The Economics of Shared Mobility Series

The Past

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# The Economic History of Rideshare

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## 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.

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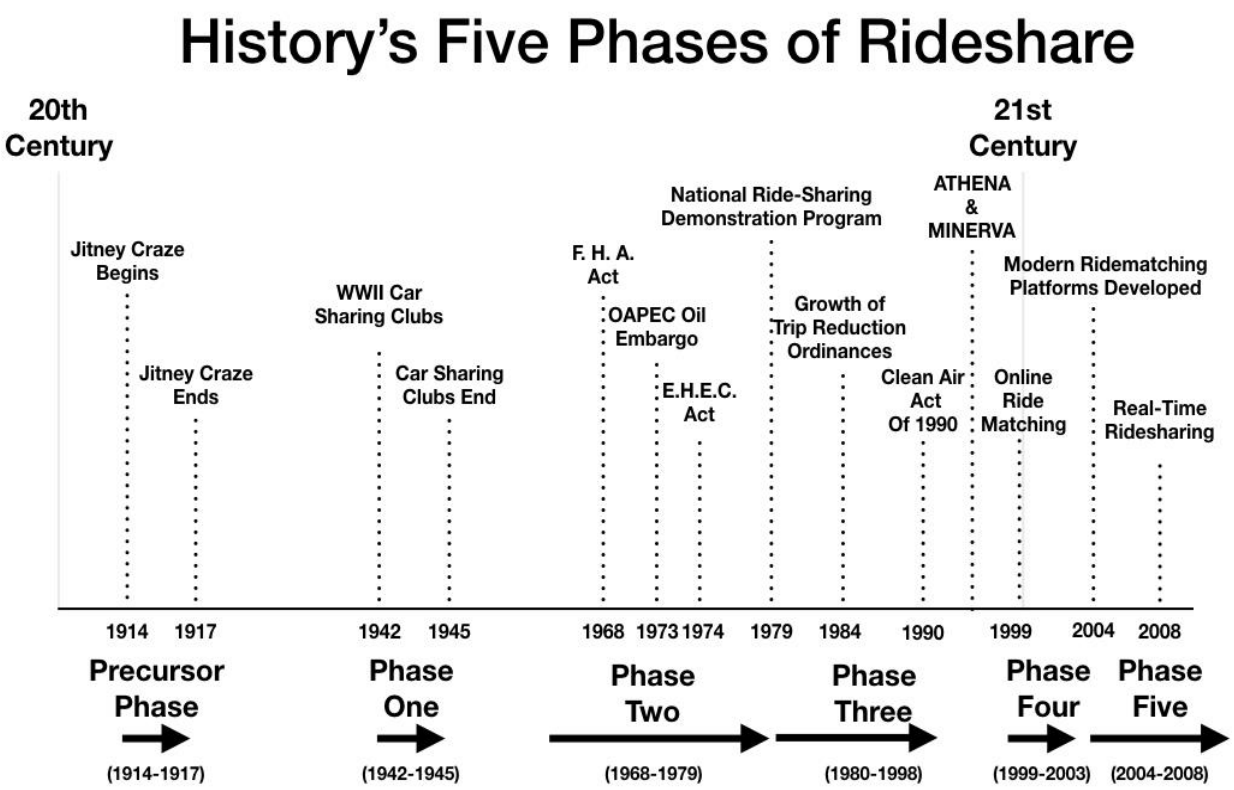
[1] Dale W. Jorgenson, *The Economics of Productivity* (Cheltenham: Elgar, 2009), 173.




Introduction

It may come as a surprise to learn that the practice of ridesharing has existed for over a century in the United States. Since the early 1900s, entrepreneurial drivers with spare time and capital have formed informal share-economies that at times have grown to challenge even the most established transportation providers. Historically perceived as a paragon of American utilitarianism, the rideshare phenomenon has typically operated as an arrangement between passenger and driver in which the driver provides a vehicle for passenger use in exchange for some fee.

Until today, rideshare use had only once reached a "critical mass" of demand capable of sustaining its market. No longer the case, as of 2017 the annual revenue in the American rideshare market is estimated to be around 11 billion dollars. Showing no signs of slowing down, the US rideshare market is expected to grow by 19.2 percent annually.[1] Despite the auspicious predictions analysts hold for the rideshare market, it is worth mentioning that unrestrained growth has crippled the rideshare market in the past.

Typically speaking, informal rideshare markets have emerged to internalize negative externalities—to fulfill market inefficiencies within metropolitan transportation networks. By the very nature of their informality, these markets have had little centralized organization. Instead, low barriers to market entry and exit have allowed underemployed and unemployed individuals looking to supplement their incomes to engage the market at will. Paradoxically, throughout the decades low market barriers have acted to both stimulate and inhibit market growth by encouraging driver supply during bear markets, and discouraging driver supply during bull markets.

If the rideshare market is to continue on its path to growth it will need to overcome the organizational constraints inherent to its nature. Technological innovations and software platforms have certainly worked to ameliorate some of these issues by providing real-time demand capabilities to rideshare users. But significant historical threats that are thematic to the market remain unaddressed and are likely underappreciated due to the animal spirits propelling current rideshare growth. These threats include uncertainty due to technological innovation, shifts in consumer preferences, economic fluctuations such as changes in gas prices, unemployment rates, and endogenous incomes, and over-zealous or unsupportive government regulation and policies.

Great opportunity exists to those organizations that examine the economic history of ridesharing and work to address these issues, which are bound to arise as the market continues to grow. The company that finds most success in the rideshare market will likely operate as an organizational nucleus to the rideshare market: it will understand the DNA of the market—its information—and use it to encourage fluid market dynamics; it will create institutional arrangements that foster reliable rideshare supply; it will work transparently with or around government entities to demonstrate both consumer and environmental benefits; and, it will work to maintain positive market exposure. To achieve these goals, however, the economic history of the rideshare market must be illustrated.

Time has been broken down into six distinct phases to explain the history of rideshare. The first phase, said to be a precursor to the ridesharing phenomenon, occurs between 1914 and 1917. Perhaps most closely resembling the ridesharing market of today, many lessons can be gleaned from this period. The next five phases occur with varying popularity between 1942 and 2008. Though arbitrary in nature, these phases serve to better illustrate fluctuations in rideshare's market exposure over time. Fundamentally, it is assumed that by tracing the economic history of rideshare through its five phases, Arity should gain better understanding the market of today, and what obstacles and opportunities may occur in the future.

## Precursor Phase: The Jitney Movement of 1914-1917

To understand the context of the Jitney Movement, one must understand the economic principles behind its emergence. Though difficult to pinpoint, ridesharing operations of the past can be thought of as residing within the informal sector of the macro-economy. Distinguishable by its existence outside of, and resistance to, regulated markets, ridesharing is emblematic of any informal activity in that its labor supply has typically been comprised of individuals looking to supplement their incomes. For over a century, this has left the supply-side of the ridesharing market extraordinarily sensitive to economic fluctuations. As wages increase in the lower-rungs of the formal economy, for instance, informal economies and those who operate within them are likely to diminish in size and participation. Consequently, informal markets are difficult to rely upon.

Meanwhile, the demand-side of the informal economy is comprised of utility-elastic individuals—individuals who value time, price, and convenience so much as to engage in informal and unregulated economic activities such as ridesharing.

Economically, the demand-side of the informal economy is a symptomatic representation of value inefficiencies that pervade existing markets.

When informal economies grow to challenge formal economic structures, governments typically react through regulatory measures. Due to lack of regulation, informal economies tend not to contribute to tax revenues, thus drawing the ire of government entities. Informal markets also compete with existing firms, usually to an unfair price advantage. They also often pose public health and safety hazards. Above all, informal economies are defined by their systemic disorganization. By definition, then, as informal economies garner greater market value and public exposure, they are more likely to fail or to be regulated into formality. In the case of the Jitney Movement of the early 1900s, failure quickly became an economic inevitability.

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The emergence of the rideshare phenomenon began July 1st, 1914 in Los Angeles, California on an otherwise inconspicuous summers day.[2] As the story goes, that day a Mr. L. P. Draper was driving along the streets of Los Angeles in his Ford Model T, the time's most ubiquitous and utilitarian automobile,[3] when he was compelled to pull over and pick up a stranger on the side of the road. After agreeing to transport his new passenger a short distance down the road, Mr. Draper was duly paid five cents for his services.[4] Colloquially referred to as a "jitney," those five cents and the impromptu ride that inspired their payment would soon usher in a brief, but meteoric national trend in informal shared transportation. The opportunities and obstacles the jitney phenomenon elicited would establish a precedent for rideshare's undulating popularity throughout the 20th Century.

The birth of the Jitney Movement was a natural extension of the precarious economic prospects of the time. By the end of 1914, an estimated one million workers had been laid off or remained unemployed in the United States.[5] Holding the brunt of these numbers was the West Coast's labor force. According to the Bureau of Labor Statistics, the highest concentration of unemployment lay in the country's western metropolitan areas, with mid-year joblessness rates ranging from 11 percent in Los Angeles to 20 percent in Seattle.[6]

For those who were lucky enough to maintain employment, the streetcar was their likeliest mode of transportation to work. By the turn of the 20th Century, the average worker living in a city of 10,000 or more people rode public transportation 252 times per year.[7] With city populations swelling, complaints of overcrowded and inefficient streetcars ran rampant. Compounding the issue was the lack of competition the streetcar faced. From 1887 to 1914, streetcars held a monopoly status in America's cities in what would be called the "Golden Age of the Electric Streetcar".[8] With no one to hold them accountable for the quality of their industry, streetcar operators often took a "take-it-or-leave-it" approach towards passengers. Consequently, the working public, already skeptical of trusts, fostered widespread resentment against the streetcar operations they had no choice but to use.[9]

With public sentiment towards streetcars at its nadir and unemployment on the rise, the stage was set for a transportation revolution to occur. All that was required to catalyze this change was the necessary capital. Indeed, what might have been an

immitigable state of affairs at any other time was rendered malleable thanks to the car production revolution Henry Ford began six years earlier.

In 1908, Henry Ford's Rogue River production plant began producing what would become the world's most popular car. A car built for "the great multitude," Ford's Model T found great commercial success thanks in large part to the adoption of moving assembly lines at his plants.[10] As production efficiency increased, the price of Ford's cars dropped precipitously. Between its induction in 1908 and the end of its production in 1927, the price of the Model T dropped steadily from $850 to $250 per car. Selling only 5896 Model T's its first year, by 1916 the car sold a record 377,036 models.[11]

And so it was that by the year 1914 the world's first market for rideshare would develop. Demand took the form of the average metropolitan worker, disenfranchised by the streetcar trusts, while the unemployed and underpaid composed the supply. As for the capital necessary to catalyze this new phenomenon, though most Americans remained carless through the auto-boom years of the 1910s,[12] levels of auto ownership swelled nationally thanks to the low price of the Model T. Factor in the easy manner with which cars could be procured for jitney service—it was not unheard of for cars to be acquired through trade, credit, and the mortgaging of one's house—and it becomes clear how the economic landscape of the early 20th Century allowed for the development of rideshare.[13]

There was no science to the jitney operation. Drivers would simply place a "jitney" sign upon their windshield and shadow streetcar routes in pursuit of customers. For price-sensitive customers in recession-era 1914, the prospect of taking a jitney ride was favorable. Not only were jitney rides cheap, they also operated more efficiently than streetcars, often slashing travel times in half for commuters.[14]

The significance of the movement's novelty should not be overlooked either. Most commuters had never been inside an automobile before, and many desired to feel the rush of riding "on rubber and air." According to one magazine of the time, "most folks helped pay for our paved city streets…and the jitney gives them a chance as nothing else ever did" to ride on them.[15] Put another way, the Jitney Movement was largely perceived to embody the most democratic ideals of the country. Fundamentalists went as far as to call the phenomenon a "new phase in the old struggle between class and mass," while others claimed the movement ushered in "a new page in the history of locomotion when convenience and economy come together for the first time."[16]

Media outlets were critical to the growth of the movement and were quick to capitalize on these sentiments. Illustrated as a battle between an underdog in the jitney and a titan in the streetcar trusts, outlets made the movement front-page news throughout the country.[17] Strengthened by its popularity, the growth of the movement became so rapid that by April 1915 the jitney reached Portland, Maine, cementing its nationwide exposure.[18] So popular was this grassroots movement that, despite lasting only three years, jitney-based travel became the fastest adopted mode of public transportation in the nation's history.[19]

The successes of the movement, however momentous, were nevertheless short-lived. From the onset, many doubted the sustainability of the movement. As inspirational as its rise was, observers of the time correctly predicted that the streetcar interests would likely use their political clout to stimulate regulatory obstacles that would inhibit the movement's growth.[20] Governments had an incentive to regulate the movement, too. Whereas streetcars operations were subject to taxation, jitney-based travel was not.

Consequently, many localities throughout the nation suffered major declines in tax revenue.[21] Compounding the obstacles the movement faced were the safety concerns increasingly voiced by the nation's media outlets.[22]

By July 1915, the anniversary of the movement's inception, it became clear that public opinion had officially turned. Twenty-seven municipalities had already imposed burdensome liability costs to all jitney drivers. Drivers were compelled to post up to 10,000 dollars in liability insurance, biting into 25 to 50 percent of driver's annual earnings. Of the 62,000 jitney drivers in operation in 1915, 21,000 had ceased operations by the following year. By 1918, the number of jitney drivers dwindled to a mere 6,000.[23]

In spite of its brief life, embedded within the jitney phenomenon were socio-economic patterns similar to those that influence the rideshare market today. The adoption of rideshare has historically been rooted in the fulfillment of unmet market needs. Individuals looking to supplement their income often possessed an excess of time and capital that they were willing expend through the chartering of time-sensitive consumers. For their part, consumers opting into jitney-based travel were often forgoing the inefficiencies that plagued their regular travel network. All things being equal, travel-by-jitney was an economic substitution to consumers otherwise limited in their options. Consumer preferences and media sentiments also held great sway in the success and failure in the growth of the rideshare market. The novelty of the car, and the meaning behind its use, fomented the jitney's greater usage. Critical too was the interplay between excessive regulatory policy and the concerted lobbying efforts by competing market interests. If anything is to be learned from the jitney phenomenon, it should be these obstacles and opportunities underlying the rideshare market.

## The Five Phases of Rideshare

As jitney-use reached its zenith, it would take almost a century of technological and socio-economic progress for the rideshare phenomenon to reach a similar level of popularity in the United States. Over the course of the proceeding decades, political, economic, and environmental factors would be highly influential in the rise and fall of the public's engagement in rideshare. Whereas the sentiments and practices of the jitney-era best resemble today's rideshare economy, the factors that affected the rideshare market between 1940 and 2008 hold important lessons for the future of rideshare.

The rideshare practices of the mid-20$^{th}$ and early 21$^{st}$ centuries were both fluid and ephemeral. As time progressed, governments, industries, and the traveling public continually experimented with novel transportation methods in hopes of saving time, resources, money, and the planet. These different approaches to rideshare will be broken down into five roughly estimated "phases."

Phase One spanned between 1942 and 1945. During this period, resource conservation efforts by the federal government were a key driver of rideshare adoption. Twenty years later, Phase Two lasted between the late 1960s until 1980. During this period, the public's rising demand for energy ground sharply against the market's inability to supply it. Consequently, the federal government working in tandem with large employers began to encourage the public to adopt rideshare practices. Between 1980 and 1998 energy prices decreased, leading to increases in road congestion and worsening air quality. In Phase Three, the government grappled with ways to best mediate these issues.

In the process, they developed ATHENA and MINERVA, the first rideshare platforms to integrate mobile geographic information system (GIS) technologies and banking into rideshare. Phase Four covers a period of about four years, between 1999 and 2003, when firms built the first internet-driven Ridesharing platforms. Finally, in Phase Five demand for Ridesharing begins its ascent into modernity between 2004 and 2008 with the advent of the smartphone and real-time communication.

Phase One: WWII Carsharing Programs (1942-1945)

The rideshare market of the 1940s looked nothing like the Jitney Movement of the early 1900s. Unlike its predecessor, which was damaged by government regulation, demand for ridesharing in the 1940s was stimulated and organized by government policy. And, whereas regulatory measures to encourage rideshare use would largely fail in the 1980s, consumer preferences during the 1940s were such that the public was prepared to acquiesce socially and economically to rideshare use. This context, in which auto-ownership models and public transportation usage shifts, is notable in the history of rideshare and deserves further exploration.

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Though no one event can be said to have fomented rideshare's slow rise to prominence, the Great Depression served this purpose well. Starting in 1929 and lasting until 1941, the economic stagnation wrought by this period helped to foster an ethos of frugality and resource conservation in the American public. It was in this environment of parsimony that the United States was thrust into war on December 7th, 1941 with the attack on Pearl Harbor. The US military, in preparation for war, now required a great influx of resources to build tanks, planes, boats, and gear. Consequently, inputs that normally flowed into the free market were channeled into the war effort. The American public, already accustomed to limitation, was now asked by their government to sacrifice more.

The stage was already being set for the rebirth of the sharing economy eight months before the Japanese attacked. On April 11th, 1941 President Franklin D. Roosevelt established the Office of Price Administration and Civilian Supply (OPACS) by executive order. Charged with the oversight of nonagricultural commodities, the express purpose of OPACS (later simply OPA) was to set price controls on vital American goods. Upon entering the war, the role of the OPA would expand to the rationing of these goods.[24]

By January 1942, the OPA had begun its campaign of rationing. Any good containing useful inputs was vulnerable to sanction. Tires, automobiles, and gasoline were among the first goods rationed for the war effort. Of these goods, tires and the rubber they contained were deemed vital commodities. Signs such as those displayed in Figure One became prominent features of propaganda and education in American society. Rubber, the government explained, was critical to the formation of boats, masks, tanks, and planes.


Figure One: US War Production Board, "America Needs Your Scrap Rubber," 1942.[25]

So important was rubber that the rationing set in place by the OPA in 1942 was deemed insufficient. That same year, the US government began to regulate everything from workplaces to neighborhoods. One US regulation stipulated that, in cases where no other means of transportation was available to workers, ridesharing arrangements must be made.[26] To complement these efforts, the US Office of Civilian Defense (OCD) formed the first organized ridesharing networks to reduce gasoline consumption and tire use. Exhorting the citizens to "Share and Spare Your Car," the OCD promoted Car Sharing Clubs and Self-Dispatching Systems throughout the country as seen by Figure Two. Explaining how Self-Dispatching Systems work, one government missive described the ridesharing process expected of US workers, saying:

> When an individual comes to any one of the Exchanges where a Self-Dispatching System is in operation he fills out the proper request card asking either for a ride or for passengers. The card is then placed on the proper board in the space numbered to correspond to the zone in which the person lives. … All ride-sharing arrangements are made by the individuals themselves. If a fee is to be paid for a regular ride to and from work, the amount of such fee is agreed upon in negotiations between the driver and rider.[27]

Cumbersome as it may have been to visit exchanges, write on cards, and hope for the best, at the time this was the most organized and efficient means of mutual transportation yet available. Such operations, moreover, were socially encouraged.

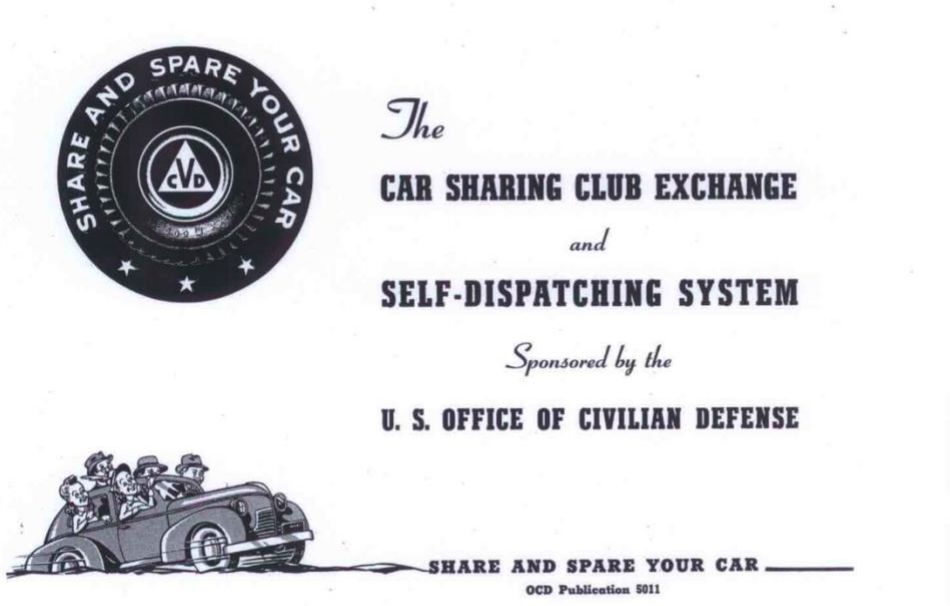


Figure Two: Office of Civilian Defense, "Share and Spare Your Car", 1942.[28]

No less than the Director of the OCD, James Landis, entreated local defense councils and neighborhood groups to participate in ridesharing programs, writing in one letter, "We certainly must keep a steady supply of rubber going into the production of life-rafts, tank linings, and gas masks, as well as tires for jeeps, army trucks, and Fly Fortresses. …This supply…is on the wheels of 27 million automobiles, the largest stockpile of rubber in the world. Every American with a set of tires is a custodian of this rubber supply."[29] As illustrated by Figure Three, Director Landis' efforts were reflective of a systemic push by the federal government to promote ridesharing through social engineering.

By 1945, the United States had surmounted its economic downturn and won the war against the Axis powers. Federal rationing was lifted, and offices such as the OPA and OCD were officially dissolved. The era of belt tightening and thriftiness was officially over in America. With it went any predisposition Americans might have had for resource conservation efforts such as the rideshare phenomenon of 1942-1945.


Figure Three: Office for Emergency Management, "When You Ride Alone, You Ride With Hitler," 1943.[30]

Phase Two: Energy Crisis and Regulation (Late 1960s - 1980)

The economic landscape that defined the rideshare market of the 1970s shared similarities to that which defined the market of the 1940s. Just as resource limitations encouraged rationing by the US government, rising resource demands allowed oil-exporting companies of the Middle East to establish an effective retaliatory oil embargo in 1973. As gas prices rose steeply, so did demand for rideshare. The economic backdrop of the 1970s serves to illustrate the sensitive interplay at work between personal mobility models and shared mobility models.

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Conservation efforts would tick up once again in late 1960s America. After sustaining a generation of economic growth post World War Two, the resource demands of American citizens had ballooned. As indicated by Figure Four, between 1950 and 1960 energy demand had more than doubled nationwide, from almost 350 billion-kilowatt-hours to over 750 billion-kilowatt-hours generated. In ten years time, energy demand would double once more, increasing to just over 1500 billion-kilowatt-hours by 1970. America's energy suppliers began to feel the crunch. Until 1968 American oil producers were able to meet 80 percent of the nation's demand. But at a yearly growth rate of 7 percent, domestic producers soon found themselves unable to keep pace with

demand.[31] As a consequence, the American market was forced to increase the importation of foreign oil, as indicated by Figure Five.

The era's growth in consumption could be explained in part by the low price of oil and the weakness of the American dollar. From 1958 until 1970, oil prices had remained largely stable at $3 per barrel. When adjusted for inflation, however, the price of crude oil actually declined in this period from $15 to $12 per barrel, in 2006 dollars. Factor in the weakness of the US dollar in 1971 and 1972, and the growth in oil consumption becomes clearer.[32] Indeed, between 1970 and 1973 alone, US oil demand grew from 2.5 million barrels per day to 6.5 million barrels per day—an increase of 160 percent in three years.[33]

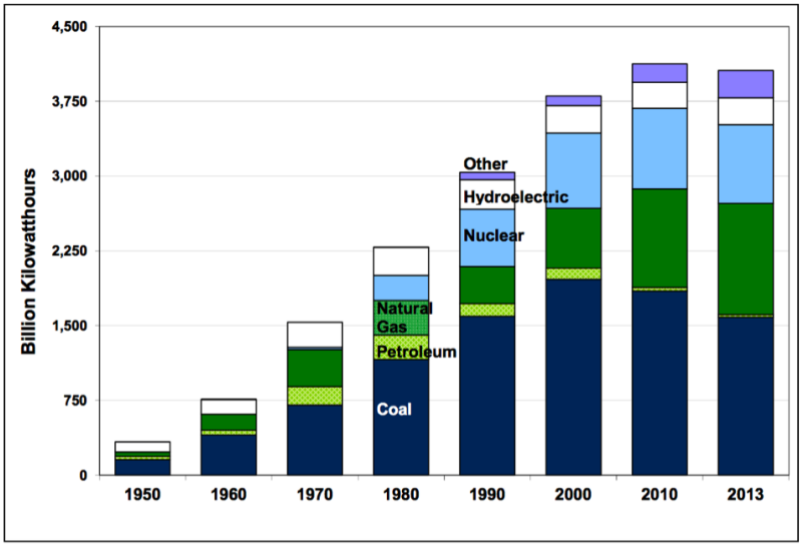


Figure Four: Congressional Research Service, "Electricity Generation by Source, Selected Years, 1950-2013," 2014.[34]

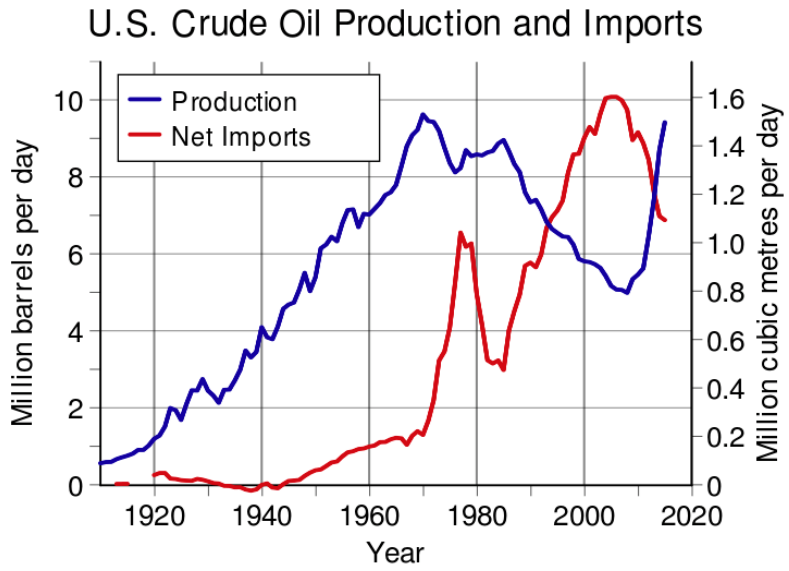


Figure Five: US Energy Information Administration, "US Crude Oil Production and Imports by year in millions of barrels per day," 2016.[35]

Keenly aware of this growing oil dependence was the Organization of Arab Petroleum Exporting Countries (OAPEC), which in 1973 proclaimed an oil embargo on all countries perceived to support Israel during the Yom Kippur War. The effects of the embargo were significant. Lines at gas stations spanned blocks, as represented by Figure Six. The price of oil per barrel rose almost overnight, rising from ten to forty dollars per barrel, in 2006 dollars.[36] Industrial costs rose, too, and consumers everywhere were hit with rising market prices. The US economy, already suffering from a stock market crash earlier that year, was in turmoil.


Figure Six: Office of the Historian, "Cars Wait in Long Lines During the Gas Shortage," 1973.[37]

Not since the Great Depression had Americans found it necessary to tighten their belts, and unlike that time change would not come as easily. The American government, hoping to curtail consumptive practices, found itself stymied. For twenty years, agencies such as the US Department of Agriculture had actively encouraged consumption, producing books like "Consumers All," a 1960's guide to American consumption (see Figure Seven). Confronted with daunting changes in the American market, the government turned to American businesses for help.

As businesses grew throughout America in the late 1960s, a pattern began to emerge. Businesses operating in metropolitan areas were increasingly constrained by space. As never before, employees were driving to work, and in ever-larger numbers, therein forcing employers to provide acres more of parking spaces for them. Seeing no end to this trend, large-scale employers encouraged their employees to commute to work together by manually ridematching their neighbors. This ridematching process yielded immediate dividends. Many companies were able to significantly increase parking capacity around their facilities by doubling vehicle occupancy rates.[38]


Figure Seven: US Department of Agriculture, "Consumer's All,", 1965.[39]

In search of solutions to America's energy crisis, in 1973 the US government saw a possible tool in employer-sponsored commuter ridesharing programs.[40] After conducting a survey among employers that offered these programs during the energy crisis, the US Federal Highway Administration found that an additional 29,400 commuters engaged in carpooling at the time, reducing vehicle miles traveled (VMT) among the sample population by 23 percent.[41] In light of these successes, the 1974 Emergency Highway Energy Conservation (EHEC) Act was passed, providing highway funds for 106 carpool demonstration programs in 96 metropolitan areas.[42] By 1979, the US Department of Transpiration established the National Ridesharing Demonstration Program, with the stated objective of increasing rideshare by 5 percent.

Other projects throughout the late 1960s and 1970s included the widespread adoption of High Occupancy Vehicle (HOV) lanes in the United States. By 2008, HOV lanes spread over 2300 lane miles across the nation.[43] Park-and-Ride Engagement also saw its ascendency in the late 1960s. Drawing inspiration from the popular 1930s practice of parking along bus routes, commuters too distant from public transit connections would drive to Park-and-Ride lots along public transit routes. Both HOV lanes and Park and Ride lots have been found to reduce congestion.[44]

Phase Three: Regulatory Pushes, Loosely Organized Ridesharing Systems (1980 - 1998)

The 1980s and 1990s were a boon to rideshare technologically, but a bust for rideshare economically. As gas prices began to fall, consumers were economically incentivized to drive more. As driving rates rose, pollution and traffic congestion would also rise, fostering among the public widespread concern for their health and for the environment. Government entities across the nation responded to these concerns with a robust regulatory push. Organizationally insufficient, these regulatory measures would

only serve to bother the public who would remain resentful of regulations for some time. Meanwhile, technological innovation towards the end of the 1990s would set a precedent for market-wide innovation and growth in the coming millennium.

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With the fall of oil prices in the 1980s, energy conservation efforts tapered while calls for congestion management and air quality reforms grew.[45] Whereas initially employer-based ridesharing programs were seen as energy conservation tools, in the 1980s local, state, and federal authorities saw use in their ability to mitigate congestion. Consequently, municipalities throughout the nation began adopting Trip Reduction Ordinances (TRO)—regulations designed to encourage commuting alternatives.

For example, in 1984 the city of Pleasanton, California passed a TRO that compelled businesses with a hundred or more workers in their employ to limit solo driving during rush hour to no more than 55 percent of their workforce. Similar to TROs, Employer-Based Trip Reduction (EBTR) programs were also used to improve air quality by reducing VMT and increasing vehicle occupancy rates. In 1988, for instance, the Southern California Air Quality Management District implemented the largest compulsory EBTR program in the nation. Called Regulation XV, the regulatory measure affected 2.26 million employees. The Clean Air Act of 1990 passed by the Federal Government pushed EBTR regulatory policy one step further: according to the bill, employers in regions suffering from severe ozone (smog) problems had to establish workplace rideshare programs.[46]

The results yielded by these regulations were mixed while the public's reaction was heated. In Southern California, average vehicle ridership remained high, despite the adoption of Regulation XV. Meanwhile, at the state level, California Senate Bill 437 was passed in 1995—a bill which prohibited the establishment of any EBTR programs by state agencies. Soon after, Southern California eliminated Regulation XV altogether. At the federal level, congestion efforts fared no better. That same year a bill loosening the requirements set by the Clean Air Act of 1990 was passed into law.[47]

One major issue with the EBTR programs was the lack of oversight and monitoring of the programs. Few programs properly tracked reductions in greenhouse gas emissions or of vehicle miles traveled by workers.[48] But where regulatory measures floundered, new developments in rideshare connectivity came in the form of telephone-based ridematching programs.

From 1993 to 1995, the Californian cities of Bellevue and Los Angeles debuted "Smart Traveler" rideshare programs. The programs operated through an automated phone service that paired willing users. Akin to the Self-Dispatch system of the 1940s, commuters with mutual travel needs would enter in their information and hope for a match. The programs, however, were deemed utter failures. The Bellevue Smart Traveler Program logged only six ridematches, while Los Angeles saw only marginally better numbers, averaging 34 users per week. In Los Angeles, users only stood a one in five chance of ridematching success. Costing $110 dollars per call, the high cost of the program coupled with its low success rate contributed to its demise.[49]

Despite these setbacks, a few years later some organizations did opt to promote "enhanced" telephone-based rideshare programs by integrating the internet's email

capabilities with telephone networks. Seattle's "Smart Traveler" program lasted from March of 1996 to May of 1997 and operated exclusively at the University of Washington. In its time of operation the program gained 500 ride requests and matched 300 commuters.[50] According to researchers, the Seattle program saw greater success due to the perceived safety of its closed-network system.

The 1990s did achieve technological success in the form of the ATHENA and MIVERVA enhanced rideshare programs. Developed by the Federal Government, ATHENA was the first fully computerized ridematching program to distinguish and record user trip information using GIS technologies in mobile phones and PDAs. Building upon the success of ATHENA, MINERVA added online banking and shopping services. Though neither program saw the light of day, these programs would form the basis for modern ridesharing programs.[51]

Phase Four: Early Ridesharing Platforms (1999 - 2003)

The rise of the new millennium brought little confidence to rideshare networkers. Jaded by the past, firms hoping to profit from the rideshare phenomenon saw little room for demand-side growth. The rise of the internet did bring with it the possibility of market renewal. Online organizational structures called "platforms" held auspices of future growth. Unfortunately, the internet alone could not mitigate the limitations inherent to shared mobility at the time.

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By the turn of the century, the ridesharing phenomenon had still to achieve the level of popularity it had seen in the 1910s. The most pressing problem rideshare systems faced in the post-jitney era was building a critical mass of users. Networks needed consistent demand to stay manageable and effective. Rideshare networkers of the time were highly cognizant of this issue and chose instead to concentrate on the needs of daily commuters with consistent travel schedules.

Within a four-year period, a major breakthrough had occurred in ridesharing capabilities. Whereas previously, internet-based rideshare networks took the form of listing agencies, online forms, and notice boards, by 1999 software companies began offering the first internet-based ridesharing platforms.[52] For a monthly fee, riders could sign up to be mutually pared with drivers with similar schedules. Still, these programs only found mild success. As commuters signed up they began to face the same challenges as ridesharers of the past, namely limited flexibility of travel.

Phase Five: Modern Ridesharing Platforms (2004-2008)

Only platformers working to scale rideshare networks before the advent of real-time demand capabilities could understand how truly innovative they would be. For almost a century, demand for rideshare was limited by the inability of travellers to engage in the market at an "at-will" basis comparable to rideshare suppliers. In the mid-to-late 2000s, when GIS technology from the early 1990s merged with cellular innovations, on-

demand rideshare became not only possible, but also set a foundation for potential future profitability and scalability in the rideshare market. In the last iteration of rideshare's past, networkers worked to encourage demand for rideshare by integrating internet-driven social networks. By the end of the decade, however, the internet would become so pervasive as to render closed-network-based-travel functionally insufficient.

* * *

The internet-based ridesharing platforms of the early 2000s were technologically hampered. For platforms to find success, users had to own a computer with internet-access and perceive ridesharing as economically advantageous. As internet use began to pervade society in the early 2000s, the once limiting prospect of ridesharing became more feasible. With the rise of social networking, clustered communities would develop online that platformers could exploit. Organizations such as Zimride saw an opening and began to operate within the closed-networks of universities and businesses. This offered a similar transportation network with the added measure of travelling with one's own peers.[53]

The closed-network system does have its drawbacks, however. Limited volume and growth potential means that platforms were hard-pressed to find more communities in which to market. As of 2011, there were 638 ridematching services operating within urban and suburban North America.[54] The idea of incentive-based travel had found success during this period. Companies such as Newride grant points to travelers who use their service that can be redeemed for coupons and discounts.

Of course, the greatest advancement of this period was the adoption of real-time ridesharing capabilities in the late 2000s. For the first time, ridesharers could overcome the limits of vehicle sharing by requesting at a moment's notice a ride from point A to B. The on-demand capabilities these modern platforms provide offered a consistency and reliability never before achieved.[55] So great would these changes be, that all ridesharing phenomena previous to the development of real-time ridesharing capabilities must be thought of as of an older era.

## Conclusion

Over a century has passed since the rideshare phenomenon began. In that time, socio-economic patterns grew to affect user demand and driver supply. Of the factors affecting rideshare use, the most pressing were technological innovations and availability, consumer preferences, economic factors such as gas prices, unemployment rates, and endogenous incomes, and government regulation and policy. Indeed, despite many technological improvements over this period, including the onset of real-time demand options and second-generation mobile platforms, factors still exist to affect market growth. Organizations that hope to integrate rideshare into their business strategies must be cognizant of these patterns, understand their development, and prepare to address these issues as they emerge. In reviewing the socio-economics of rideshare, vital historical context has been provided to help meet these needs. In this concluding section, a brief overview and analysis of these patterns will be offered.

*Technological Innovations and Availability*

The most notable development in the rideshare phenomenon was the commodification and increased accessibility of transportation capital to the general public. Although the automobile had been invented almost twenty years earlier, it was not until 1908 that the average consumer could afford a car. Clearly the availability of capital was integral in the development of the rideshare market. Without this option, the rideshare phenomenon might not have developed for another forty years.

The first handheld mobile phone was invented in 1973. Its popularity did not rise significantly, however, for another twenty-five years. In this time, platforms using GIS technology such as ATHENA and MINERVA were developed. They would radically change the way cellphones would be used in the future. But the inventor of the mobile phone could not have known at the time how often or in what way cellphones would be used. Nor could the federal government have known the effect its projects would have on the economy. Had they known, it is likely they would not have abandoned them so quickly—ATHENA was scrapped after it was overturned by a city council vote, and MINERVA evolved into a study on microbus services.[56] Businesses working with rideshare networks would do well to learn then that the slow adoption of technologies could be symptomatic of a greater problem. Namely, technological features, which would otherwise encourage greater use, might be missing.

No technological development has done more to illustrate this point than the advent of real-time mobile features. At no point in the history of rideshare other than, perhaps, the shadowing of streetcar routes in the 1910s has rideshare become so accessible to the public. The power of real-time technology seems to be its ability to internalize the negative economic externalities inherent to rideshare. Put another way, to engage in ridesharing has traditionally implied one must limit one's mobility in exchange for some clear economic convenience. History has indicated that rideshare adoption has faltered due to the perceived limitations placed upon commuters. The opportunity cost consumers faced in not owning a car or in limiting their driving schedules was too great. In stark contrast, real-time ridesharing internalizes, or incorporates into its platform structure, the ability to travel by one's own accord with great expediency. So great is this technological shift that the past and present must be divided between rideshare before real-time technology and rideshare after real-time technology.

In summary, for organizations hoping to expand their market exposure and understanding, history seems to clearly indicate that technology must be cheap, expedient, and available to the general public.

*Consumer Preferences*

Critical mass in the rideshare industry is crucial to its success. As seen today, consumer confidence in the rideshare phenomena significantly affects success or failure in the industry.[57] Looking to the past, only the jitney-era of the 1910s saw anything close to the numbers needed to sustain the industry. Just as today, no entity portended its success more so than the media.

Portrayed as an underdog, a paragon of democratic idealism, and an economic solution for the common man, newspapers throughout the nation expressed utter

adulation for the movement. The popularity the movement enjoyed was likely proportional to the support media outlets provided. By contrast, streetcar trusts of the time faced no competition and great criticism for the quality of their services. To ride in a jitney, therefore, was to make a social statement about one's self, one's beliefs, and one's perception of other means of transportation. The novelty automobile travel provided only added to its acclaim.

In just three years time, however, utter adulation shifted to collective skepticism and concern. Outlets that at one time lauded the movement eventually helped shift public sentiment away from rideshare largely by expressing safety concerns. The condemnation media outlets expressed, though not singularly responsible for the movement's destruction, surely had a negative influence on consumer preferences.

If companies are to properly anticipate future obstacles and opportunities in the rideshare system, they must be aware that shifts in consumer preferences are integral to achieving and maintaining a critical mass of use. Companies should actively track the public's perception of rideshare. Questions they might think to ask include: Do the youth perceive rideshare as environmentally friendly? What kind of statement does ridesharing make? How does ridesharing compare economically and socially to other means of transportation? Do men and women view ridesharing as safe? By surveying consumer preferences, not only will companies engaging in rideshare gain a better understanding of the market, they will also glean vital information for potential future opportunities.

*Economic Factors*

History has demonstrated that the rideshare market is almost wholly dependent on the economic advantages provided to consumers. For example, in periods of economic downturn such as the 1910s, 1940s, and 1970s, demand for rideshare grew. During periods of economic growth, the 1980s, 1990s, and early 2000s, rideshare buy-in was less robust. Recent technological improvements and shifts in consumer preferences have certainly opened the market, but for rideshare to stay competitive consumers must believe they are at least as economically as well-off by engaging in rideshare services—that there is a reciprocal return on their investment. For their part, rideshare drivers, car-lenders, and platformers are most sensitive to risk and economic loss, and must believe they also stand to gain by providing their services.

Gas prices, ownership models, and wage-leisure ratios influence rideshare supply and demand. As gas prices rise, consumers are more likely to see the benefits of rideshare. This was made clear during the energy crises of the 1970s. Meanwhile, ownership models are an area that still demands greater market research. Auto-ownership patterns of the past are unlikely to predict whether consumers continue to prefer private vehicle ownership in the future. That said, the past does provide helpful context in understanding ownership models. For instance, like many drivers today, most drivers of the jitney-era failed to account for capital depreciation when entering the market.[58] But there is every reason to believe that technological changes and shifts in consumer preferences will likely make ownership models of the past unrecognizable to those of today. Whichever way ownership models turn will be sure to affect the ridesharing market.

Wage-leisure ratios are an area of economic concern for rideshare drivers. When choosing to engage in rideshare, drivers must weigh the wages they earn with the utility they gain from leisure. If the utility earned by drivers is greater through the earning of wages than from that of leisure, labor supply curves will be more positively sloped. Endogenous incomes play a significant role in wage-leisure ratios. Generally speaking, the sharing economy operates through the use of idle assets: free time, parked cars, and empty bedrooms. If suppliers of idle assets feel they earn enough or more than enough income through their primary occupations, their willingness to share will be more elastic. Therefore, the supply curve of individuals who are underpaid or unemployed is assumed to be comparatively inelastic. As unemployment rises or as wages stagnate, then, more suppliers will enter the rideshare market, assuming low barriers to entry.

History has indicated that the economics of the rideshare market are fluid and ephemeral. Attaining a critical mass of ridership has, therefore, been difficult. If organizations are to keep ahead of the market, they should understand the economic factors that influenced ridership in the past.

*Government Policy and The Environment*

Whether the rideshare market is successful or otherwise, two factors are still bound to affect industry growth. Government policy and environmental concerns are intimately related subjects that have both had significant impacts on the rideshare market. In the 1940s, resource shortages compelled strict government regulations upon the public resulting in rising demand for rideshare, while in the 1980s and 1990s traffic congestion and air quality concerns inspired similar policies. As concerns for global climate change grows the government will likely act once again to reduce carbon emissions from vehicles. If it can be demonstrated that rideshare is not only economically advantageous, but also environmentally friendly, the market will be less likely to face stringent regulations—they may, in fact, receive government encouragement. Events of the past demonstrate, however, that if the opposite is proven, government regulations can work to undermine ridesharing completely. In the case of the jitney-era, it was not environmental concerns, but safety, tax revenues, and insurance concerns that inspired the government to stifle the market. Organizations should make a concerted effort to prove to the government that they are working to improve public safety and mitigate risk.

Equally as problematic are the myriad interests that exist to thwart ridesharing growth. As with the streetcar trusts of the past, competition exists whose interests are diametrically opposed to rideshare market expansion. Oil companies are obvious choices of concern. Other entities, such as automakers and dealerships hold the potential to be either partners or opponents, depending on the future development of ownership models. Organizations should strategize for both outcomes.

Finally, history provides an additional lesson for organizations, societies, and governments facing Schumpeterian "creative destruction." In 19th Century England, during the first Industrial Revolution, a movement of trained and experienced craftsman called the Luddites began voicing their descent as textile machines began to threaten their livelihoods. Aggrieved that unskilled laborers were being hired to operate mindless machines, the Luddites revolted. With sledgehammers in hand, Luddites attacked and burned down factories throughout the country. Known as the Luddite Rebellion, this

historical event is emblematic of a trend of technophobia that has lived for centuries among the general public. As technology has steadily developed throughout the 20th and 21st Centuries, creative destruction has resulted in economic plenty and the replacement of a number of outdated occupations. If rideshare is to find success in the future, platformers and organizations should do their best to integrate technology into society in a manner least burdensome to workers and consumers. Strategies that assist workers in their jobs, rather than function to replace them, are likely the most sustainable methods for rideshare organizers to adopt.

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