The Economics of Shared Mobility Series

The Present, Part I

* * *

Property Rights, Shared Economies, and Market Disruption

Benjamin J. Labaschin

Arity, LLC
November 2017

Series Introduction

This essay is one in a series of papers dedicated to providing critical context and analysis on the economics of shared mobility. The rideshare, carshare, e-hail, and mobile fleet industries that comprise the shared mobility market have achieved unprecedented growth in the last decade or so. Culturally resonant companies such as Uber and Lyft are increasingly integrating within the fabric of established urban transportation networks, while more conventional firms such as Ford and General Motors are committed to entering the market as well. Meanwhile, around the globe startup companies are emerging to fulfill market needs and overcome transportation inefficiencies. Put simply, it seems as though we are living through a transportation revolution.

The growth of shared mobility comes on the heels of significant innovations in the tech industry. As semiconductor prices steadily plummeted since the 1960s, the pace with which mobile technology diffused into economies only increased.[1] These innovations, coupled with data telematics' integration with Geographic Information System features in phones and the spread of mobile internet connectivity, allowed for the formalization of typically disorganized markets. Informal activities such as ridesharing that had existed for over a century could now be scaled exponentially. The results of these changes have been economy defining. Growth in the industry has continued annually, and is expected to rise still more over the coming years. Any company tied to transportation has likely already been affected by these changes.

As part of Arity's mission to revolutionize transportation, it is not only critical to grasp how this growth has arisen, but also to prepare for the future by investigating the factors that affect the mobility market today. Written from a macroeconomic perspective, these papers take a long-run, theoretical approach to examining these factors. Real-world data will be woven together with abstract economic concepts to paint a clearer picture of the typically chaotic world of shared mobility. Divided into three subseries (I: Past, II: Present, and III: Future), each essay will work to answer fundamental questions such as: how did the shared mobility market form; what economic concepts are critical to understanding the shared mobility market; and, in which direction is the market likely to head in the future? At minimum, these papers should function to inform any and all members of the Allstate family why traditional approaches to mobility and risk are changing. At their best, these papers could act as a resource upon which Arity relies when making economic decisions in the shared mobility market.

[1] Dale W. Jorgenson, *The Economics of Productivity* (Cheltenham: Elgar, 2009), 173.

Change is not made without inconvenience, even from worse to better.

—Richard Hooker, 16th Century Theologian

We should not conclude from this that everything depends on waves of irrational psychology. On the contrary, the state of long-term expectation is often steady, and, even when it is not, the other factors exert their compensating effects. We are merely reminding ourselves that human decisions affecting the future whether personal or political or economic, cannot depend on strict mathematical expectation, since the basis for making such calculations does not exist; and that it is our innate urge to activity which makes the wheels go round, our rational selves choosing between the alternatives as best we are able, calculating where we can, but often falling back for our motive on whim or sentiment or chance.

—John Maynard Keynes on Animal Spirits

Introduction[2] [3]

The United States is changing at a fast pace. For over a century the rate of adoption of new technology has been increasing at an exponential rate. Meanwhile, income growth is stagnating, debt is rising, and the employment-population ratio is faltering. In this world of rapid change, the transportation market is facing what some are calling a fourth industrial revolution.[4] Perhaps no market is experiencing more change that the shared mobility market—a consortium of access-based transportations firms set to disrupt the fundamentals of existing economy dynamics.

Organizations looking to exploit this market are legion. Most are simply following the animal spirits of market growth and possess only a fleeting understanding of macro-market dynamics. While it is critical to keep pace with market changes, those firms who exploit the market best will not simply be reactive, they will be proactive. The most proactive firms will attempt to appreciate how the shared mobility market functions. But to understand how the shared mobility market functions firms must appreciate the economic theory that fuels the market in the first place. The objective of this paper is to elucidate that theory. In writing this paper, the foundation will be laid for future papers on the economic nuances of the shared mobility market.

* * *

Over the past decade, the shared mobility market has grown to be a market force. With the onset of ridehail companies like Uber and Lyft, not to mention the increasing significance of organizations like Zipcar, shared mobility is becoming a prevalent feature of the American transportation economy. The growth of the shared mobility market exists within an even larger market phenomenon called the "shared economy"—a market based

[2] Dedicated to Professor Jeffrey Sundberg for introducing me to the world of property rights.
[3] Quotes from: Samuel Johnson and Terence M. Russell, *Samuel Johnson: A Dictionary of the English Language* (Aldershot: Ashgate, 1997), Preface; John Maynard Keynes, *The General Theory of Employment, Interest, and Money* (Prometheus Books: Amherst 1997), ch. VII, 162.
[4] Nicholas Davis, "What Is the Fourth Industrial Revolution?," *WeForum*, January 19, 2016. Accessed October 30, 2017. https://www.weforum.org/agenda/2016/01/what-is-the-fourth-industrial-revolution/

on access to capital rather than a transfer of exclusive ownership rights. The growth of this economy has taken the country by storm. Startups and traditional manufacturers alike are entering the market, betting on the future of the industry. Meanwhile, established entities like the insurance industry face a difficult choice: adapt or weather-the-storm.

The choice is not as simple as it may seem. Changing economic dynamics are so momentous as to be revolutionary. Many businesses simply do not know where the market will be tomorrow, and for those with limited resources, there is great risk in misplaced investment. As dynamics shift, risk and uncertainty also give rise to moral hazards and adverse incentives in shared economy users. As it will be asserted many times throughout this paper, the firm that best internalizes the costs of these dynamics—the firm that mitigates risks through organization—will offer the most to businesses seeking to lower costs and maintain growth in the shared mobility market. By the end of this paper, eight rules of property rights mitigation will be provided. By using these rules as a guide, firms such as Arity can ensure the systems they provide partners increase profitability. Because this essay relies heavily on the insights gained from the previous paper in this series, "The Economic History of Rideshare," a brief overview of that paper is provided below.

Prologue: A Brief Review

In the first paper of The Economics of Shared Mobility Series, the history and development of ridesharing was presented. By reviewing the past, obstacles and opportunities in the shared mobility market were elucidated. Despite the prodigious market growth shared mobility has recently experienced, these themes have not disappeared. In this next series of papers, the present shared mobility market will be similarly reviewed and scrutinized.

* * *

The shared mobility market has existed for over a century in the United States. Loosely defined as an arrangement between passenger and driver in which the driver provides a vehicle for passenger use in exchange for some fee,[5] shared mobility first emerged with the ridesharing "Jitney Movement" of the early 1900s. As innovations to production reduced the cost of manufacturing automobiles, it became possible for an increasing number of Americans to gain access to transportation capital. With the American economy stagnating, drivers looking to supplement their incomes began to offer transport to wayfaring urban travelers.[6]

Presented with new options for transportation, American commuters, largely jaded by the monopolistic practices of streetcar vendors, latched onto the opportunity. Within a year ridesharing spread throughout the nation. From Los Angeles, California to Portland, Maine, it quickly became the fastest adopted mode of transportation in United States history. Despite its meteoric rise to prominence, however, the practice of

[5] Benjamin Labaschin, "The Economic History of Rideshare," *Arity, LLC* (2017): 3.
[6] For more information about any of the claims in this section, see: Benjamin Labaschin, "Shared Mobility Series, Subseries II: The Economic History of Rideshare," *Arity, LLC* (2017).

ridesharing would not surpass a critical mass of use. Indeed, in hindsight the movement's swift rise growth likely prompted its demise.

Unregulated and untaxed, the popular practice attracted formidable opponents. Governments that relied upon funding from the taxation of streetcars were now hemorrhaging revenue. Insurance companies were presented with new, seemingly untenable risk. And streetcar trusts began to lose precious monopoly power. The existence of rideshare was a provocation. For all its growth, and in spite of its promising position as a mode of personalized public transportation, regulatory and market forces worked to stifle the jitney. Within months of its sudden ascent, these forces raised the cost of participation through means both social and economic, stymieing the market in the process.

Ironically, over the proceeding decades the American economy would develop such that regulatory powers would have cause to encourage rideshare use. From the car-share clubs of the 1940s to the energy crises of the 1970s, regulators would continually view rideshare as a panacea for society's transportation ills. Still, for every socio-economic downturn that reinvigorated shared mobility use, there was a movement to supersede it. With the decline of gas prices in the 1980s and 1990s, the market only encouraged personalized transportation. Though attempts were made to reduce congestion and improve air quality, for many Americans the cheap cost of travel tended to supplant the benefits of shared mobility. These costs were not simply limited to money, either. Whether it was travel by streetcar, train, or jitney, from the beginning of organized urban transportation, the notion of foregoing one's transportation liberty to travel by bus, carpool, or mass transit was deeply limiting.

The 1980s through the early 2000s saw a pronounced effort by governments and large-scale employers to ameliorate the social costs of personal travel. For their part, federal, state, and local governments attempted to regulate commuters, passing Trip Reduction Ordinances and Employer-Based Trip Reduction legislation to reduce congestion and encourage shared transit. For all their good intention, however, these legislative efforts would be largely ineffective. Success might have come in the form of transformative ridematching technology in the 1990s. Funded by the federal Government, ATHENA and MINERVA were the first computerized programs to exploit Geographic Information Systems in mobile phones and PDAs. Unfortunately, these precursors to modern shared mobility platforms, like many achievements that come before their time, were underappreciate and unceremoniously scrapped.

Meanwhile, as increasing numbers of workers drove to work, large-scale employers faced the increasing cost of providing parking for their employees. Ever attentive to cost reduction, businesses around the country began manually pairing employees that lived in close proximity to travel to work together. Perceived as a success, in the early 2000s platformers would emerge to emulate this process, dedicating themselves to commuter ridematching. Indeed, with the rising ubiquity of the internet, commuter web-forums and eventually full-fledge platforming networks would begin to facilitate ridesharing to utility-sensitive travelers. But it was not until the technological development of mobile phones and applications that the growth of shared mobility would begin to match the momentum of the "Jitney Movement" of the early 1900s.

Part I: Market Mechanics and The Economics of the Present

Today, not only has rideshare reintegrated into the fabric of American society, shared mobility platforms of every kind have reached a ubiquity never before known. Unlike the jitney era, market transactions of the present are not limited to the informal taxiing of commuters from one area to another. From carsharing to e-hailing and fleet management, businesses and individuals alike are beginning to capitalize on once idle transportation assets. No small transition, this shift into access-based capital represents a new economic paradigm of property ownership. Often referred to as the shared economy, the projected value of just some of the industries within this market are estimated in the trillions of dollars.

To investors such possibilities are a kind of golden succor. Keynesian animal spirits have enveloped financiers and venture capitalists the market over; stimulating both great market speculation and growth. As a result, the present shared mobility market is complex, ever-changing and potentially volatile. So nuanced is its growth that the analysis of the market will be spread over the course of two papers.

The main focus of this first paper will be theoretical. Due to the fast-paced nature of the current shared mobility market many businesses are so set on keeping up with market trends that they have not thought to look under the hood of the market—they have not tried to apprehend the underlying mechanics that allow for the market to function. This is to their detriment. Like financial day trading, it is possible to find success in short-term transactions, but the volatility of the market is such that, without a long-run understanding of the market, it is unlikely such a strategy would be sustainable. If Arity is to withstand the volatility of the shared mobility market, it must come to understand the fundamental factors driving the market forward and holding the market back.

Using the insights generated in this first paper, the paper succeeding it will analyze supply and demand trends in the shared mobility market. The conclusions of this paper, that technological innovation has allowed for revolutionary shifts in property rights regimes, will be used to argue that firms that internalize the externalities of new ownership paradigms will hold an advantage over competition. By scrutinizing developments in industry costs, revenue, growth, and profitability, market needs and limitations will be delineated.

Still, to achieve the goals of this second paper, readers must possess a mutual understanding of the mechanics behind the shared mobility market. The "shared" aspect of the shared mobility market is revolutionary in nature—it represents a shift in the economic understanding of ownership the likes of which have not been seen since the 17th and 18th Centuries. By briefly reviewing this shift, present market costs can be better understood.

The Surprising Significance of Property Rights and Ownership Paradigms

In no uncertain terms, the economic evolution occurring today is of such significance that its reverberations hold the potential to last for decades to come. In a time of such swift technological change, it may seem counterintuitive to look to the classical

economists for insight. In fact, when such revolutionary shifts do occur, one has nowhere to look but to the past for answers, for past events form the structure upon which present events occur. If insight of the present is to be gained, it is to the past we must first look.

In the 17th and 18th Centuries the western world was experiencing prodigious economic change. Increasingly the feudal land distributions among plutocratic monarchies that had been the structure of many western societies were coming into question. In a challenge to absolutist sovereignty, distinguished pamphleteers such as John Locke began to empower the individual in society by declaring the existence of their natural, God-given rights. A century later, the worldly philosopher Adam Smith would take Locke's arguments further by consolidating patterns of human existence into a social science. Central to Smith's argument was his contention that only through the incentive of mutual benefit can society as a whole succeed. Framing his discourse in part on Locke's assertion of the individual's natural right to property ownership, Smith's reasoning gave validation to an ownership paradigm that lasted until the early 21st Century.

* * *

In 1690 influential political commentator and philosopher John Locke published his *Two Treatises of Civil Government*. A tome to justify the English Revolution of 1688,[7] Locke's *Treatises* would help set the foundation for western civil government and the future creation of the United States Constitution. Called "…the most important contribution ever made to English constitutional law" by historians, *Treatises* famously promoted the principles of self-governance and the ideals of representative democracy.[8]

Locke's underlying argument was that all individuals are endowed with natural rights to property and that civil societies are the result of the efficient allocation of these rights. In so writing, Locke began his essays fundamentally opposing the popular absolutist ideologies of Thomas Hobbes, whose philosophies were propagated by the aristocracy.[9] Whereas it was Hobbes' contention that humanity's natural state is one of irrational anarchy, Locke believed that the natural state of humanity is rationality. According to historian William S. Carpenter, Locke believed all people "…are subject to the law of reason which teaches all mankind that no one ought to harm another in his life, health, liberty or possessions."[10] A revolutionary notion, it was Locke's assertion that at a person's most basic state exists a natural right to self-ownership. By extension, each person therefore has a natural right to the possession of their own labor. So, according to Locke, any asset that is economically improved by one's own hand becomes, in turn, one's own property. If an asset is not owned outright, then an exchange occurs between worker and owner equal to the difference in value added by labored improvement.[11] At a

[7] The revolution occurred when William of Orange of Holland usurped the throne of King James II. John Locke, *Two Treatises of Civil Government* (Dutton: New York, 1966), Introduction.
[8] Ibid.
[9] Ibid.
[10] Ibid, xii.
[11] This should help to explain hourly and service-based wages.

time when the monarchy had been slowly ceding power to the people,[12] Locke's *Treatises* gave written logic to budding sentiments about the individual's right to work and ownership.

Such arguments would have been meaningful in their own right, but Locke further extrapolated upon his reasoning. In doing so, he set the stage for modern economic thinking to develop. According to Locke, at humanity's most rational state all property, be it life, health, liberty, or land, should not be at risk to damage, harm, or theft. But, because there exists in nature no entity to enforce the law of reason, each person is naturally obligated to enforce their own property rights. And so, when the ability to communicate breaks down, as it so often does, social inefficiencies occur. Consequently, civil society was developed as a social response to natural enforcement inefficiencies. In modern economic parlance, we call this process of creating formal systems to mitigate costs "internalization."[13] To Locke, civil society is just that: a mutual "compact" by rational individuals agreeing to forgo their natural right to enforce property rights so that the community can efficiently protect property in all its iterations. Importantly, though the right to enforce the law of reason may be sacrificed, many other rights still remain with the individual. For instance, the right of the individual to limit the power of the sovereign community still lies within each person.[14]

Locke's perspective, that individuals have innate, God-given rights, and that some of these rights are forgone for the benefit of all individuals, was captivating. So significant would the theory of natural rights be that in the future these concepts would become foundational to western economic ideology. Just as Locke distributed property rights individually, so too do economists today refer to ownership as "bundles" of separable rights;[15] the efficient allocation of which are said to occur when willingly traded through rational market transactions.

In expounding on the tendency of individuals to mutually sacrifice enforcement rights to the community, Locke, perhaps more than any other before him, set the conceptual framework for modern economic understanding. Soon others, such as Adam Smith, would adopt the theory of natural rights and apply them to real world phenomena. Indeed, almost a century later, in North America and Scotland, these ideas would be used to catalyze our modern practice of property ownership.

1776 was a banner year for property rights. In Scotland, Adam Smith had just released *An Inquiry into the Nature and Causes of the Wealth of Nations*: a treatise of piercing scope that lay the foundation for the rational approach to political economy. Meanwhile in North America, a group of thirteen colonies espousing notions of representative democracy published a declaration of independence from the English state.

---

[12] The English Bill of Rights was passed by parliament in 1689. It limited the powers of the monarchy while also consolidating power between William III and Mary II. Notably, it also grants the rights of freedom of speech, free elections, and standardized parliamentary procedures.
[13] Harold Demsetz, "Toward a Theory of Property Rights," *The American Economic Review* 57(2), (1967): 347-359.
[14] It is implied but not stated here that societies that do not provide citizens the right to mitigate power and therefore tend towards inefficiency.
[15] Demsetz (1967): 347

By no coincidence, both publications were fueled by Lockean ideals.[16] Each would establish a powerful base of support for efficiency of individualistic property ownership that lasted until the notable paradigm shift of today. In focusing on just one publication, Smith's *Wealth of Nations*, we might glean important lessons about capital allocation in today's transitioning economy.

Adam Smith's work was revolutionary not necessarily for its depth as for its breadth. As today, in 1776 economic dynamics were changing.[17] The established means by which those in power generated wealth was increasingly viewed as stemming from the inequitable ownership of land and resources. Among Smith's triumphs was his ability to demonstrate rationally why the inequitable distribution of property rights was detrimental to all of British society. First, Smith had to explain how income was generated, writing:

> The whole annual produce of the land and labour of every country…naturally divides itself…into three parts: the rent of land, the wages of labour, and the profits of stock; and constitutes a revenue to three different order of people: to those who live by rent, to those who live by wages, and to those who live by profit. These are the three great, original and constituent order of every civilized society, from whose revenue that of every other order is ultimately derived.[18]

Put simply, Smith saw society as being broken down into capitalists (those who profited off capital ownership), landlords (those who leased land to laborers and paid rent to capitalists), and laborers (who earned wages from the goods they sold). Because rent is least risk-laden, Smith went on to posit, businesses and individuals often seek to earn rent by owning capital whenever possible. Called "rent-seeking" today,[19] such behavior is thought to be detrimental to society. When capital is seized upon but not improved, as had long been the case in British society, it is thought that capital does not reach its economic potential.

Enter Smith, who was in this way critical of the manner that capitalists and landlords owned tracts of land in England. In chapter eleven of *The Wealth of Nations*, Smith points out that, at times of lease-renewal, laborers who improved upon the land which they worked would be charged in proportion to the improvement of that land.[20] Because they had no claim to the land or its development, these laborers, argued Smith,

---

[16] John Montgomery, "Adam Smiths [*sic.*] Economics of Freedom," *Foundation for Economic Education*, January 1, 1982. Accessed October 20, 2017. https://fee.org/articles/adam-smiths-economics-of-freedom/; James W. Ely, *The Guardian of Every Other Right: A Constitutional History of Property Rights* (Oxford: Oxford University Press, 2008), 28-9

[17] Smith rejected traditional mercantilism, a national accounting policy relying upon gold and silver accounts. But he also rebuffed physiocratic ideologies—an economic premise claiming the wealth of a nation lay in its land. Constitutional Rights Foundation, "Adam Smith and The Wealth of Nations," *CRF USA* 23, no. 1, (2007).

[18] Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations*, Edwin Cannan ed. (London: Methuen & Co., Ltd. 1904): II.III.4—Library of Economics and Liberty, available from http://www.econlib.org/library/Smith/smWN8.html

[19] Anne O. Krueger, "The Political Economy of the Rent-Seeking Society*," The American Economic Review* 64, no. 3 (1974): 291-303. http://www.jstor.org/stable/1808883.

[20] Smith (1904): I.XI.

were being penalized for its improvement. With no stake in the land upon which they worked, laborers might even go as far as to over-farm the land, draining it of its nutrients.[21] The English economy, dependent upon agriculture, was not optimizing its economic interests.[22] The wealth of England lay stagnant not because individuals did not have *access* to capital, but because they *could not benefit from its improvement*.

In but briefly examining the past we have already developed tools for approaching the present. According to Smith's 1776 socio-economic analysis of property allocation and economic incentives, an analysis clearly beholden to Lockean ideology, we now see that laborers of the past had no incentive to improve upon the land which they worked. Because they were economically dis-incentivized to improve capital, English society as a whole was weighted with inefficiency. Put in Lockean terminology, civil society had developed such that, despite laborers sacrificing their natural right to property enforcement, another of their rights, the right of the individual to limit the power of the sovereign community, was limited to the point of economic and social inefficiency. Could today's transition into shared mobility yield similar inefficiencies? By coupling this historical context with the economic theory behind property rights, it should become possible to determine.

Risk Mitigation: Property Rights Delineated

Since Smith's time much thought has been placed into the economics and mechanics of property rights enforcement. Entire political ideologies have formed from these economic musings; from capitalism, to socialism, to libertarianism, whole populations are beholden to systemic interpretations of property rights. Economic thought has become so pervasive that some have even argued that the Neolithic Revolution, humanity's large-scale shift from hunter-gatherer society to agriculturalist society, was the consequence of a social need to exclude foreign bands of hunters from vital resources.[23] In other words, the mechanics of property rights may have compelled our early ancestors to transition into Lockean civil societies. If so, then it is no act of hyperbole to state that any transition in ownership paradigms—the common methods by which property is transacted in the market—could be of great social significance. In these

---

[21] For those that are interested, soil nutrients and capitalism was one of Karl Marx's key contributions to political economy. Called the "metabolic rift," Marx theorized that the depth of the division between rural and urban economies reached as deeply as the soil upon which laborers farmed. To Marx, the food produced in agrarian society stole nutrients from rural areas and sent them away to urban areas. Karl Marx, *Capital: A Critique of Political Economy, Vol. III. The Process of Capitalist Production as a Whole*, Frederick Engels, ed. Ernest Untermann, trans. 1909—Library of Economics and Liberty. http://www.econlib.org/library/YPDBooks/Marx/mrxCpC.html

[22] For a starker example of economic incentives and property rights, there has been robust literature on the economics of slavery: an extreme form of property rights misallocation. See, for example, Yoram Barzel, "An Economic Analysis of Slavery," *The Journal of Law and Economics* 20, no. 1 (1977): 87-110; and, Alfred H. Conrad and John R. Meyer, "The Economics of Slavery in the Ante Bellum South," *Journal of Political Economy* 66, no. 2 (1958): 95-130. https://doi.org/10.1086/258020

[23] Douglass C. North and Robert Paul Thomas, "The First Economic Revolution," *The Economic History Review* 30, no. 2 (1977). doi:10.2307/2595144.

next paragraphs, the mechanics of property rights will be delineated. In connecting them to the economic developments of the past, the fundamental nature of the shared mobility market will be theorized.

* * *

Property rights are value-laden constructs. In a highly influential 1967 article, economist Harold Demsetz famously described the value of property rights, explaining, "When a transaction is concluded in the marketplace, two bundles of property rights are exchanged. A bundle of rights often attaches to a physical commodity or service, but it is the value of the rights that determines the value of what is exchanged."[24] Said another way, when reduced to their barest form, economic transactions are a value agreement between two parties regarding a seller's right to own the fruits of their labor or the property which they have in some manner acquired. Expanding upon this point in a later paper, Demsetz refined the issue of property rights further in writing:

> It is not the resource itself which is owned; it is the bundle, or a portion, of rights to use a resource that is owned. In its original meaning, property referred solely to a right, title, or interest, and resources could not be identified as property any more than they could be identified as right, title, or interest.[25]

Following Lockean tradition, Demsetz claims that, beyond value, ownership is really a composition of bundles of individual rights. Following theory, possession becomes almost a foreign concept in western economic ideology. Rather, possession is the culmination of socially enforced rights and the extent to which these rights can be socially enforced and accepted. Therefore, it is theoretically possible that the possession of an asset can be divided infinitely so long as it is not depreciated completely. As economists would later learn, the inability to enforce these principles can lead to poor results. Thankfully, a solution to better enforce property rights regimes was developed. For now it should suffice to say that property is valued by the allocation of ownership.

These rights are commonly broken down into four bundles: (1) The right to use a good; (2) the right to retain the return yielded from the usage of a good; (3) the right to convert the form and structure of a good; and, (4) the right to transfer one of more of these property rights to other persons.[26] In the Western economic canon, these four rights underlie every market transaction, every item owned, and every possession consumed. Though not explicitly stated, in

---

[24] Demsetz (1967): 347

[25] Italics removed from original quotation. Armen A. Alchian, and Harold Demsetz, "The Property Rights Paradigm," *The Journal of Economic History* 33, no. 1 (1973): 17. doi:10.1017/s0022050700076403.

[26] Eirik G. Furubotn and Svetozar Pejovich, "Property Rights and Economic Theory: A Survey of Recent Literature," *Journal of Economic Literature* 10, no. 4. (1972): 1137-1162; Sabine Moeller and Kristina Wittkowski, "The Burdens of Ownership: Reasons for Preferring Renting," *Managing Service Quality* 20, no. 2 (2010): 178.

aggregate these four rules are said to give rise to a fifth: (5) the right to exclude property from others.[27]

The right to exclude others from the use of one's own property is arguably the ultimate objective of effective property right allocation.[28] The economic logic behind this objective is clear. If rights are value-laden and value is socially apparent, then unless there exists some cost for violating these rights greater than or equal to the value individuals perceive in said property, rational individuals might violate these rights. Put another way, *to own the right to exclude others from the use of property is a socially constructed method of mitigating the risks inherent to value itself*. Economically speaking, the eschewal of any of these five property rights raises the risk of damage, harm, or theft to property.

So ubiquitous is the right to exclusivity that most people and businesses are likely unaware of the structures that need to exist in order to regulate it.[29] It is likely that most feel as if exclusivity is a natural extension of the foundational principles of Western democracy. And, for a long time they have been. Citing Locke as one of "the three greatest men that have ever lived, without any exception,"[30] Thomas Jefferson leaned heavily on Locke's theory of civil compact in the process of writing the Declaration of Independence. The very preamble of the Declaration is a clear allusion to Locke's espousal of "life, liberty, and estates."[31] But as Locke earlier indicated, the efficient enforcement of property rights and their exclusion are, in fact, not technically natural. Among the many reasons that formed them, societies such as the United States were created to be formal systems under which inefficiencies of property right enforcement could be internalized. Under the creeds enshrined by The Declaration of Independence and, later, The United States Constitution, citizens have been able to rely upon these rights only in so far as social order and function has been maintained.

---

[27] Demsetz (1967); Moeller and Wittkowski (2010): 179.

[28] Property rights regimes are embedded in controversy. Some, like Katz, point out that many view ownership as "essentially constituted by the exclusion of others from the object owned." But complications arise from the difference between an exclusive rights and a right to exclude. Larissa Katz, "Exclusion and Exclusivity in Property Law," *University of Toronto Law Journal* 58, no. 3 (2008): 275-315.

[29] Typically, there are two property overarching property regimes to maintain exclusivity: public ownership, private ownership. A third, which will be addressed in this paper, also exists called common ownership.

[30] Thomas Jefferson to John Trumball, February 15, 1789, Collection of the United States Library of Congress, https://www.loc.gov/exhibits/jefferson/18.html.

[31] According to historian James W. Ely Jr., "…Thomas Jefferson borrowed heavily from the compact theory of John Locke. Locke used the expression "life, liberty, and estates" to describe the natural rights that government was formed to protect. Jefferson, however, substituted the phrase "pursuit of happiness" for "estates," a change that should not be understood as rejecting the emphasis on property rights in revolutionary ideology. The concept of happiness as an end of government was widely accepted in the eighteenth century and was generally equated with economy opportunity. … The right to obtain and possess property was at the heart of the pursuit of happiness." See James W. Ely, *The Guardian of Every Other Right: A Constitutional History of Property Rights* (Oxford: Oxford University Press, 2008), 28-9.

With the modern transition into the shared economy, the right to exclusivity, and therefore the right to mitigate risk, is being challenged from within. Specific rights like the right to use a good and the right to retain the benefit yielded from the use of the product are being allocated to consumers. While the right to convert the form and structure of a good and the right to transfer property rights to other persons remain with the owners of capital. In shifting the traditional paradigm of ownership, a greater amount of risk is being allocated to those who grant access to their capital, therein removing responsibility to the user. As will be explained below, *those who have access to capital through carsharing have already demonstrated a tendency to exploit and disregard the capital they are so given.* Like Smith's feudalism example, providing access to capital may yield economic inefficiencies. Without a concerted stake in the maintenance of capital, consumers will be more likely to harm, damage, or even steal assets in the shared economy.

Only by internalizing these "externalities"—the peripheral consequences of economic activity that are not redirected proportionally into the cost of a good or service—can shared mobility, and indeed the shared economy, be sustained as an industry. So far, the industry has seemed largely able to do so. But, as the industry scales, will this continue to be the case? For instance, many firms within shared-mobility perceive the cost of insurance to be prohibitive to their long-term sustainability. These costs, however, may well be proportional to the increased risks of non-traditional ownership structures. Might there be a means by which Arity could internalize the risks to non-traditional ownership? It is the argument of this paper that the shared mobility market would benefit greatly from a rights-based risk solution. If Arity is able to create formal structures to reduce businesses' operation costs, if it is able to internalize the negative externalities inherent to shifts in property rights allocation, it may well become a nucleus to the shared mobility market. In Part II, this theory will be applied to the growth of the shared economy as a whole and arguments in support of Arity's role in the internalization of property rights will be presented.

Section II: Market Disruption, Market Mechanics, and The Shared Economy

In "The Economic History of Rideshare" it was demonstrated that over the course of a century socio-economic hurdles had plagued the rideshare phenomenon in the United States. Overregulation, insurance costs, and consumer safety concerns all weighed upon the adoption of rideshare, but arguably no hurdle was more burdensome than the limitations inherent to ridesharing itself. As the 20th Century progressed, it became only more restrictive to rely on public transportation for mobility. Metropolitan areas like Los Angeles were being built around personal automobile travel, [32] while many suburbs simply could not be reached without a car. Quite simply, America was a consumer-centric society fueled by personal transportation networks.

So it has come as a surprise to many that in America, seemingly the most unlikely of environments, shared mobility has taken off. Like that of the jitney era, technological

[32] Adam Nagourney, "The Capital of Car Culture, Los Angeles Warms to Mass Transit," *The New York Times*, July 20, 2016. Accessed October 25, 2017. https://www.nytimes.com/2016/07/21/us/the-capital-of-car-culture-los-angeles-warms-to-mass-transit.html

innovation, cheap access to capital, and a greater reliance upon the service sector have all contributed to greater consumer buy-in to shared mobility. In this new transportation environment, young consumers increasingly prefer temporary access to cheap, informal travel rather than car ownership. Some reports have it that in cities like New York, ridehailing companies like Uber have begun to transport more people than traditional taxi companies.[33] While the veracity of these claims are dubious, it is incontrovertible that the modern era is seeing a rise in non-traditional economics. So great are these changes that many are calling this the era of the shared economy—where market transactions are increasingly exchanges of capital access rather than ownership.[34]

This new paradigm of ownership naturally elicits two important questions that this paper will venture to answer. First, why has shared mobility developed now? Second, what affect, if any, will the inherent limitations of shared mobility have on its market sustainability? To answer these questions, insights gained from "The Economic History of Ridesharing" will be integrated with the revelations on property rights presented in this paper. These answers will lend credence to eight guiding rules that should assist efforts to internalization. These principles, the formulation of which led to a Nobel prize, are believed to be key to the internalization of shared property, and therefore key to risk and cost reduction. In summary, the answers to these questions and the explication of these eight principles should provide a conceptual framework to analyze the shared mobility market in the next paper.

* * *

It has become clear over the last decade and a half that the transportation market has begun to change. Entrenched American traditions such as vehicle ownership are in flux. For the first time since 1960 the proportion of American households without a vehicle rose; from 8.9 percent in 2010 to 9.1 percent in 2015.[35] These changes are symptomatic of overall paradigms shifts in patterns of American consumption. Increasingly property ownership is being abandoned for temporary access to capital.[36]

Data from the US Census Bureau illustrates this trend. In 1998 the rental and leasing industries made 87 billion dollars in revenue, by 2015 industry revenue had risen

[33] According to data from Uber, as of July 2017 it recorded 288,000 rides each day compared to NYC taxi's 277,000. That said, there is an incentive for Uber to report these high numbers. Also, Uber may be intentionally taking a hit to revenue in order to boost its usage numbers. Winnie Hu, "Uber, Surging Outside Manhattan, Tops Taxis in New York City," *The New York Times*, October 12, 2017, accessed October 22, 2017. https://www.nytimes.com/2017/10/12/nyregion/uber-taxis-new-york-city.html.

[34] Fleura Bardhi and Giana M. Eckhardt, "Access-Based Consumption: The Case of Car Sharing," *Journal of Consumer Research* 39 (2012): 881. doi: 10.1086/666376.xs

[35] Dave Dershgorn, "No-Car Households are Becoming More Common in the US," *Quartz*, December 28, 2016. Accessed October 24, 2017. https://qz.com/1088612/where-to-find-opportunities-in-an-aging-bull-market/.

[36] Bardhi and Eckhardt (2012); Tobias Shaefers, et al., "How the Burdens of Ownership Promote Consumer Usage of Access-Based Services," *Springer* 27 (2016): 569-570.

54 percent to almost 160 billion dollars.[37] From bikes and clothes to cars and houses, new twists on classic staples of consumption are being marketed to the public in what is being called a "sharing revolution."[38] Following the growth of major companies like Uber and Lyft, some are predicting the access-based consumption market to grow from a 14 billion dollar industry in 2014 to a 335 billion dollar industry in 2025.[39]

While businesses attempt to keep pace with these rapid changes, academics are busy trying to explain the mechanics behind this economic transition. Though discussions continue, some conclusions have been made. For one, it is clear to scholars that access-based transactions fundamentally differ from traditional property-exchange transactions.[40] Property rights regimes fully explain that without a full transfer of property rights, the risks and responsibilities of ownership no longer lie completely with users.[41] The risks and responsibilities that are associated with property are commonly referred to as the "burdens of ownership."[42] Although it might not seem intuitive that capital ownership brings with it an inherent burden, this phenomenon is the foundation of insurance.

Insurance was developed to manage the risks of owning a home, a car, land, one's self or, historically, a ship. The so-called "bottomry"-based insurance market was one of the first western insurance markets.[43] Developed to mitigate the burdens of ownership of ships, merchants sought a way to insure ship hulls, or "bottoms," that were at risk of breaking; destroying captain, crew, ship, and commerce in the process.[44] Certainly other risk schemes had existed previous to the bottomry trade.[45] In early 14th Century Italy, *securitas* (securities) were offered to vendors as risk collateral. But as Niall Ferguson points out in his classic *The Ascent of Money*, "these arrangements had the character of conditional loans to merchants, which could be cancelled in case of a mishaps, rather than policies in the modern sense."[46] These schemes would be adapted so that by the 1350s contractual insurance systems akin to those of today would develop.

As these contracts were refined over the decades, names familiar to modern ears such as Lloyd's of London would emerge to insure risk-laden markets like marine

---

[37] United States Census Bureau, "Annual Service Reports, Historical Tables, Table 1: Estimated Revenue for Employer and Nonemployer Firms: 1998 Through 2007," *United States Department of Commerce*, accessed October 24, 2017.
[38] Mike Bruce, "The Sharing Revolution," *The Courier Mail, May 29, 2012*. Accessed October 24, 2017 http://www.couriermail.com.au/ipad/sharing-in-the-rental-revolution; Shaefers, et al., (2016): 570.
[39] Niam Yaraghi and Shamika Ravi, "The Current and Future State of the Sharing Economy," *Brookings India IMPACT Series No. 032017* (2017).
[40] Christopher Lovelock and Evert Gummersson, "Whether Services Marketing?: In Search of A New Paradigm and Fresh Perspextives," *Journal of Service Research* 7, no. 1 (2004): 34.
[41] Moeller and Wittkowski (2010); Shaefers, et al., (2016): 571.
[42] Ibid: 570.
[43] In the area of modern China insurance had already existed for some time.
[44] This is by no means a comprehensive history of insurance. For more, see Niall Ferguson, *The Ascent of Money: A Financial History of the World* (London: Penguin, 2012).
[45] Interest in insurance was precipitated in 1666 by the catastrophic Great Fire of London which destroyed over 10,000 houses.
[46] Ferguson (2012), 185.

mercantilism.[47] But, as with most new markets, externalities arose. Non-related parties began to take out marine and life insurance policies as a form of gambling. This eventually prompted English Parliament to intercede with The Marine Insurance Act of 1745 (MIA 1745), a law that voided any marine policy taken by parties without interest in the safety and maintenance of a vessel.[48] Whereas The MIA 1745 diminished gambling on ship safety, policies continued to be taken out on the lives of public figures. Newspapers even went as far as to publish the odds of survival of public figures. The "insurable interest" doctrine would be enshrined in insurance schemes thirty years later with The Life Assurance Act of 1774 (LAA 1774). The LAA 1774 internalized these negative externalities by applying the insurable interest doctrine to life insurance policies.[49] In doing so, The LAA 1774 and The MIA 1745 lay the structural foundation for modern insurance practices.

For over two hundred years, to take out insurance policies individuals have required an insurable interest in the property they wish to indemnify. These policies have been largely based on traditional property rights regimes established by Locke and Smith to mitigate risk. Now, with the expansion of access-based consumption, there exists another market to moderate the risk burdens of ownership. Utility-sensitive users who wish to avoid burdens of ownership like insurance can now inexpensively access transportation capital rather than own it. This option is especially appealing to urban travelers who face greater risks to car ownership than their suburban and rural counterparts. To own and operate a car in an urban landscape entails greater exposure to other cars, more time spent finding spaces, and higher insurance premiums.[50]

For many, socio-economic factors have clearly been persuasive enough to encourage car use. Public transportation, the primary travel alternative to private ownership, presents its own burdens to the urban commuter, including comfort and safety concerns, travel expediency, and even social stigma. Now, with shared mobility options, many urbanites are choosing to switch to access-based consumption. Studies indicate that the more people use shared mobility, the more likely they are to ride public transit, spend less money, and forgo car ownership all together.[51] *In many ways, shared consumption acts as an alternative form of insurance to consumers.*

Traditionally, insurance acts as an enabler to economic growth.[52] Among its many attributes, it encourages ownership by reducing the risk of extreme expenditure from

---

[47] "History," Lloyd's of London, 2017. Accessed October 31, 2017. https://www.lloyds.com/lloyds/about-us/history; Ferguson (2012), 185.

[48] Scottish Law Commission, "Insurance Contract Law: Insurable Interest," *Insurance Contract Law: Insurable Interest Extract from LCCP 201/SLCDP 152*: 104-5

[49] Ibid.

[50] Tom Vanderbilt, *Traffic: Why We Drive the Way We Do (and What It Says About Us)* (New York: Alfred A. Knopf, 2010); Jim Gorzelany, "Where It Costs The Most -- And Least -- For Car Insurance," *Forbes*, April 14, 2015. Accessed October 24, 2017. https://www.forbes.com/sites/jimgorzelany/2015/04/14/where-it-costs-the-most-and-least-for-car-insurance/#bd7a5ba242bd

[51] American Public Transportation Association, "Shared Mobility and the Transformation of Public Transit," *Shared-Use Mobility Center* (2016).

[52] Insurance reduces the risks to the pursuit of innovation, therein reducing interest rates, and increasing savings in the process. AXA, "Insurance is Invisible Everywhere," 2017. Accessed October 31, 2017. https://group.axa.com/en/about-us/macro-economic-role-insurance

property theft or damage.[53] But as technology expands options, risk-sensitive users are sacrificing the right to exclusivity for the often-cheaper option of temporary access. Of course, many laborers in the shared economy require insurance to operate their capital. But to ridehail users, the responsibilities of ownership such as car maintenance and insurance costs are now forgone burdens. This presents a challenge to traditional insurance companies to adapt to these new structures. As will be explained later in this paper, some twists on traditional policies have already emerged to reduce costs. Still, in aggregate nothing like the notion of "insurable interest" has emerged to internalize market risks and liabilities companies and ridehail drivers endure. This is to the detriment of the shared mobility market which still contains risk to be managed. *It also presents an opportunity to innovative firms to develop novel ways to mitigate costs and, like insurable interest, incentivize entrance into shared mobility participation*.

Ridehail laborers are among the most disadvantaged participants in the shared mobility market. Like any laborer, contract drivers are theoretically paid the value they perceive their labor is worth.[54] A corruption has arisen, however, related to a classic economic concept called "money illusion."[55] Money illusion occurs when individuals think in nominal, rather than real economic terms. Today, laborers suffer a mixture of money illusion and "asymmetries of information"—where an asymmetry of information is the inequitable possession of information, or understanding, that affects market prices. In the case of shared mobility labor, we have substantial anecdotal evidence that laborers supplementing their income[56] do not efficiently factor in the costs of burdens of ownership including capital depreciation and maintenance. For the sake of this series of papers, this phenomenon will be called "cost illusion," and will be defined as a trend in shared mobility drivers to misjudge or ignore altogether the costs of their labor.

Costs are not limited to the misjudgment of expenses either, especially for those who have chosen to make a career of ridehail driving. Because urban landscapes are their primary area of ridehail operation, they are therefore the most lucrative. Unfortunately, revenue is relative in driving for rideshare. Data from a Princeton University study indicated that drivers operating up to fifteen hours a week for Uber's least expensive platform, UberX, earn an hourly average of $16.37. Drivers who more than double their hours of operation, from thirty-five to forty-nine hours a week, on average only earned eighty-seven cents more at $17.24 an hour. At fifty hours per week drivers began to earn less money on average, earning a mean hourly revenue of $16.65.[57]

These averages do not even account for the costs of operation, monetarily and otherwise. For example, one report cites that throughout the nation there are many drivers

[53] By paying lower monthly premiums, consumers lower the potential of future extreme, and possibly untenable, lump sum expenditures.
[54] Depending on barriers to entry and exit, workers should enter or leave employment based on remuneration preferences. Clearly, in practice, salary disbursement is not a simple process.
[55] Money illusion, otherwise known as price illusion, was a concept developed by economist Irving Fisher and popularized John Maynard Keynes.
[56] In a voluntary survey of over one thousand rideshare drivers, 55 percent of drivers claimed that very little to less than half their monthly income comes from ridesharing. Henry Campbell, "The Rideshare Guy 2017 Reader Survey," *The Rideshare Guy* (2017).
[57] Jonathan V. Hall and Alan B. Kruger, "An Analysis of the Labor Market for Uber's Driver-Partners in the United States," *Princeton University* (2015): 18, Table 2.

who "…live near, but not in, expensive cities where they can tap higher fares, ferrying wealthier, white-collar workers to their jobs and out to dinner—but where they can't make enough money to get by, even with longer hours." In other words, space itself becomes a cost of shared mobility driving. In order to maximize their time and income, many drivers mitigate these costs by finding "…supermarket parking lots, airports and hostels where they catch several hours of sleep after taking riders home from bars and before starting the morning commute." Some full-time drivers like Chicagoan Walter Laquian Howard have been relegated to sleeping in local parking lots. It is not uncommon for Howard to spend five nights a week in his car at a local 7-Eleven. After entering Uber's car-lease program, Howard began to work more hours to make his payments. In Howard's words, "I left my job thinking this would work, and it's getting harder and harder. … They have to understand that some of us have decided to make this a full-time career."[58] For drivers who choose to fully commit to driving for ridehail providers, costs can extend beyond monetary concerns. For some, the decentralized ridehail-ideal of running their own business on their own time has become centralized under the control of the platform itself; a practice that seemingly conflicts with the industry's self-image.[59]

The economics of the phenomenon afflicting drivers like Howard harkens back to 1844. Criticizing what he perceived as systemic patterns of alienation in the industrial economy, political economist Karl Marx claimed *Entfremdung* [estrangement] occurs when the natural rights of workers are removed, draining their freedom and the fruits of their labor in the process.[60] Today laborers in the shared mobility market can suffer cost illusion to such an extent as to develop *Entfremdung* [estrangement] from their natural right to enforce the value of their labor or the autonomy of their workmanship.

Changes in the economics of space and theoretical understanding have become so profound as to change the lives of some who enter the mobility market. In the next paper the spatial dynamics of the shared mobility market will be more intimately assessed. For now, glaring questions remain as to the sustainability of the ridehail labor force. Clearly cost illusion is an inefficient socio-economic phenomenon of the shared mobility market. Far from being an immitigable obstacle, however, cost illusion can be viewed as an informational and organizational opportunity to be internalized. True, there are efforts by producers to mitigate the costs of supply altogether with the development of autonomous vehicles (AVs).[61] But at present, it seems clear that the shared mobility market is challenging established economic practices.

To conventional industries like insurance, these challenges fundamentally throw into disorder methodologies that have existed for centuries. Clayton M. Christensen, Harvard Professor of Business Administration and author of the popular *Innovator's Dilemma*, famously coined the term "disruptive innovation" to describe this process.

---

[58] Eric Newcomer and Olivia Zaleski, "When Their Shifts End, Uber Drivers Set Up Camp in Parking Lots Across the US," *Bloomberg*, January 23, 2017. Accessed October 31, 2017. https://tinyurl.com/jgfaepk

[59] Adam Lucher, "Uber to Deny It Is Part of the 'Gig Economy…," *The Independent*, September 25, 2017. Accessed October 31, 2017. https://tinyurl.com/yarz5uyk

[60] R. Arneson, "Marx on Alienated Labor," *University of California San Diego* (2006). http://philosophyfaculty.ucsd.edu/faculty/rarneson/Courses/166alien2006.pdf

[61] This topic will be discussed in greater detail in a later paper in this series.

According to Christensen, the term is used to describe "…a process by which a product or service takes root initially in simple applications at the bottom of a market and then relentlessly moves up market, eventually displacing established competitors."[62] The shared mobility market presents a similar such threat to established industries by shifting the allocation of risk from consumers to suppliers. Although shared mobility has not fully achieved disruption status, established markets should be aware that if expectations continue as they are, disruption may occur. The following model is used to describe the logic behind this assumption.

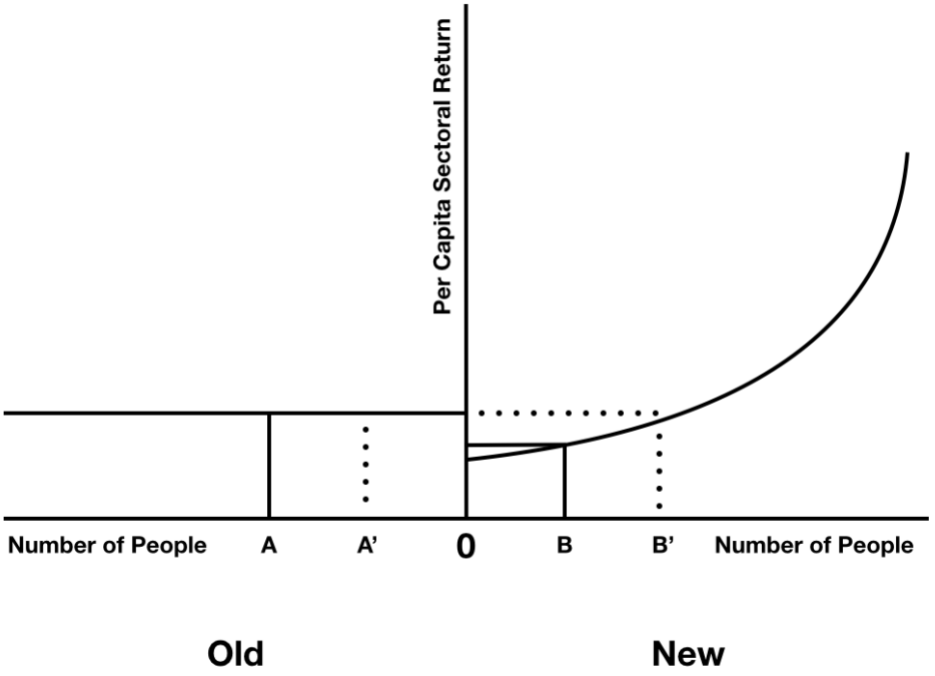

Figure One: History Versus Expectations of Per Capita Capital Use[63]

Figure One represents an illustration of the historical allocation of capital and the effects expectations have on market dynamics. Two canonical markets are represented as the Old and New sectors of a given economy. For convenience, the economy as a whole is comprised solely by these two sectors. Each sector holds a proportion of the total capital $\overline{K}$ in the given economy, where capital is an asset that produces wealth. Let K be the share of capital allocated to the New Sector (i.e. a portion of the whole), and let $\overline{K}$- K be the share of capital allocated to the Old Sector. The total number of people in the economy are also allocated between each market sector. The x-axis represents this allocation. As curves move away from the center y-axis, at point 0 (zero), the number of people in the economy are said to increase. Note that a shift in the allocation of people in

[62] "Key Concepts," Clayton Christensen, November 22, 2013. Accessed October 24, 2017, http://www.claytonchristensen.com/key-concepts/.
[63] This model and all analyses of it come from Dabraj Ray, *Development Economics* (Princeton, NJ: Princeton University Press, 1998).

the economy only alters the *position* of line $\overline{AB}$, not its total length. The y-axis represents the Per Capita Sectoral Returns to Capital. A positive shift in the y-axis signifies the extent that the use of capital yields returns to the sector.

In the Old Sector of the economy, the rate of per capita returns to capital is "normalized" to zero. In other words, the slope of the line in the Old Sector is flat because returns are assumed to be constant relative to the increasing returns the New Sector is believed to provide. The equation for the rate of return to capital use in the New Sector is represented by:

(1) $$r = f(K)$$

where per capita sectoral returns r equals f, a continuous, positively increasing function, and $f(0) < 0 < f(\bar{K})$.

Said another way, the rate of return r of the New Sector is positively contingent upon its historical capital endowment K. Starting below the normalized rate of zero, the return to each individual depends positively on the number of people already existing in that sector. Assuming that each person within this model is allocated one unit of capital, each person can choose to make their capital to either sector.

The sectoral allocation of individuals has been set intentionally in this model. Point A represents a greater historical allocation of people in the Old Sector than in the New Sector despite the fact that, were more to shift to the New market, the economy would theoretically yield greater returns to capital. It is critical to realize then, that this model illustrates the importance of existing capital allocations. Even if an established market, method, or technology is inefficient in contrast to a new market, *the historical allocation of capital use can hinder efficient shifts in the market*.

As an example, consider the historical context of jitney use in America. As more people gained access to automobiles, the rideshare market emerged to oppose the established streetcar market. Jitney use skyrocketed, becoming the fastest adopted mode of transportation in US history. This shift is illustrated by the change from $\overline{AB}$ to $\overline{A'B'}$. As jitney use hit critical mass, represented by point B' on the x-axis, it can be seen that only a slight increase in use would have exceeded the returns to capital provided by the Old market. But, due to rising regulatory costs explained in the paper, critical mass would not be surpassed, and rideshare did not become a major market. This model indicates how close shared mobility was to becoming an established market a century earlier.

The model also indicates another important conclusion about market disruption. Just as historical allocations of capital use matter, so too do the *expectations* of capital use matter. For, even if the allocation of individuals is centered in the Old Sector, when people expect that most others will move to the New Sector, they will shift their capital use to the New Sector as well for its *expected* higher returns. Said explicitly, *expectations of capital returns affect the allocation of current and future capital use*. Because new markets necessarily start below the normalized rate of return 0, realized returns are less impactful than the returns people believe they will achieve. As will be discussed, this is called market speculation, and it fuels market growth and decline. For now, it is enough to realize that if expectations continue on their current path, the shared mobility market will disrupt the market, irrespective of the true level of capital returns provided.

This point is made with one significant caveat, however. For how can we be sure that the expected growth of the market will not be stifled in the same manner as the jitney movement a century before? Indeed, there are no guarantees in the market and to fully investigate potential regulatory responses would take extensive space. In a future paper, these potentialities will be explored. For now, what is certain is that, economically, regulatory measures are a response to current or perceived externalities and market entry problems.[64] And because most economic models contend externalities are a prominent feature of economic growth,[65] it stands to reason that to understand present market growth is to better prepare for current and future regulatory potentialities.

Technology and Macroeconomy

There is no consensus on how to best measure economic growth.[66] What is certain, however, is that growth is an expansion in the ability to produce goods and services by a firm or economy.[67] Traditionally there are four ways of achieving growth: increases in labor force and labor force productivity, increases in available durable capital and natural resources, increases in savings rates and investment, and increases brought about by technological innovation and efficiency.[68] It is to technological change that economists often attribute the greatest expansions in growth. Robert Solow, one of the preeminent economists of the 20th Century, famously estimated that 80 percent of the rise in long-run US per capita income (otherwise known as per capita Gross Domestic Product) was the consequence of technological progress. The remaining 20 percent was due to increased investment in capital.[69] By no coincidence, the growth of the present shared mobility market is intrinsically tied to technological change. In this section, technological change in the shared economy and the macroeconomic conditions which have facilitated investment will be examined.

* * *

In *Technopoly,* a book made famous for its critical take on western society's rate of technological adoption, famed theorist Neil Postman wrote, "Technological change is

[64] Robert Litan, "Regulation." *The Concise Encyclopedia of Economics* (2008)—Library of Economics and Liberty. Accessed October 27, 2017. http://www.econlib.org/library/Enc/Regulation.html.
[65] Peter J. Klenow and Andres Rodriguez-Clare, "Externalities and Growth," *Handbook of Economic Growth* in: Philippe Aghion & Steven Durlauf ed., *Handbook of Economic Growth* 1 (2005): 4.
[66] See Joseph E. Stiglitz, Amartya Kumar Sen, and Jean-Paul Fitoussi, *Mismeasuring Our Lives: Why GDP Doesn't Add Up* (New York, NY: New Press, 2010).
[67] Paul M. Romer, "Economic Growth," *The Concise Encyclopedia of Economics.* David R. Henderson, ed. Liberty Fund, Inc., (2008)—Library of Economics and Liberty. From http://www.econlib.org/library/Enc/EconomicGrowth.html.
[68] For more on inputs to economic growth, see "Solow Growth Model" in Dabraj Ray, *Development Economics* (Princeton, NJ: Princeton University Press, 1998).
[69] Paul Krugman, "The Myth of Asia's Miracle," *Foreign Affairs* 73, no. 6 (Nov/Dec 1994): 62

never additive nor subtractive. It is ecological."[70] No matter the validity of Postman's rhetorical criticisms, socio-economically Postman's assertions are largely accurate. Take, for instance, the rate of technological diffusion in America over the last century.[71] Figure Two illustrates graphically the adoption rate of technological innovation since 1900. Clearly the rate of technological adoption is quickening. Take the telephone: it took decades to penetrate 50 percent of the American populace. By comparison, the cellphone took a fraction that time to diffuse similarly; and this in an America with a population 350 percent greater than in 1900.[72] As a consequence of rapid technological diffusion,[73] firms have had to quicken the pace at which they keep up with market trends.[74] In short, both consumption rates and production rates are accelerating to parallel to technological diffusion. The ecology of the economy is relentlessly transforming.

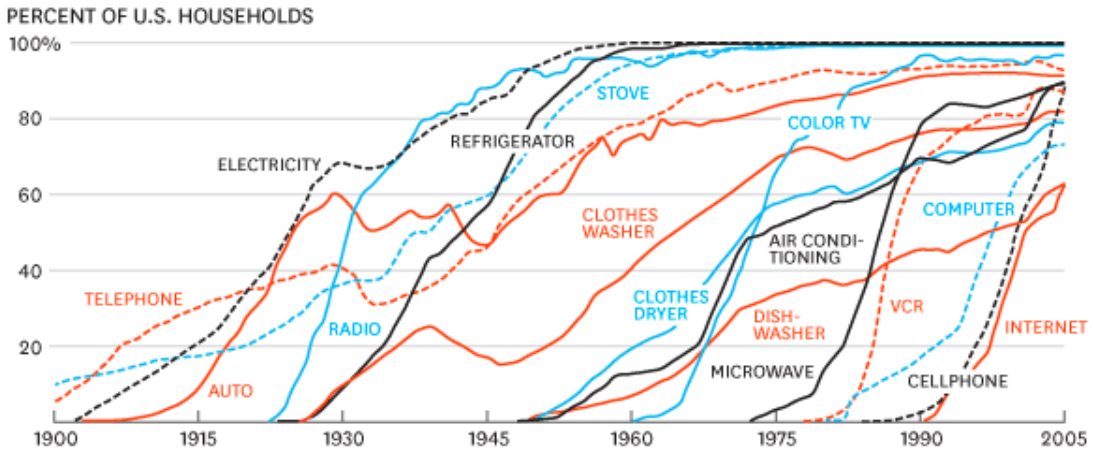

Figure Two: Technological Diffusion in America Over Time[75]

Advancements in the diffusion of cellular technology have been integral in the ecological towards access. The first commercially available cellphone was the Motorola DynaTec 8000x. At two and a half pounds, the phone hit the market in 1983 with the

[70] Neil Postman, *Technopoly: The Surrender of Culture to Technology* (New York: Vintage Books, 1993), 18.
[71] Technological diffusion is the process by which new innovations spread across economies. See: P. L. Stoneman, "Technological Diffusion: The Viewpoint of Economic Theory," *Reader in Economics,* University of Warwick (1985).
[72] Population in America July 1, 1900: 76,094,000. Population in America July 1, 1999: 272,690,813. United States Census Bureau, "Historical National Population Estimates" *Population Division* (2000). https://www.census.gov/population/estimates/nation/popclockest.txt
[73] Or perhaps to fuel this expansion…
[74] Rita Gunther McGrath, "The Pace of Technology Adoption is Speeding Up," *Harvard Business Review*, November 25, 2013. Accessed October 25, 2017. https://hbr.org/2013/11/the-pace-of-technology-adoption-is-speeding-up
[75] Nicholas Felton, Michael Cox, and Richard Alm, "You Are What You Spend," *The New York Times*, February 10, 2008. Accessed October 25, 2017; Rita Gunther McGrath, "The Pace of Technology Adoption is Speeding Up," *Harvard Business Review* (2013).

lofty price tag of $3995.[76] Like most new technology, the debut of mobile phones on the market was prohibitively expensive.[77]

The high cost of new phones can be explained by the concept of economies of scale. When producing new capital, costs to production tend to begin higher, as shown by the long run average cost curve in Figure Three.[78] As more units are produced the average cost per unit produced lowers. Theoretically, firms will produce to an optimally efficient point O^* where the diminishing costs of producing an additional good (their diminishing marginal cost) would begin increase with another unit produced. Average costs are a parabolic function. When firms produce additional goods past the optimal point O^*

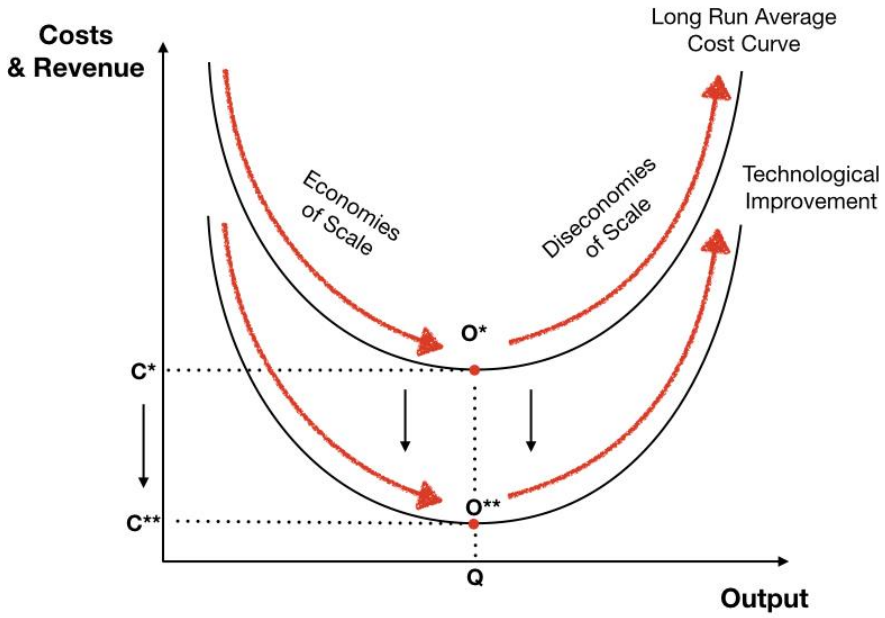

Figure Three: Diagram of (Dis)Economies of Scale

average costs of production begin to increase. This is called diseconomies of scale and it often occurs when businesses grow too large. For this reason, growth and efficiency are intimately related.

[76] $10,082 in 2017 dollars. "CPI Inflation Calculator," Bureau of Labor Statistics, October 25, 2017. bls.gove/data/inflation_calculator.htm.

[77] Mobile phone technology had been invented years earlier. Motorola developed the first truly portable phone was in 1973. Rebecca Greenfield, "You Never Forget Your First Cell Phone," *The Atlantic*, April 3, 2013. Accessed October 25, 2017. https://www.theatlantic.com/technology/archive/2013/04/first-cell-phone/316670/

[78] We are assuming that new capital is not a slight modification to existing processes.

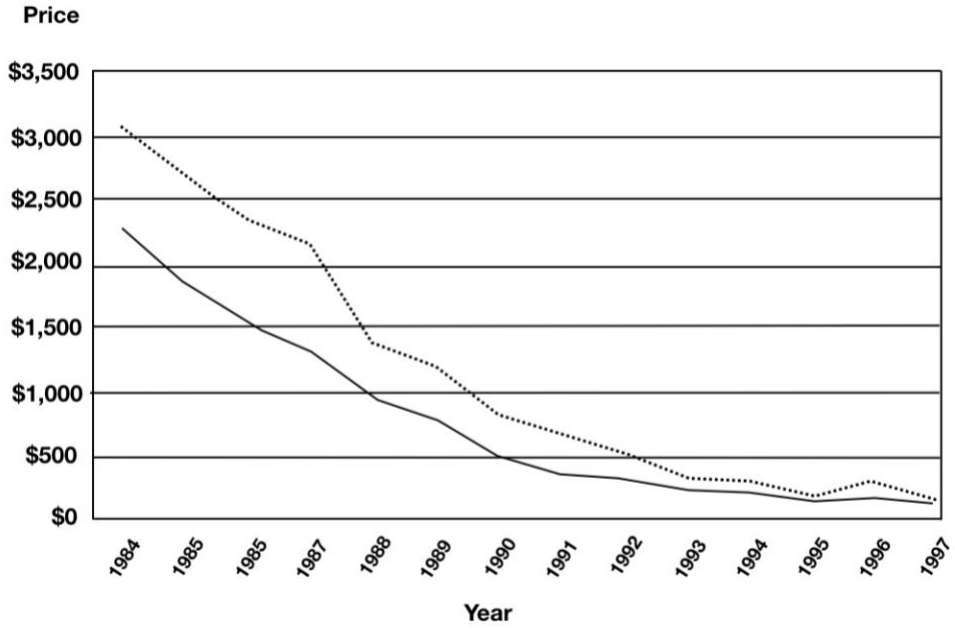

Figure Four: Average Cellphone Prices Over Time (—— Mobile, ------ Portable)[79]

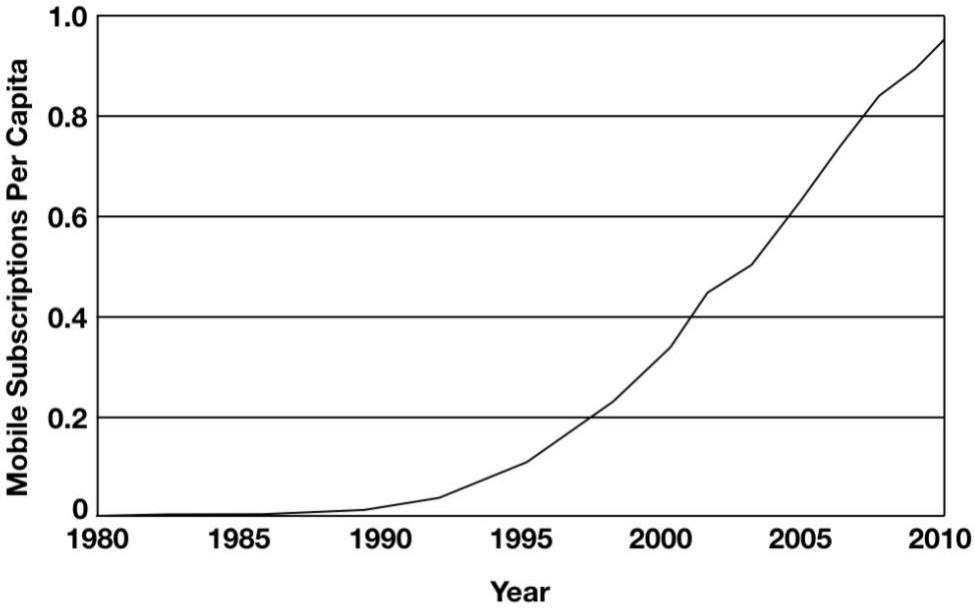

Figure Five: Mobile Phone Subscriptions Per Capita[80]

[79] Graph replicated from Figure 2 in: Jerry Hausman, "Cellular Telephone, New Products and the CPI, *Journal of Business & Economic Statistics* (April 1999): 190

[80] BMJ 2012; 344 doi: https://doi.org/10.1136/bmj.e1147 (Published 08 March 2012)

Fortunately, growth is not solely limited to optimizing production costs. By reducing the number of inputs into a process (labor, time, material), innovations in technology and production processes can reduce costs. Illustrated by the lower curve in the above figure, it was technological improvement, in combination with economies of scale, that made mobile phones accessible to the public. Over a 22-year period, between 1974 and 1996, the price of memory chips declined by 40.9 percent annually—a factor of 221974. By comparison, over this same period, productivity growth in the US economy was two orders of magnitude slower.

The computing technology fueling cellular devices depend on semiconductors—small reactive "chips" made of switch-like transistors acting as quantum gates to electrical currents. The first transistor was invented at Bell Labs in 1947.[81] With every open swing of the transistor gate, computers are signaled and process a one. With every swing close of the transistor gate, computers process the lack of signal as a zero. Together each number, or bit, acts as the language that fuels computers and computing devices like smartphones. In 1959 billions of transistors were bunched together to create the integrated circuit—hardware that could store and manipulate binary signals.

Technological progress was a trend in the semiconductor industry. In 1965 a researcher named Gordon Moore noted this pattern. Like clockwork, every few years a new chip was released that contained two times more transistors than its predecessor. If this trend continued, yearly chip capacity would increase by 35 to 45 percent. Moore, who would found Intel Corporation in 1968, was correct in his prediction. Over the next 40 years this trend, now called Moore's Law, continued.[82] This trend in innovation intimately parallels the reduction in prices, not only in memory chips, but of mobile and portable cellphones, as shown by Figure Four above.

As the data represented in Figure Five suggests, and as any economist would expect, when prices represented in Figure Four lowered mobile phone subscriptions soared.[83] It seems as if Moore's Law held. What Moore did not predict, however, was how mobile phone technology would change the ecology of the economy by reaching into the transportation sector and changing the very notion of mobility.

In 2007 Apple released its first smartphone. Though IBM released a smartphone thirteen years earlier, the difference was marked. With the release of "The App Store" in 2008 the meaning of mobile technology changed all together.[84] The App Store expanded the iPhone's technological capabilities with its user-friendly software hub. With a tap of the finger, consumers could connect to producer services as never before. From mobile banking, to mobile mapping, to mobile shopping, the integration of dynamic software with static hardware began to ameliorate the very limitations of physical existence.

Though their phones were fragile, Apple's App Store itself was malleable enough to allow traditionally rigid markets to provide tractable, scalable service-solutions to an itinerant public. This is not to say that Apple's App Store cornered the mobile market. As

---

[81] Jorgenson (2009): xvi

[82] For more history of the economics of information technology, see: Dale W. Jorgenson, "The Economics of Productivity," 2009

[83] Graph replicated from Figure 1 in: M. P. Little, et al., "Movile Phone Use and Glioma Risk," *The BMJ* (2012): 189. doi: https://doi.org/10.1136/bmj.e1147.

[84] BBC, "World's First 'Smartphone' Celebrates 20 Years," August 15, 2014. http://www.bbc.com/news/technology-28802053

Figure Six shows below, Google's Android software platform began to outperform Apple's iOS since around Q1 2010. Economically speaking, however, Android's market entry and subsequent competition only serves to demonstrate the growth potential of the mobile market instigated by Apple.

Of the many markets that arose from the app-based competitive market of the early 2000s was the ridesharing and ridehailing app. Though Uber became the first American company with a shared mobility app in 2010,[85] it was really two years later in

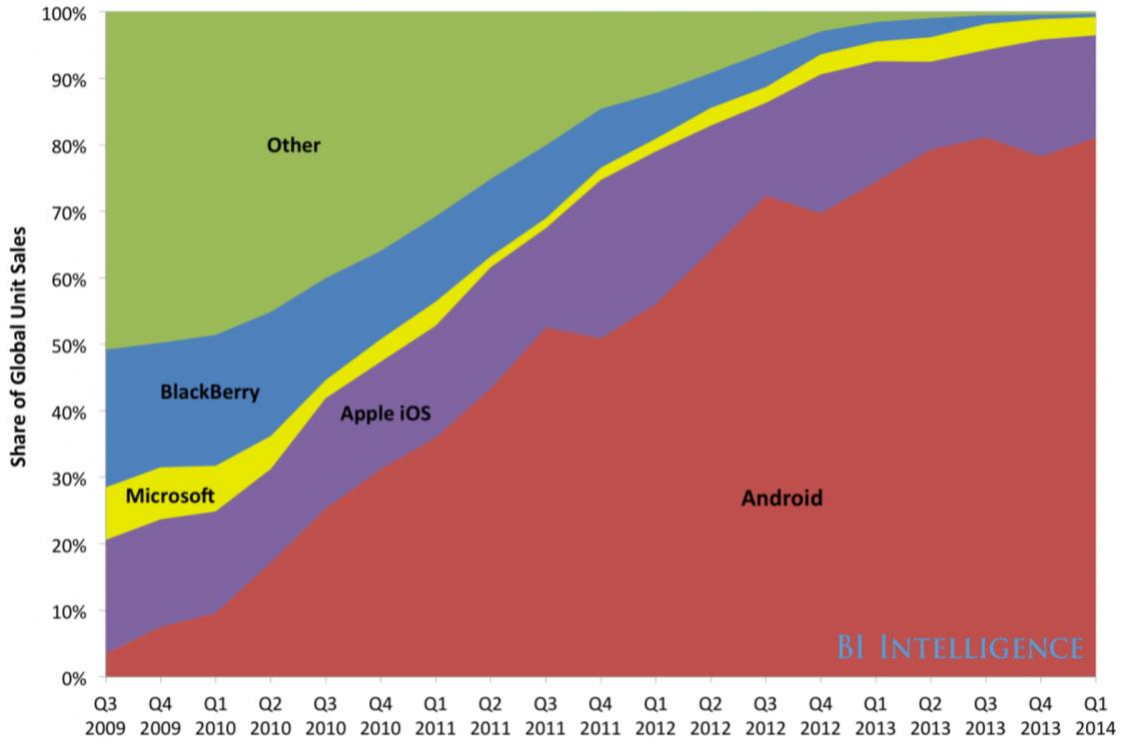

Figure Six: Global Smartphone Market Share by Platform[86]

2012 that real-time ridesharing developed. [87] It was around that time in San Francisco that apps like Lyft and SideCar began to match drivers with riders.[88] Uber was comparatively late to the game. Initially the app was used to hail sleek black sedans at a cost one and a

[85] There are those who would dispute this claim. Whether it was America's first ridehailing app, it was certainly the first major ridehailing success. Nathan McAlone, "This is How Uber Used to Look When it First Started and How It's Changes Over Time," *Business Insider*, February 10, 2016. Accessed October 23, 2017. http://www.businessinsider.com/ubers-design-history-2010-2016-2016-2

[86] Jim Edwards, "The iPhone 6 Had Better Be Amazing and Cheap Because Apple Is Losing the War To Android," *Business Insider* May 13, 2014. Originally published in *IDC*, "Strategy Analytics."

[87]Tomio Geron, "Will Ride-Sharing Apps Replace Car Ownership?," *Forbes*, July 9, 2012. Accessed October 25, 2017. https://www.forbes.com/

[88] ZimRide's Lyft initiative merged into its primary business model around 2011, in 2012 significant competition began to emerge.

half times the price of a taxi.[89] Only in 2012 did Uber's "UberX" debut—its response to the Lyft user-based taxi model. In some areas Uber's prices would be 35 percent lower than its original sedan platform.[90] Uber's practice of charging low prices would attract great controversy, [91] but it also allowed the company to expand its user base significantly. By the end of 2013 alone, Uber's reach would extend to sixty cities and span six continents.[92]

Clearly new life was breathed into the shared mobility market by a wave of "cellular" diffusion. As mobile technology prices lowered, Americans increasingly integrated mobile technology into their lives. Soon advancements in app-based smartphones provided users real-time transportation options. Ownership paradigms centuries old were suddenly challenged.[93] With the expansion of cheap, real-time technology platforms, the inherent limitations of shared mobility were suddenly alleviated.

The market noticed. Since 2009 Uber's market valuation has grown to almost 70 billion dollars.[94] Today, shared mobility adoption is beginning to reflect a market not seen in a century. Factors that allowed shared mobility growth in 1914 such as access to transportation capital mirror the diffusion of cellular technology today. It is also curious to note that the recessionary economy that catalyzed change in 1914 echoes the macroeconomic conditions surrounding the emergence of the ridehail phenomenon. In so many words, the uptake of interest and investment in shared mobility follows similar socio-economic conditions of the past. These conditions demand further scrutiny.

For almost two centuries, the service sector, under which shared mobility falls, has employed a majority of Americans in the United States.[95] As depicted in Figure

---

[89] McAlone (2016).

[90] Alexia Tsotsis, "Uber Opens Up Platform to Non-Limo Vehicles…," *TechCrunch*, July 1, 2012. Accessed October 26, 2017. https://techcrunch.com/2012/07/01/uber-opens-up-platform-to-non-limo-vehicles-with-uber-x-service-will-be-35-less-expensive/.

[91] In 2013, Uber was hit with lawsuits, protests outside its headquarters, among other controversy. See: Ryan Lawler, "See, Uber—This Is What Happens When you Cannibalize Yourself," *TechCrunch*, March 15, 2013. Accessed October 26, 2017. https://techcrunch.com/2013/03/15/see-uber-this-is-what-happens-when-you-cannibalize-yourself/.

[92] Steven Melendez, "How Uber Conquered the World In 2013," *Fast Company*, January 3, 2014. Accessed October 26, 2017. https://www.fastcompany.com/3024236/how-uber-conquered-the-world-in-2013

[93] Certainly, rental and leasing operations had already existed. The difference here was that of the scale of market growth and the challenge it brought to existing consumer expectations and purchasing patterns.

[94] The veracity of this valuation is dubious. There are many issues with the valuation of unique, private market entities. These contentions will likely be addressed in a future paper. Anita Balakrishnan, "There's No Way Uber Is Worth Anything Near 70 Billion, Tech Investor Says," *CNBC*, August 17, 2017. Accessed October 27, 2017. https://www.cnbc.com/2017/08/15/whats-ubers-valuation-not-70-billion-dollars-roger-mcnamee-says.html

[95] Economists typically divide the US economy into three production-based sectors. The primary sector is concerned with the collection or extraction of natural resources. Sometimes referred to as the agricultural sector, it includes all agriculture, forestry, and mining industries. Next is the secondary sector, which processes the inputs of the primary sector and is often referred to as the manufacturing or industrial sector. It includes the manufacturing, construction, and the utilities

Seven, over a 170-year period the closest the manufacturing sector has come to surpassing service sector labor force employment was in the 1880s.[96] Only the agricultural sector has ever provided more jobs to Americans than the services sector, and

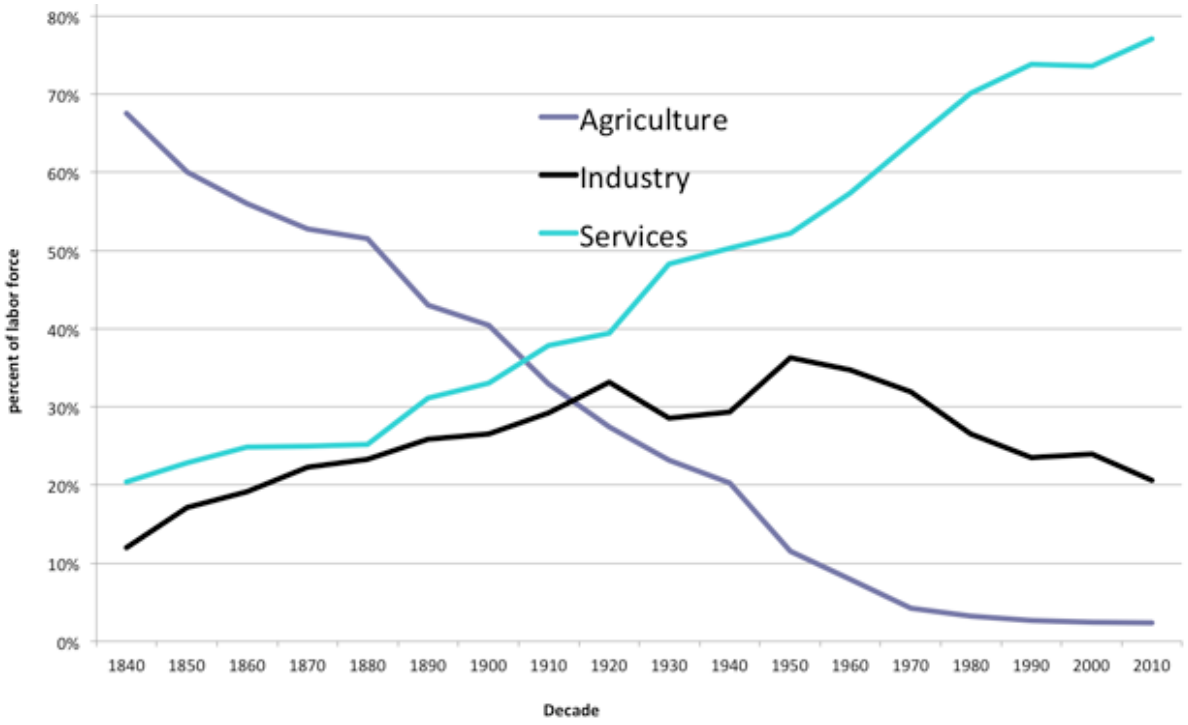

Figure Seven: Distribution of Labor Force by Sector, 1840-2010[97]

this ended around 1905. Almost consistently, employment in the service sector has risen in the American economy. Since the 1950s this trend has become only more profound. Whereas Americans have increasingly found employment in the service industry, the average worker's income followed no such parallel trend. As indicated by the green, orange, and red lines in Figure Eight below, in the last half-century sixty percent of American households have seen their average incomes stagnate. For the top 20 and 5 percent of wage earners, incomes essentially doubled. As wage-growth has slowed, the cost of living has risen. Between 2003 and 2016, the nominal cost of living outpaced

industries. Finally, is the tertiary sector. Better known as the service sector, all production not included in the first two sectors belongs here. See: *Neva R. Goodwin, Macroeconomics in context (Armonk, NY: Sharpe, 2014)*, 8-2; Louis D. Johnston, "History Lessons: Understanding the Decline in Manufacturing," *Minnesota Post* February 22, 2012. Accessed October 25, 2017. https://www.minnpost.com/macro-micro-minnesota/2012/02/history-lessons-understanding-decline-manufacturing

[96] Johnston (2012); Robert E. Gallman and Thomas J. Weiss, "The Service Industries in the Nineteenth Century," *in Production and Productivity in the Service Industries*, ed. Victor R. Fuchs (New York: Columbia University Press (for NBER), 1969): 287-352; John W. Kendrick, Productivity Trends in the United States, (Princeton: Princeton University Press (for NBER), 1961).

[97] Ibid.

income growth.[98] Meanwhile, as Figure Nine indicates below, over that same period household debt soared relative to income. In sum, the average worker has been increasingly service-oriented, has not seen gains to their income, but has amassed more debt. All the while, increasing numbers of people were connected by their phones.

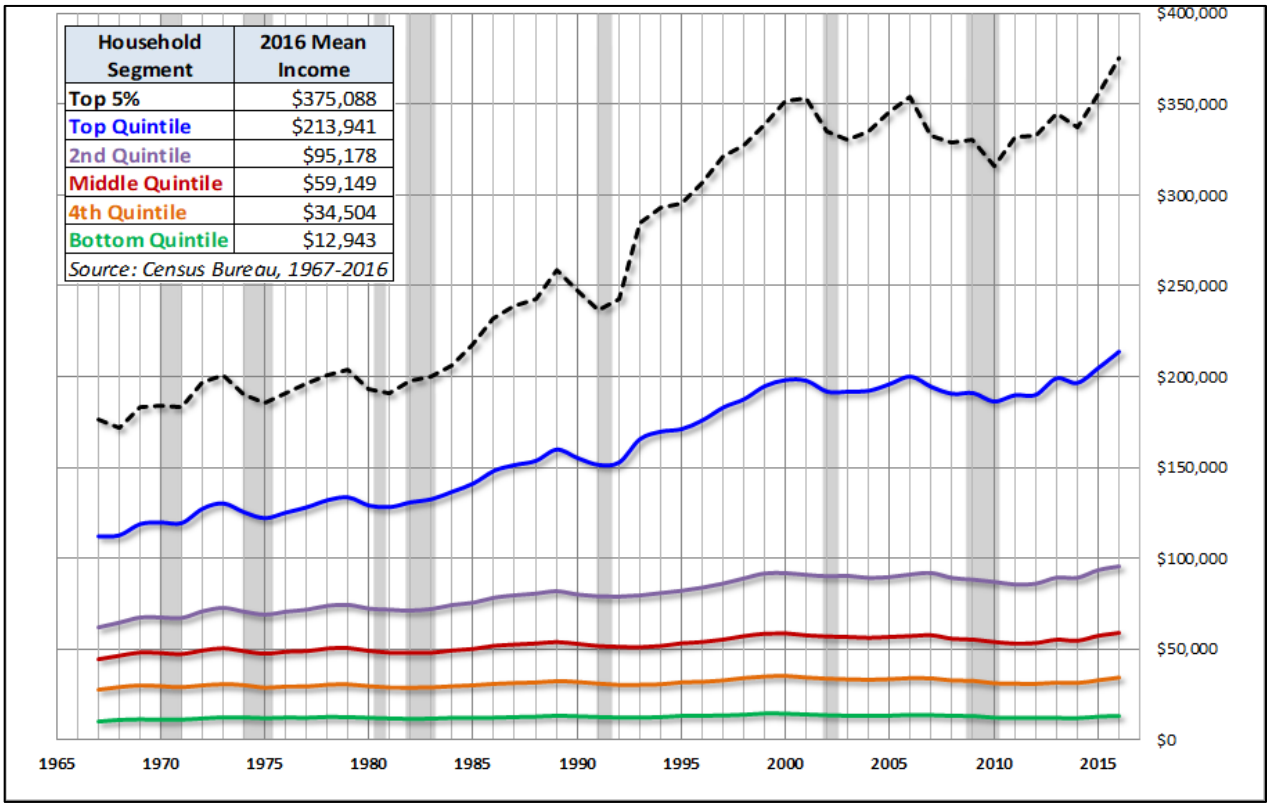

Figure Eight: Real Average Household Income, Quintile and Top Five Percent [99]

Then came the Great Recession. Between 2007 and 2010 an estimated 8.7 million jobs were lost. The employment to population ratio plummeted from 68 to 59 percent. Including part-time workers, the unemployment rate reached almost 17 percent. It would take almost six and a half years for the economy to recover to pre-recession employment levels.[100] But just what kind of employment has this recovery been built on?

[98] Erin El Issa, "2016 American Household Credit Card Debt Study," *NerdWallet*. Accessedd October 28, 2017. https://www.nerdwallet.com/blog/average-credit-card-debt-household/
[99] Jill Mislinski,"U.S. Household Incomes: A 50-Year Perspective," *Advisor Perspectives*, October 8, 2017. Accessed October 20, 2017. https://tinyurl.com/ya6mxzwf
[100] Center on Budget and Policy Priorities, "Chart Book: The Legacy of the Great Recession," *CBPP*, October 20, 2017.

Figure Nine: Real Household Income Versus Household Debt, 2002-2016 [101]

According to data from the Bureau of Labor Statistics, since 2010 the average number of people working multiple jobs has increased almost ten percent. While these numbers could reflect a return to pre-recession conditions, since the number of people who have left the labor force altogether has consistently increased since 2008,[102] one cannot be sure. Over this same period, the number of people employed as drivers in the shared mobility sector increased exponentially, as depicted by Figure Ten. As can be seen, over 100,000 workers had already been participating in informal rideshare networks by the 1990s. Growing steadily through the early 2000s the shared mobility market experienced an admirable increase in the number of independent contractors around 2010. Then a seemingly remarkable and altogether different shift occurred. In an unmistakable burst of participation, in 2013 contractor rates rose steadily from 250,000, rising continually to reach just under 600,000 drivers just two years later. In 2015 alone shared mobility added an estimated 217,000 workers, an increase of 63 percent from the previous year.[103]

[101] Issa (2017).
[102] Bureau of Labor Statistics, "Unadjusted Multiple Jobholders" and "Unadjusted Not Labor Force," *United States Department of Labor* (2017).
[103] Ian Hathaway and Mark Muro "Ridesharing Hits Hypergrowth 2017," *The Brookings Institution*, June 1, 2017. Accessed October 30, 2017. https://www.brookings.edu/blog/the-avenue/2017/06/01/ridesharing-hits-hyper-growth/

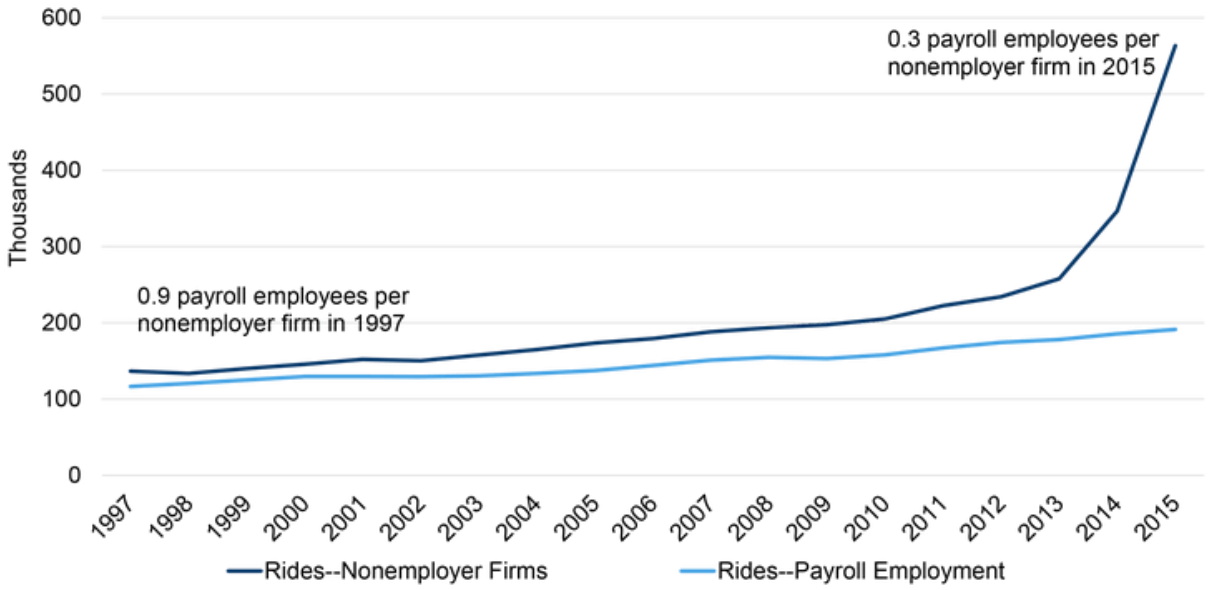

Figure Ten: Non-employer Firms and Employment in Select Passenger Ground Transportation Industries (1997-2015)[104]

Without direct data, we cannot know the true connection between these macroeconomic circumstances. It would be specious to go as far as to claim that the Great Recession was singularly or even primarily responsible for the sudden rise of the shared mobility market. We do know however that the economic conditions fueling the shared mobility revolution are quite similar to the conditions that fueled the jitney movement. Like a century earlier, the economic environment was ripe for the supply of drivers to increase. As debt rose, employment fell, and income stagnated. Despite these market ills technological diffusion only accelerated. And throughout it all the shared mobility market skyrocketed. Of course, it is not helpful to merely point out that these economic circumstances are curious. Thankfully, there are two aspects to the current market that are unique enough to glean fresh insight about current trends. First is the prodigious amount of investment in the market. Second are advancements in the ability to organize the market and internalize costs.

It has been suggested that investors are attracted to the shared mobility market, and this is true. Uber and Lyft, some of the most well-known upshots of the shared mobility movement, have raised an estimated 14.2 billion dollars of private equity between them as of 2017; the vast majority of which belongs to Uber.[105] So extensive has growth become that, according to an analysis of shared mobility labor participation rates by the Brookings Institution, as of 2013 the market has hit so-called "hyper growth."[106]

To business theorist Clayton Christensen, such market change presents a challenge or "innovator's dilemma" to traditional firms in the market. To Christensen,

[104] Ibid.
[105] "Uber," "Lyft," *Crunch Base*, October 20, 2017. Accessed October 24, 2017. https://www.crunchbase.com/organization/uber
[106] Ibid.

such dilemmas occur "when an established market must choose between holding onto an existing market by doing the same thing a bit better, or capturing new markets by embracing new technologies and adopting new business models."[107] Put differently, Old Sectors must weigh whether the lower returns to capital of the New Sector will remain lower, or if they stand to improve with time. In response to this dilemma, Original Equipment Manufacturers (OEMs) like Ford Motor Company and General Motors have begun to invest significant capital into shared mobility projects. Having already released mobility platforms like Maven and Chariot, it is clear OEMs see long-term opportunity in the market.

OEMs are most determined to succeed in the autonomous vehicle (AV) arena. And successful market integration of AV may come sooner than many think.[108] In a September 2017 note to investors, market analyst Rod Lache of Deutsche Bank spoke confidently of AVs, writing, "GM's AV's will be ready for commercial deployment, without human drivers, much sooner than widely expected (within quarters, not years), and potentially years ahead of competitors."[109] Though market exposure clearly lies with fresh brands such as Tesla Motors, [110] the market has been heartened by GM's progress. Raising its rating of GM's stock, Deutsche Bank recently announced plans to buy a great stake in the company to gain access to the AV market.[111]

Whether it is Tesla, GM, Ford, or some other firm that first breaks the AV market, it is significant in itself that capital-rich OEMs have devoted such resources to the market. Private equity investments are one thing, but when established, profit-centric firms begin to enter a new market, this presents a whole other type of cue. To investors, the concentration on AVs by OEMs represents unimaginable opportunity. Some groups are predicting the value of the global AV market at 7 trillion dollars by 2050.[112] Consequently, it is hard for investors to think of shared mobility as anything other than a cash cow

Investor exuberance in the shared mobility market is significant for two reasons. First, clearly the market expects the new shared mobility sector to last well into the future. OEMs entering the market has sent a clear signal that they perceive shared mobility as more than a passing fad. Consequently, substantial capital and technological

---

[107] A.W., "What Disruptive Innovation Means," *The Economist* (2015); "Key Concepts," Clayton Christensen, November 22, 2013. Accessed October 24, 2017. http://www.claytonchristensen.com/key-concepts/

[108] Researchers commonly cite the mid-to-late 2020s for AV diffusion. If innovation trends continue at their current pace, this figure seems conservative.
Todd Litman, "Autonomous Vehicle Implementation Predictions Implications for Transport Planning," *Victoria Transport Policy Institute* (2017)

[109] Parenthetical comments found in original quotation. Tae Kim, "GM, not Tesla, is a better bet on the autonomous vehicle future right now, Deutsche Bank says," *CNBC* (2017) https://www.cnbc.com/2017/09/25/gm-developing-autonomous-vehicles-at-a-fast-pace-deutsche-bank-says.html

[110] According to a 2016 survey by market researchers AlixPartners, consumers most associate with AV innovation with Tesla. AlixPartners, "Global Automotive Outlook," *AlixPartners Summer 2016 Surveys of US Consumers Pre- and Post-Tesla Crash.*

[111] Tae Kim (2017).

[112] Roger Lanctot, "Accelerating the Future: The Economic Impact of the Emerging Passenger Economy," *Strategy Analytics* (2017): 5.

investments are being made to make this future a reality. Second, and perhaps most significantly, such moments of high growth and even high exuberance are when human conceits run most wild. When market exuberance reaches new heights, it is exceedingly important to step back and think critically.

In the mushrooming shared mobility market, it can be difficult to discern short term volatility from long term trends. With billions or even trillions of dollars on the line, many businesses prioritize keeping pace with competitors. To choose this path is tantamount to racing a rudderless boat upon a tempestuous sea of uncertainty. To care solely about the looming visages of vessels on the horizon is to place one's faith in similarly rudderless boats that would like nothing more than to appear as if they understand the sea. Indeed, beyond all reason and evidence to contrary, many businesses in the shared mobility market act as if they truly understand where the market is going, despite sailing at the forefront of *terra incognita* with neither map nor compass. In spite of the lack of comprehensive literature regarding the field of shared economics, many firms follow the pack under the mistaken belief that they are pursuing the market—unaware that they themselves are the market.

The truth of the matter is that the state of the current shared mobility market is labyrinthine, complex, and overcome with exuberance. Firms and consumers alike, enraptured by remarkable market growth and fearful of losing out have plunged headlong into the market. These animal spirits are to be expected. John Maynard Keynes, who knew all too well about market dogma, spoke to this phenomenon back in 1936, writing in *The General Theory of Employment, Interest, and Money*:

> Most, probably, of our decisions to do something positive, the full consequences of which will be drawn out over many days to come, can only be taken as a result of animal spirits—of a spontaneous urge to action rather than inaction, and not as the outcome of a weighted average of quantitative benefits multiplied by quantitative probabilities. Enterprise only pretends to itself to be mainly actuated by the statements in its own prospectus, however candid and sincere. Only a little more than an expedition to the South Pole, it is based on exact calculation of benefits to come. Thus if the animal spirits are dimmed and the spontaneous optimism falters, leaving us to depend on nothing but a mathematical expectation, enterprise will face and die;—though fears of loss may have a basis no more reasonable than hopes of profit had before. … This means, unfortunately, not only that slumps and depressions are exaggerated in degree, but that economic prosperity is excessively dependent on a political and social atmosphere which is congenial to the average business man.[113]

To Keynes, animal spirits, otherwise known as speculation, are the very soul of any market. All growth and decline is the result of speculation, and although many businesses claim to possess well-thought out plans, in practice many are about as substantial as a map to the South Pole. In practice, most firms react to both the winds of today and how they feel the winds will be tomorrow. If the going gets tough, even if the map says one's objective is close, this is not enough to compel them to follow the market. To

[113] Keynes (1997), 161-162.

intemperately malign market exuberance is to levy youthful criticism upon a system without honestly acknowledging its merits. At the same time, to uncritically pursue market trends with no understanding of the economic theory guiding the market is to consign one's fate to chance.

Many in the market are doing just this: investing great capital and assets today into a market that seems as though it will be bigger tomorrow. The same trend of exuberance occurred twice in the last twenty years: first with the Dot-com bubble of the early 2000s, then with the Great Recession of 2007. In both, great speculation raised the prices of assets (websites and real estate respectively) beyond the realized returns these assets actually yielded. Consequently, a great contraction occurred and markets once thought invincible were exposed as fraught with vulnerabilities.[114] Accordingly, an important question arises, is the growth that is occurring in the shared mobility market truly priced correctly? It is difficult to say. In the next paper the conditions of the market will be more technically pursued. For now, it should suffice to overview the extent of our understanding of market demand.

In a first of its kind study,[115] Pew researchers sought to investigate how real-time digital services are "weaving their way into the lives of (some) Americans, raising difficult questions around jobs, regulation, and the potential emergence of a new digital divide."[116] From their data researchers extrapolated that of the 72 percent of American adults who have used some type of real-time service, 15 percent of Americans have used ridehailing applications. Assuming their data are correct, by 2015 just over 37.4 million US adults had engaged in ridehailing use at least once. By comparison, recent estimates by the market research firm Frost and Sullivan dwarf this data. According to a recent report, as of 2016 current rideshare membership reached 51.49 million Americans[117]—6 percent of the US population. Are 37.4 to 51.49 million Americans really using rideshare services? What defines use? For that matter, how do the authors of these studies define rideshare and ridehailing similarly? In truth, the shared mobility market has grown so precipitously over the last decade that few outside academia have managed to remain consistent with their definitions. Without answers to these questions, and with such a dearth of consistent data on market costs and revenues, one is led to believe that many prevailing market valuations are, in actually, undergirded by exuberance. If this is the case, then only a steep reduction in costs will allow for mobility markets to last into the future. Said more clearly, if market exuberance is unrealistically compelling speculation, where market value is unequal to market price, then only by reducing costs can the market be sustained and avoid severe growth contractions. Thankfully, strategies exist to internalize the costs to shared mobility brought about by shifting property regimes.

---

[114] Clearly this is a simplification of nuanced economic events. To this day there is not even consensus on the causes of the Great Depression. Nevertheless, the basic assertions are accurate.
[115] Researchers surveyed a random sample population of 4787 nationally representative U.S. adults living in households. Participants were interviewed from Nov. 24th to Dec. 21st, 2015. The margin sampling error was ± 1.94. For more information, see: Aaron Smith, "Shared, Collaborative, and On Demand: The New Digital Economy," *Pew Research Center* (2016).
[116] Parenthetical comments found in original quotation. Smith (2016): 3.
[117] Global Automotive and Transportation Research Team, "Global Mobility Martket, Strategic Insight 2017," Frost and Sullivan (September 2017): 4.

Mitigating Costs of the Commons

With the expansion of the shared economy, access, as opposed to ownership, has become an increasingly viable option to many utility-sensitive individuals. As property rights have shifted, risk, and therefore cost, has risen for shared mobility firms. As Garrett Hardin showed the world in 1968, this is to be expected.

As indicated earlier, the right to exclude others has been a central tenant of western economic thought and practice for centuries. So powerful was the right to exclude that to many economists, the answer to most social problems could be answered by the installation of democratic capitalism.[118] Then, in 1968, ecologist and philosopher Garrett Hardin provided the world a galling problem. In his infamous article *The Tragedy of the Commons* Hardin illustrated his problem thusly:

> Picture a pasture open to all. It is to be expected that each herdsman will try to keep as many cattle as possible on the commons. Such an arrangement may work reasonably satisfactorily for centuries because tribal wars, poaching, and disease keep the numbers of both man and beast well below the carrying capacity of the land.[119] Finally, however, comes the day of reckoning, that is, the day when the long-desired goal of social stability becomes a reality. At this point, the inherent logic of the commons remorselessly generates tragedy.[120]

By "remorselessly generates tragedy," Hardin means to say this: according to economic theory, if individuals are rational actors they will follow their own self-interest. But to follow one's own self-interest in the commons would entail using the most resources as possible due to its inherent uncertainty. Since rational actors cannot exclude others from using the commons, they cannot know how long the commons will last, and are thus compelled to use the common unsparingly in an act contrary to the common good. Replacing "the commons" with "the Earth," one begins to see the obstacle Hardin presented economists. Certainly, in any other situation a classical economist might claim that public or private property would ameliorate risk. But one cannot easily exclude others from the use of the earth's atmosphere, or its oceans. Hardin's commons problem essentially states commons yield high cost and low rewards.

The shared mobility market essentially operates on the commons, and a recent study exemplifies the results we might expect. In the study, some forty ZipCar users were interviewed about their carsharing habits. The interviews were telling. One driver stated simply, "I really don't care [about the car]. I know that it's a shared car. …people have smoked cigarettes in the car. …I know that it's a communal car, and I know what I'm expecting which is why the cigarette smoke is OK." While another went as far as to admit, "I'll double park a ZipCar real quick…which I wouldn't want to do with my car…I'll parallel a ZipCar in a tighter spot than I would with mine because it's not mine. I'm just not worried about it." [121] With the burdens of ownership largely removed from

[118] Joseph E. Stiglitz, *Globalization and Its Discontents* (New York: W.W. Norton, 2002).
[119] For more on this assertion see Thomas Malthus's *An Essay On the Principle of Population*.
[120] Garrett Hardin, "The Tragedy of the Commons," *Science* 162, no. 3859 (1968): 1244.
[121] Bardhi and Eckhardt, (2012): 888-89.

the driver, shared mobility experiences essentially remove the sense of responsibility individuals have to the capital they use. Reflecting Smith's 1776 example, without a vested ownership interest in capital, economic returns will likely be suboptimal.

The insurance industry has attempted to internalize the costs of the commons by adapting its pricing tactics to phases of responsibility. Initially companies like Lyft have had to wrestle with providing commercial insurance policies to their drivers. Whereas the contention was that they were not employers but platformers, eventually the concept of insurance phases was developed as a cost-compromise, as shown in Figure Eleven.

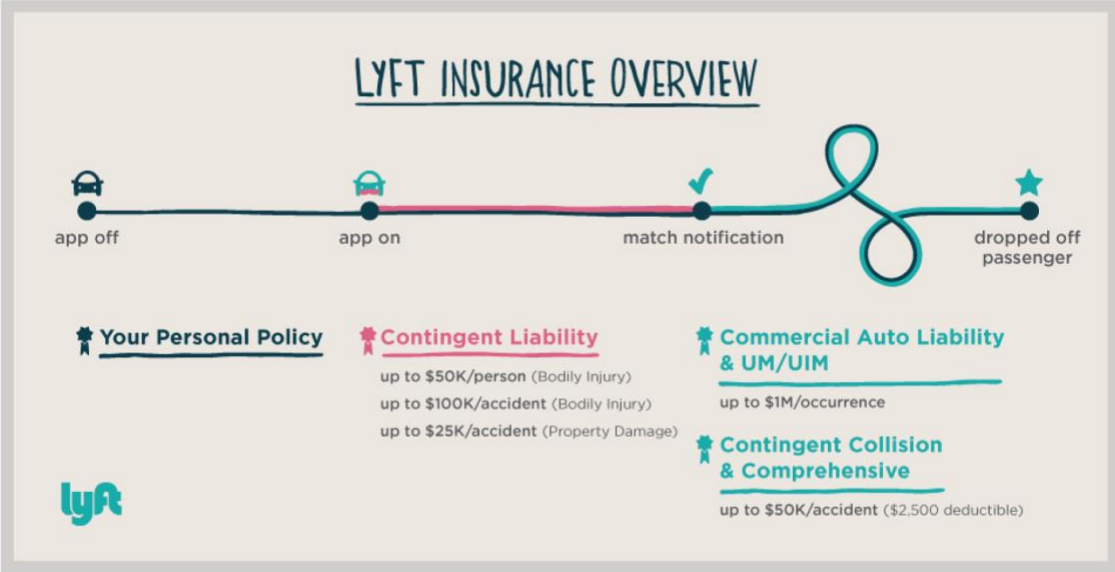

Figure Elven: Lyft Insurance Overview[122]

In phase zero, drivers are subject to personal insurance policies. In phase one, drivers in search of riders are subject to a "contingent liability" plan. In picking up and driving passengers during phase two and three, both are subject to commercial auto liability and contingent collision policies."[123] Such internalization efforts are effective, but not comprehensive. As demonstrated by the ZipCar example, phased insurance coverage only reduces so many costs. Hardin's tragedy still haunts the industry.

Thankfully, a solution was provided to Hardin's problem by political economist Elinor Ostrom. After observing socio-economic instances where commons were not abused, Ostrom abstracted eight rules to "common pool resources." Ostrom's rules, which earned her Nobel Prize in 2009, were as follows: [124]

---

[122] R.J. Lehmann, "Blurred Lines: Insurance Challenges in the Ride-Sharing Market," *R Street Policy Study* 28 (2014): 8

[123] Ibid: 8.

[124] Ostrom is currently the only female to have won the Nobel prize in economics. For more on Ostrom's Eight Rules, see: T. Chow and B. Weeden, "An Introduction to Ostrom's Eight Principles for Sustainable Governance of Common-Pool Resources as a Possible Framework for Sustainable Governance of Space," *Secure World Foundation* (2012).

(1) Clearly define what a resource is and who can (and cannot) use it
(2) Enact reasonable rules that match the needs and conditions of the local socio-economic environment
(3) Ensure that people subject to these rules have the ability to affect their change
(4) Ensure that those outside the commons respect the sovereignty of those inside the commons
(5) Form a community-enforced system for monitoring commons behaviors
(6) Employ graduated fines or sanctions for rule breaking
(7) Develop cheap, accessible means for dispute resolution
(8) Instill a sense of responsibility to governing the commons

Just as the four rules of property rights must all exist in order for private ownership to be efficient, so too must these rules exist according to Ostrom for the costs of common ownership to be efficiently internalized.

Theoretically, whosoever is able to create and provide systems that fulfill these eight rules of governing the commons will be able to best internalize the costs of shared mobility operation. According to Demsetz, "The most important effect of alterations in institutional arrangements may well be the impact of such reorganizations on the cost of transacting." By reorganizing the very structure of shared mobility such that the risks to access-based ownership are reduced, it is possible that costs will decline, and expectations and investments will form a sustainable mobility market. In this concluding section, the insights of this paper will be reviewed, and some practical applications to Ostrom's eight rules will be provided.

Conclusion

The shared mobility market has reached unprecedented growth. Backed by billions of dollars in private equity investment following Keynesian animal spirits, the potential value of the mobility market is estimated in the trillions of dollars. Barring significant external changes, these investments themselves are set to propel market expectations towards the shared mobility Businesses throughout the United States have been affected by this change. Many established industries face existential and palpable destruction if they do not adapt. Though businesses have for some time tried to keep pace with rapid technological changes, the shared economy has presented new market dynamics that many firms could not have been prepared for.

The shared economy calls into question property rights regimes that have existed for centuries. Inherent to this change is looming, untenable risk heretofore not prevalent in western economies. Since Locke first argued for the individual's natural right to property ownership, western economies began to adopt these sentiments. With Smith's treatise on the social science behind property rights, individual ownership was all but assured. Today consumers are abandoning typical ownership structures for cheaper, and less user-risky property regimes. Four property rights, the right to use a good, the right to retain the return yielded from the usage of a good, the right to convert the form and structure of a good, and the right to transfer one of more of these property rights to other persons, are being divvied between supplier and demander. Whereas the right to convert goods and transfer rights remain with supplier, users still maintain the right to use and

benefit from capital. With this new reality arises a new, almost untraditional relationship between user and capital. Typical property-user bonds are severed, and therefore users no longer feel great responsibility for the treatment of capital. This levies higher costs on the supplier of shared capital. Property-laborer bonds are changing as well through cost illusion. Some drivers are so ill-prepared to enter the market that they have become estranged [*Entfremdung*] from their natural right of labor ownership. Only through the internalization of risk can these costs be lowered.

This is where firms such as Arity comes in. By internalizing the costs of the commons, providing services to mitigate cost illusion and *Entfremdung*, and perhaps even developing a new concept comparable to insurable interest for the modern market, Arity can encourage market entrance and the future profitability of shared mobility. Fortunately, political economist Elinor Ostrom developed eight solutions that together, like the concept of exclusivity, mitigate risk and costs. Some rules, such as rule one, "clearly define what a resource is and who can (and cannot) use it," seem relatively simple in theory, but can be difficult in practice. For instance, is not risk raised in car sharing schemes when individuals allow non-subscribed people to drive cars? Certain monitoring systems must be developed to ensure that risk is ameliorated. But to do so, argues Ostrom, users must believe in monitoring, and have a means of influencing the rules place on them. If buy-in is unsustainable, shared capital is likely put at risk. Harder still are rules like number eight, "instill a sense of responsibility to governing common ownership." Such a rule is more difficult to achieve. But with advances in data analysis, perhaps personalized, consumer-based solutions are now attainable. If Arity can develop locally appropriate governance systems, for instance, they may generate greater user-input for carsharing schemes decreasing insurance and liability costs in the process. Such pursuits should become Arity's long-run objectives. While so many other firms are simply attempting to keep pace with the market, plans to systematic efforts to internalize market volatility are sure to be met with interest.

In the next paper in this series, the present market will be analyzed further. First, macroeconomic trends in interest and inflationary rates will be used to assess the growth sustainability of the shared mobility market. As has been mentioned briefly, speculative bubbles have formed from exuberant investments of the past. It is therefore crucial to assess the similarities of the current market. On the supply side of the market, wage-leisure ratios will be explored in addition to competitor responses to the emergence of shared mobility. On the demand side of the market, spatial and sociological economics will be used to assess consumer trends. Finally, current regulatory responses to market growth, including a closer look at insurance approaches to mobility will be reviewed to gain a wider understanding of current sentiments towards shared mobility. Throughout it all, insights gained through the assessment of property rights will be used to better understand market dynamics.