wheeler, T. (2018, September 25). The Real 5G 'Race' is to Serve All Americans. Retrieved from https://www.brookings.edu/blog/techtank/2018/09/25/the-real-5g-race-is-to-serve-all-americans/

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The Walton Family Foundation is, at its core, a family-led foundation. The children and grandchildren of our founders, Sam and Helen Walton, lead the foundation and create access to opportunity for people and communities. We work in three areas: improving K-12 education, protecting rivers and oceans and the communities they support, and investing in our home region of Northwest Arkansas and the Arkansas-Mississippi Delta. In 2017, the foundation awarded more than $535 million in grants in support of these initiatives.