Global Digital Futures Policy Forum 2016: Issues Brief

Panel 4B: On Notice: The Coming Transformation of Key Economic Sectors

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Introduction

Several vital economic sectors are currently undergoing significant disruption as a result of the advancement of digital technologies over the past decade. The emergence of digital technologies coincides with the convergence of smaller and faster chips embedded with sensors and actuators that are underpinning a multitude of devices. These devices are sending and receiving huge amounts of data over the high speed, global Internet. The storage and analytics of that data support limitless solutions and applications. Taken together this convergence is often referred to 'the Internet of Things (IoT)' and provides the backdrop for the next industrial revolution.

The financial sector faces the growth of Bitcoin and other cryptocurrencies and is now exploring adopting the underlying blockchains technology to gain efficiencies in their own operations. Automotives are rapidly incorporating sensors, artificial intelligence and data-driven operations in an attempt to develop autonomous vehicle solutions. The recent 'uberization' of several markets (e.g. hotels, taxis) is now moving into logistics.

Just as with the first industrial revolution, when governments were slow to react in understanding how to regulate international commerce driven by new technology, today the digitization of our economy is presenting a new set of policy challenges that maybe the most complex we have ever faced. While it is impossible to capture the multitude of issues surrounding this change, an examination of the impending policy needs presented by cryptocurrencies, blockchains, autonomous vehicles and urban transportation can serve to offer some important insights for the coming transformation of key economic sectors.

Problem Statement

The digitization of cryptography has given rise to the advent of cryptocurrencies and blockchains. The ability to transact on the internet in a simple and anonymous manner is creating new difficulties for policy makers and regulators that were never before imagined. With smart phones gaining prevalence across every corner of the globe how should governments balance allowing individuals to benefit from this technology through new ways to transact with one another while maintaining a consistent rule of law to control fraud and abuse? The stability of blockchains offers new ways to organize transactions and relationships but what mechanisms are in place to ensure the proper accounting of this new platform? All of these issues are important discussion points as connected devices become the common platforms for transacting in the global economy.

The development of autonomous vehicles has attracted huge investment from global automotive companies, auto parts suppliers and diverse technology companies that are new entrants in the automotive sector. While autonomous vehicles offer a tremendous profit opportunity, they present a multitude of policy challenges, with perhaps the greatest being how to regulate safety when the driver is now the vehicle. Governments have a responsibility to maintain the safety of the public especially on the roadways. In the case of autonomous vehicles and other emerging robotic devices how can the safety of the owner, user and general public be preserved when there is no human in the loop? Autonomous vehicles represent an immediate challenge to our current safety regulatory regime and that offers the opportunity for a demanding discussion of current international governmental approaches.

Finally, so-called sharing economy companies are very visibly disrupting numerous industries from hospitality to mobility. Urban transportation has experienced one of the fastest transformations and governments at all levels are facing new challenges as Uber, Lyft and others gain a greater share of markets. Ride sharing is quickly evolving into new logistics solutions and policy challenges around labor relations and liability among others are now front and center, requiring governments to adapt to keep pace.

Cryptocurrencies and Blockchains

Since the public release of Bitcoin in 2009, governments have worked vigorously to develop rules and regulations to govern this new way to transact. However, there is still great divergence between how different governmental organizations and agencies define and consider cryptocurrencies and blockchains.

The initial efforts aimed at users of cryptocurrencies highlight four distinct policy issues, relating to the definition of a cryptocurrency, that have broad and substantial fiscal, monetary and economic implications (for more detailed explanation of the definitions below, see Appendix 1):

- From the users perspective, the Financial Action Task Force (FATF) defines crytocurrencies as a **currency** so, for tax purposes, should profits from sales be taxed as ordinary income? [1]
- Or is it a capital **asset,** following the Internal Revenue Service (IRS) definition, and thus gains and losses should be subject to capital gains tax rates and losses should be used to offset other gains?[2]
- Could certain cryptocurrencies meet the '*Howey'* test and thus be treated as a **security**, implying treatment under federal securities laws and oversight by the Securities and Exchange Commission (SEC) in the U.S.?[3]
- Finally, do cryptocurrencies meet the U.S. Commodity Exchange Act's definition of a **commodity**, implying that that mining Bitcoin should be taxed in another form such as royalties on mineral rights?[4]

[1] FATF (2014), "Virtual Currencies Key Definitions and Potential AML/CFT Risks", available from: http://www.fatf-gafi.org/media/fatf/documents/reports/Virtual-currency-key-definitions-and-potential-aml-cft-risks.pdf, (accessed 4/12/16)
[2] IRS (2014), "IRS Virtual Currency Guidance:", available from: https://www.irs.gov/uac/Newsroom/IRS-Virtual-Currency-Guidance, (accessed 4/12/16)
[3] U.S. Supreme Court, SEC v. Howey Co., 328 U.S. 293 (1946), available from: https://supreme.justia.com/cases/federal/us/328/293/case.html, (accessed 4/12/16)

Without proper policies in place the ambiguity of the treatment of cryptocurrencies impacts all of the actors in this sector from exchangers to miners of virtual currency. This lack of clarity limits that broad international adoption of cryptocurrencies.

At the same time, this also enables the potential for use of cryptocurrencies to support crime and tax evasion. Anti-money laundering and know your customer rules must now be applied to virtual currency. From a global policy perspective, are there sufficient regulatory bodies in place to ensure that cryptocurrencies are not being used to finance terrorism? Should these entities be satisfied with self-regulation by the financial industry or do governments need to step in the ensure that this new ability to transact is not exploiting weaknesses in the global payment system?

Cryptocurrencies provide the ability to transact. This differs from the underlying blockchains, which supports the shared ledger. The Australian Stock Exchange (ASX) in January of 2016 announced it was implementing a blockchain solution for equity trade processing. The new distributed ledger could reduce administrative costs and increase the efficiency of ASX's trading system. This is one of the first commercial applications of blockchains and many other finance entities are exploring the adoption of this new technology. Listed equity stock trading is a highly regulated market. Trading must be harmonized across the entire globe to ensure stable pricing and execution. Has there been enough testing of blockchains to ensure it is ready to go live? Who would be liable in the event of an incident and according to what standards? Numerous questions must be quickly studied and addressed.

Autonomous Vehicles

The United States Department of Transportation (USDOT) National Highway Traffic Safety Administration (NHTSA) defines vehicle automation as having five levels.[5] While each level of vehicle automation has numerous policy issues, this discussion will involve Level 4 or Full Self-Driving Automation. A Level 4 vehicle is designed to perform all safety critical driving functions and monitor roadway conditions for an entire trip. Such a design anticipates that the driver will provide destination or navigation input, but is not expected to be available for control at any time during the trip.[6] Governments have very recently ramped up discussions of how to approach this innovation.

In February of 2015, the United Nations Economic Commission for Europe (UNECE) was the first international body to discuss international regulatory steps concerning autonomous vehicles. Under the auspices of the World Forum for harmonization of vehicle regulations, the UNECE

[4] Commodity Futures Trading Commission (CFTC) (2015), Docket No. 15-29, Coinflip, Inc., d/b/a Derivabit, and Francisco Riordan, available from: https://supreme.justia.com/cases/federal/us/328/293/case.html, (accessed 4/12/16)

[5] No Automation (Level 0), Function Specific Automation (Level 1), Combined Function Automation (Level 2), Limited Self-Driving Automation (Level 3), and Full Self-Driving Automation (Level 4). For full definitions of each level of automation please see Appendix 2.

[6] NHTSA (2013), "Preliminary Statement of Policy Concerning Automated Vehicles Available", available from: http://www.nhtsa.gov/staticfiles/rulemaking/pdf/Automated_Vehicles_Policy.pdf, (accessed 4/12/16)

Working Party on Brakes and Running Gear reviewed proposals covering semi-automated driving functions to pave the way for more highly-automated vehicles.[7]

The United States (US), United Kingdom (UK) and Japan among others have held hearings to discuss Level 4 vehicles but thus far have not enacted any new policies specifically governing autonomous vehicles. Within the US, at the state level, California, Michigan, Florida, Nevada, Tennessee and Washington D.C. have enacted legislation allowing limited driverless vehicle testing on public roadways.[8]

It is clear that policy makers are struggling with the best approach to address this new technology. The only approach that has been tried thus far is offering testing in controlled environments. Many technology companies feel this is insufficient because autonomous vehicles need to learn from real world environments. In the US, major autonomous vehicle players are increasingly growing frustrated with inaction at the federal level and complaining that US states are enacting a patchwork of laws that are not supportive of the commercialization of Level 4 vehicles.

In general, national or central governments need to update, establish and enforce policies and regulations around safety, privacy, data sharing, cybersecurity, manufacturing, vehicle design, infrastructure and data communications related to autonomous vehicles to enable state or provincial governments to then further tailor rules that meet distinct local needs.

- At the national level policy challenges include revising vehicle equipment requirements such as steering systems, braking systems, visual aids (side and rearview mirrors), seatbelts, and airbags, just to name a few. All of these current equipment specifications will have to be modified for Level 4 vehicles that use GPS, LiDAR[9] and radar for situational awareness.
- Roadway infrastructure requirements need to be revised in terms of signage and road striping for autonomous perception.
- In terms of liability does a human need to be in the loop? Should there be a human driver at all times or is there a need to require a human be available to override an autonomous vehicle system. If a human is not in the loop where does liability reside? With the vehicle owner? With the manufacturer? What standards or instructions should be required of the decision making of a Level 4 vehicle on the public roadways to ensure safety of the public?

At the state, provincial or local level policy challenges include vehicle permitting, infractions and infrastructure. With Level 4 vehicles, human error should be drastically reduced. This changes the paradigm for speeding tickets, traffic infractions and drunk driving laws, which are all administered at the state or local level. Other considerations include parking tickets,

[7] UNECE (2015), "UNECE to discuss first international regulatory steps concerning automated-driving", available from: http://www.unece.org/info/media/presscurrent-press-h/transport/2015/unece-to-discuss-first-international-regulatory-steps-concerning-automated-driving/unece-to-discuss-first-international-regulatory-steps-concerning-automated-driving.html, (accessed 4/12/16)

[8] Gabriel Weiner and Bryant Walker Smith, "Automated Driving: Legislative and Regulatory Action", available from http://cyberlaw.stanford.edu/wiki/index.php/Automated_Driving:_Legislative_and_Regulatory_Action, (accessed 4/12/16)

[9] An acronym of Light Detection And Ranging, LiDAR is a surveying technology that measures distance by illuminating a target with a laser light.

incentives for high occupancy vehicles and support for public transportation. All of these policy regimes will need to be revisited and competitiveness of a nation may depend on ensuring that these emerging rules and regulations are consistent across jurisdictions.

The race is on globally. Despite President Obama proposing $4 billion over ten years for autonomous vehicle research and testing, Google has indicated it may look to the UK as its first deployment market. The UK has advanced limited regulation for autonomous vehicles and instead is supporting new private insurance for autonomous vehicles to enable deployment in the real world creating real global competition in this exciting new sector.[10] Dramatic cooperative action between nations is quickly taking shape as exemplified by transport ministers of all 28 European Union member states signing on April 14, 2016 the 'Amsterdam Declaration' that details steps necessary to establish rules and regulations to allow autonomous vehicle on the public roadways.[11]

Urban Transportation

After the launch of Uber in 2009 and Lyft in 2012, the growth of ride sharing applications has proliferated across the globe. There are numerous ways in which entrepreneurs are designing applications to support the tremendous need for mobility solutions in urban areas.

Historically, most governments regulated commercial vehicle for hire services at the local level. The primary policy goals often included transparent and standardized fares, licensed and safe drivers, and licensed and safe vehicles. More recently policies and regulations to ensure equitable services for the disabled, initiatives to reduce greenhouse gas emissions, and congestion pricing have been introduced in various jurisdictions. Overall, with hundreds of thousands of localities on every continent, there is currently a patchwork of fragmented policies and procedures regulating vehicle for hire services.

In spite of this fragmentation, Uber, Lyft and others have been able to grow rapidly and generate substantial revenue in developed and developing nations alike. As these new services have grown they are facing increasing opposition from existing local providers. In reaction to this opposition, some localities have banned these app-based services entirely and others are requiring onerous and inconsistent registration requirements. Beyond, the registration and licensing issues, individual safety for riders and drivers is an emerging issue. The unfortunate murder of six people by an Uber driver in Kalamazoo, Michigan in February of 2016 illustrates that there may be the need for federal or national legislation to ensure the safety of all participants in app based services.

As the ride share market becomes saturated in developed nations, large technology companies are seeking to leverage connected devices to transform logistics services especially in urban areas. From an environmental perspective fossil fueled ground transportation vehicles

[10] James Titcomb (2015), "Google's meetings with UK Government over driverless cars revealed", The Telegraph, available from: http://www.telegraph.co.uk/technology/2016/01/21/googles-meetings-with-uk-government-over-driverless-cars-reveale/, (accessed 4/14/16)
[11] Government of Netherlands (2016), "Europe wants to pick up the pace towards market introduction of self-driving vehicles", available from: https://www.government.nl/latest/news/2016/04/14/europe-wants-to-pick-up-the-pace-towards-market-introduction-of-self-driving-vehicles, (accessed 4/18/16)

contributed approximately one-quarter of energy-related global greenhouse gas emissions (GHGs) and was responsible for about one-fifth of energy use.[12] New technologies to better optimize last mile freight delivery in urban areas offers a unique opportunity to reduce GHGs and tap a very lucrative logistics market. New solutions for logistics may include autonomous air and ground vehicles teaming together to deliver good in an environmentally sound, cost effective manner. As firms look at these solutions, how can government provide the proper support to enable to improvements of urban areas? What standards must be put in place, regulations need to be changed, agencies need to take the lead to enforce the proper rules when the convergence of new technology transforming vast sectors of the economy?

Conclusion

There are myriad policy issues related to cryptocurrencies, blockchains, autonomous vehicles, and urban transportation. Cryptocurrencies face questions around their status as a currency, asset, security or resource. This can be viewed as a national or central government issue with important international considerations in terms of harmonizing with the global financial system. Whereas automotive vehicle regulation is a federal/central, state/provincial and local government issue where brand new policies and procedures must be developed and implemented as the vehicle as the driver becomes a reality. Urban transportation app based services on the other hand can be considered a local issue with logistics and vehicle for hire regulations needing to be tailored to the local community. And yet as new technology continues to converge any rule at the local level must be suitable to offer the interoperability required of the digital economy that knows no bounds.

As governments grapple with these new innovations many are beginning to recognize the dramatic ways in which applications and solutions related to digital technologies are transforming our global economy. It will be a requirement of policy makers at all levels of government to carefully balance the competing needs of various actors to ensure that the complexities of the 21st century are properly weighted and evaluated in order to support the increasing prosperity and quality of life that these new technologies have the potential to deliver.

Appendix 1

At an international level, through the Financial Action Task Force (FATF), general definitions of cryptocurrencies and blockchains have emerged to support regulation of this new innovation. The FATF defined cryptocurrency as "a math-based, decentralised **convertible virtual currency** that is protected by cryptography…Hundreds of cryptocurrency specifications have been defined, mostly derived from Bitcoin, which uses a proof of work system to validate transactions and maintain the block chain."[13]

As a decentralized virtual currency, cryptocurrencies are distinct from FinCEN's definition of real currency as "the coin and paper money of the United States or of any other country that [i] is designated as legal tender and that [ii] circulates and [iii] is customarily used and accepted as a

[12] International Association of Public Transport (2014), Action Plan for 2014 UB Climate Change Summit, available from: http://www.un.org/climatechange/summit/wp-content/uploads/sites/2/2014/07/TRANSPORT-Action-Plan-UITC_revised.pdf, (accessed 4/18/16)
[13] FATF (2014), op cit.

medium of exchange in the country of issuance." Thus, in contrast to real currency, "virtual currency is a **medium of exchange that operates *like* a currency in some environments, but does not have all the attributes of real currency**. In particular, virtual currency does not have legal tender status in any jurisdiction."[14]

In the United States, in March of 2014, the Internal Revenue Service (IRS) detailed "that virtual currency is treated as **property** for U.S. federal tax purposes."[15] General tax principles that apply to property transactions apply to transactions using virtual currency, with tax consequences on wages or capital gains or losses derived in cryptocurrencies. A payment made using virtual currency is subject to information reporting to the same extent as any other payment made in property.

The Security and Exchange Commission may consider certain activities related cryptocurrencies as the exchange of **securities,** which would thus fall under federal securities laws. Such activities would have to pass the '*Howey'* test, which defines a security as a, "contract, transaction or scheme whereby a person [1] invests his money [2] in a common enterprise and [3] is led to expect profits [4] solely from the efforts of the promoter or a third party."[16] This may be applicable to certain instances where new cryptocurrencies are created or bought/sold on online marketplaces.

Finally, the Commodity Futures Trading Commission has labeled Bitcoin, one of many cryptocurrencies, as a **commodity**[17]. This decision was based on the potential for cryptocurrencies, like Bitcoin, to fall under the broad definition of a commodity in the Commodity Exchange Act as, "all services, rights, and interests in which contracts for future delivery are presently or in the future dealt in".

Appendix 2

The United States Department of Transportation (USDOT) National Highway Traffic Safety Administration (NHTSA) defines vehicle automation as having five levels: No-Automation (Level 0): The driver is in complete and sole control of the primary vehicle controls at all times. Function-specific Automation (Level 1): Automation at this level involves one or more specific control functions. Examples include electronic stability control or pre-charged brakes. Combined Function Automation (Level 2): This level involves automation of at least two primary control functions designed to work in unison to relieve the driver of control of those functions. An example of combined functions enabling a Level 2 system is adaptive cruise control in combination with lane centering. Limited Self-Driving Automation (Level 3): Vehicles at this level of automation enable the driver to cede full control of all safety-critical functions under certain traffic or environmental conditions and in those conditions to rely heavily on the vehicle to monitor for changes in those conditions requiring transition back to driver

[14] FINCEN (2013), Application of FinCEN's Regulations to Persons Administering, Exchanging, or Using Virtual Currencies, available from: https://www.fincen.gov/statutes_regs/guidance/html/FIN-2013-G001.html, accessed (4/14/16)
[15] IRS (2014), op cit.
[16] U.S. Supreme Court (1946), op cit.
[17] CFTC (2015), op cit.

control. The driver is expected to be available for occasional control, but with sufficiently comfortable transition time. The Google car is an example of limited self-driving automation. Full Self-Driving Automation (Level 4): The vehicle is designed to perform all safety-critical driving functions and monitor roadway conditions for an entire trip. Such a design anticipates that the driver will provide destination or navigation input, but is not expected to be available for control at any time during the trip. This includes both occupied and unoccupied vehicles.[18]

[18] NHTSA (2013), op cit.