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Comments for Public Posting: Attached please find a paper authored by Greg Autry, PhD of the Marshall School of Business at the University of Southern California entitled "An Economic Analysis of the Impact of Rooftop Messaging Smart Screens on Taxi and Shared Ride Drivers in the City of Los Angeles." This paper was commissioned by CALinnovates. Autry contends that, "Implementation of Rooftop Messaging Smart Screens in Los Angeles would improve the lives of some of the hard-working Angelinos at no cost to these lower income residents. These systems would also clearly contribute positively to the local economy, potentially injecting tens of millions of dollars annually, including up to \$16 million in primary spending from equipping the Los Angeles taxi fleet. This contribution will indirectly increase tax revenues with no cost to the city."

An Economic Analysis of the Impact of Rooftop Messaging Smart Screens on Taxi and Shared Ride Drivers in the City of Los Angeles

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¹ This report is commissioned by CALinnovates, a technology advocacy coalition. The views expressed are those of the author only, and do not reflect the view of his affiliated institution.

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Summary

Several cities in the United States, including the City of Los Angeles, recently encountered the phenomena of Rooftop Messaging Smart Screens (RMSS), a digital advertising and civic communications system utilizing roof mounted digital screens on taxi cabs and shared ride vehicles. This paper examines the impact of RMSS on taxi and shared ride drivers in Los Angeles.

Traditional methods of mobile advertising on taxis and other commercial vehicles as well as private cars have long included static signage on trunks, roofs and even full vehicle “wraps.” Digital advertising systems have also been in place inside of taxis for some time. While these methods provide some income to fleet operators or drivers they offered no meaningful value to the cities where the vehicles operated.

I conclude that RMSS promises to upend the traditional paradigm of mobile advertising in a positive way, delivering significantly greater returns to individual drivers and offering a real-time, mobile messaging platform for public entities. Specifically:

RMSS offers supplemental income for drivers with no capital or additional time requirement. - *Denying access to RMSS advertising in Los Angeles would reduce the relative income of an already struggling group of workers and reduce their entrepreneurial activities, leaving them at the mercy of Transportation Network Company (TNC) platforms that set fares, driving them further toward poverty.*

RMSS promises to stimulate the Los Angeles economy. - *Equipping the Los Angeles taxi fleet with RMSS could stimulate up to \$16 million in primary spending with a significant multiplier effect resulting in secondary economic activity of many tens of millions of dollars. The ride-hailing fleet offers an even larger impact.*

RMSS offers city agencies real-time public communications to Angelinos with no capital investment or maintenance. - *While instant communications with Angelinos would be very desirable to a variety of city and other public agencies, including emergency service providers and law-enforcement, deploying and maintaining a massive network for digital signs across Los Angeles would cost tens of millions of dollars.*

RMSS offers local businesses the best solution for affordable and viably targeted advertising. - *Denying access to RMSS advertising in Los Angeles would unfairly disenfranchise small and minority-owned firms and sustain one more advantage for their large, non-L.A.-based competitors, shifting revenues and higher paying jobs outside the city.*

The Difficult Circumstances of Professional Drivers

In a seminal 2006 paper, Blasi and Leavitt detailed the deplorable working situation of Los Angeles taxi drivers.² Their study found that the average driver was working 72 hours per week and earning less than \$9 per hour net.³ A more recent 2018 paper⁴ paints a somewhat rosier wage picture of \$14.33 per hour for Los Angeles taxi drivers, approximating the city's minimum wage.⁵

In any case, a large number of these drivers are immigrants and heads of households struggling to establish a life in Los Angeles, put children through school and somehow save for retirement. They are usually working without any benefits beyond those they are legally required to pay for themselves. Blasi and Leavitt report these drivers are most often dependent on federal or state healthcare programs such as medical. It is clear this group of individuals is badly in need of additional income. Specifically, these drivers need revenues from the 56%⁶ of their miles driven and hours worked which currently are unpaid.

A Rare Opportunity for Increased Income

Mobile advertising is nothing new in itself; taxis and other commercial vehicles as well as private cars have long been decorated with fixed advertising signage on trunks, roofs and even full vehicle "wraps." Digital advertising systems have also been in place inside of taxis for some time. While these traditional systems provided some income to fleet operators or drivers they offered no value to the cities.

Among the leaders in the emerging RMSS market, the company Firefly is offering to install its display system on taxis and private shared ride vehicles, such as those associated with Uber and Lyft, at no charge and paying full-time drivers a flat rate that averages \$300 per month. That equates to \$3,600 a year paid directly to the worker, resulting in an instant wage increase of roughly 20% for most drivers.

Such a marginal increase in income results in an immediate higher standard of living for the drivers and their families. Other opportunities for wage increases invariably require monetary and time investments by the workers in education or in equipment. Time and capital are resources drivers are entirely lacking in and such an opportunity is extremely rare for them.

² Blasi, Gary, and Jacqueline Leavitt. "Driving poor: taxi drivers and the regulation of the taxi industry in Los Angeles." *Project funded by the UCLA Institute of Industrial Relation and published in* (2006).

³ Specifically, Blasi and Leavitt report owner-operator taxi drivers earning an average \$8.63/hr. net of vehicle costs and lease taxi drivers earning an average \$8.46/hr. net of their lease cost.

⁴ Hall and Krueger. "An Analysis of the Labor Market for Uber's Driver-Partners in the United States." (2015) https://s3.amazonaws.com/uber-static/comms/PDF/Uber_Driver-Partners_Hall_Krueger_2015.pdf

⁵ The U.S. Bureau of Labor Statistics (BLS) May 2017 Occupational Employment Statistics (OES) reports an average of \$16.31 per hour for all California taxi drivers. It appears that the Blasi and Leavitt study does a more thorough job of including all operational costs into the net hourly wage figure.

⁶ Blasi and Leavitt report from LADOT data that only 43.6% of taxi miles are paid miles.

This income opportunity may be large enough to motivate drivers to eschew residing in jurisdictions where they cannot obtain this extra free income. It would be hard to imagine, for instance, a two-driver family staying in a city that would deny \$7,200 a year for the support of their household. In the greater Los Angeles area, drivers can easily move a few miles across a border and reap that reward in adjacent cities.

Surviving in an Increasingly Unaffordable L.A. Housing and Rental Market

The cost of living in Los Angeles has grown increasingly unsustainable for lower income households. According to a study by real estate website Zillow⁷, families in the bottom third of income that own homes must spend 83% of their income on housing, compared to 30.8% for wealthy families in the top third of incomes. The report found even more dire circumstances for low-income Angelenos families that rent their homes in Los Angeles and must pay higher shares of their income on rent than similar families in Philadelphia, New York, Boston, or even San Francisco. In fact, lower-income families would need to spend 121% of their income to afford a typical rent in Los Angeles, even at the bottom third of the rental market. That is the definition of unaffordable housing.

When housing and rent expenses consume such large portions of low-income families' budgets, it leaves little to no room for savings or other safety nets. Preventing these families from earning supplemental income from RMSS would be a grave policy miscalculation for any City intent on improving living conditions for low-income families and seeking to combat increasingly unaffordable housing costs.

Significantly, workers in the lowest income quartile have a very high Marginal Propensity to Consume (MPC). They will spend this additional money and do so rapidly.⁸ In fact, analysis of data from the BLS Consumer Expenditure Surveys demonstrates that individuals in the lower four deciles of income, *spend more than they receive in additional income*.⁹ A driver earning \$30,000 is in the second U.S. income decile and will spend approximately 140% of any additional income (see Figure 1), creating a multiplier effect. \$3,600 delivered to such an individual will result in \$5,040 in primary economic activity. This means, for example, that given a \$100 bonus, such a worker may be able to take his or her family out for a weekend activity that costs a total of \$140.

⁷ <https://www.zillow.com/research/q2-2018-affordability-21286/>

⁸ Carroll, Christopher, et al. "The distribution of wealth and the marginal propensity to consume." Quantitative Economics 8.3 (2017): 977-1020.
<http://www.econ2.jhu.edu/people/ccarroll/papers/cstwMPC.pdf>, last accessed February 9, 2019

⁹ Hobijn, Bart, and Alexander Nussbacher. "The simulative effect of redistribution." *FRBSF Economic Letter* 21 (2015). <https://www.frbsf.org/economic-research/publications/economic-letter/2015/june/income-redistribution-policy-economic-stimulus/>, last accessed February 9, 2019

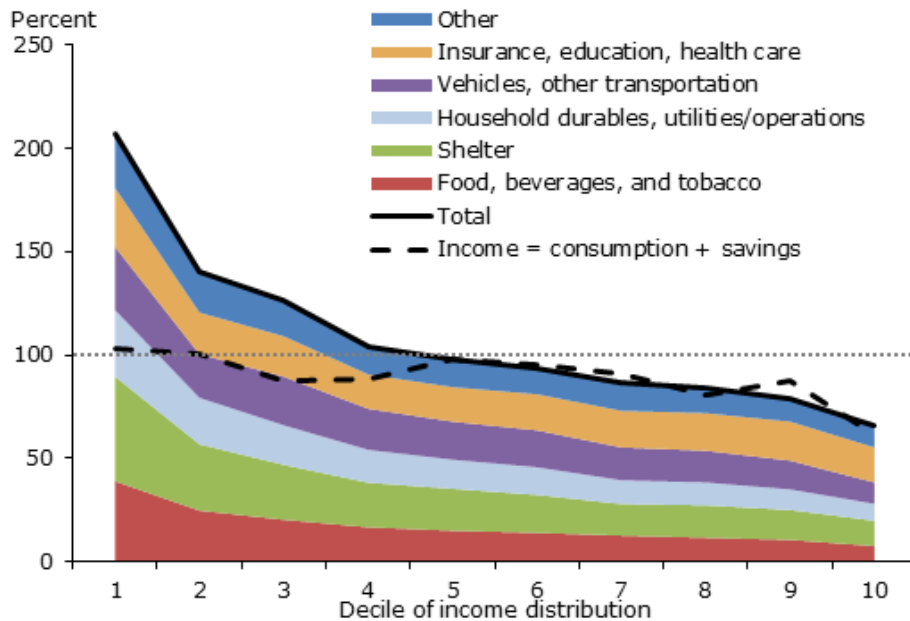


Figure 1 Marginal Propensity to Consume. Source: Federal Reserve Bank of San Francisco

The Los Angeles Department of Transportation (LADOT) report of January 2017 concludes that there are 2,361 taxis in Los Angeles.¹⁰ Equipping each of these with a RMSS unit at the Firefly rate and factoring in the MPC data (above) would deliver almost \$12 million in primary stimulus to the Los Angeles economy annually.¹¹ As most of this money will be spent at retail, the secondary impact of this stimulus is likely to be subject to a multiplier of 1.4 resulting in a first-year impact of more than \$16 million. This estimate presumes 100% driver participation and should scale proportionally. So, assuming that only 25% of taxis are RMSS equipped in a particular year the primary and secondary stimulus could estimate to be \$4 million.

While exact data on the number of ride-hailing cars operating within the boundaries of the City of Los Angeles is unclear¹², Uber recently reported they had *added* 12,000 drivers in the “greater Los Angeles area” and were seeking an additional 15,000.¹³ It is reasonable to assume there are at least 10,000 such drivers within the city proper, with at least 25% driving full time. Setting the full-time driver population equal to the taxi market suggests a

¹⁰ LADOT, “Los Angeles Taxi Cab Review and Performance Report” (2018) <https://ladot.lacity.org/sites/g/files/wph266/f/Los%20Angeles%20Taxicab%20Review%20and%20Performance%20Report%202017.pdf>, last accessed February 9, 2019

¹¹ $\$300/\text{mo.} \times 12 = \$3,600/\text{yr.} \times 140\% = \$5,040 \times 2,361 \text{ cabs} = \$11,899,440$

¹² Notably an RMSS system would potentially be capable of providing aggregate data to assist in answering this question and the question of how much time vehicles spend in and out of LA proper.

¹³ Pasadena Star News, “Uber Looking to Hire 15,000 More LA Area Drivers” (April 17, 2017) <https://www.pasadenastarnews.com/2017/04/17/uber-looking-to-hire-15000-more-la-area-drivers/>, last accessed February 9, 2019

potential maximum stimulus of \$16 million for ride-hailing or \$32 million a year for the combined taxi and ride hailing fleets. I believe this is a conservative estimate, though obviously, it will take some time for the fleets to be so equipped and it is unlikely all full-time drivers will be recruited. It is also possible that competition will increase the payment amounts to drivers. Nonetheless, the conclusion that the driver-side stimulus from a mature RMSS industry in the City of Los Angeles will be in the tens of millions of dollars annually is well-grounded, and this stimulus will indirectly increase tax revenues with no cost to the city.

Benefits to Other Local Businesses Owners

Monopolization of advertising, based on scale, is a significant tool that large firms use to leverage their size against small competitors in all markets.¹⁴ Regional and national chain retailers benefit from the current state of mobile advertising which covers a larger area, filled with their outlets. A national fast food chain, gas station or convenience store with locations across the city and region needn't worry about where the ad is at any particular time as it is likely to be in proximity to one of their stores. Even if it is not, the consumer viewing the ad is sure to be near one of their stores in the near future. This barrier to market entry makes is a huge disadvantage to minority owned firms in Los Angeles.

Access to geofencing and location aware advertising allows small businesses to compete against large chains that dominate traditional, untargeted advertising. For example, the owner of a small, independent restaurant in South Central LA cannot afford to be running static ads on taxis or busses that spend the vast majority of their time outside of her neighborhood. Nobody seeing their ad at Los Angeles International Airport or cruising around cities beyond Los Angeles is going to take advantage of the little restaurant's nightly special. Similarly, a local corner shop simply cannot afford to make their neighborhood customers aware of their own offerings.

Even local advertisements on bus stops and the like fall short because they are of limited supply and their static nature doesn't allow vendors to adjust. With RMSS when the restaurant is empty, the owner can instantly up the ads and if she fills her tables cut them off so as not to waste expenditures. The geographic and temporal precision of RMSS advertising is the only medium that can level the playing field for these businesses. It offers significant economic value to those businesses most in need of city support.

Locally owned corner shops, restaurants and boutiques are traditionally disadvantaged by the inadequate customer parking in older, crowded strip malls or traditional street front store locations. Their large chain operator competitors are able to leverage their massive advantages in capital to secure prime corner locations and build out and maintain large parking areas. Consequently, in addition to other economic drivers, a greater percentage of

¹⁴ Lynn, Gary S., et al. "New media in marketing redefine competitive advantage: a comparison of small and large firms." *Journal of Services Marketing* 13.1 (1999): 9-20.
<https://www.emeraldinsight.com/doi/abs/10.1108/08876049910256041> , last accessed February 9, 2019

their small business customers utilize taxi and rideshare services. Allowing the RMSS industry to subsidize the taxi and ride-hailing operators helps to level the economics of the parking lot for locally owned firms.

Denying access to RMSS advertising in Los Angeles would unfairly disenfranchise small and minority-owned firms and sustain the advantages of their large, chain competitors. This will further accelerate the domination of large, non-LA-based retail chains across the city. These chains export their profits to support staff in out-of-state operational centers, evading Los Angeles' progressive wage and labor regulations. Similarly, these firms maintain their highest value upper management positions in headquarters outside the city. Local firms keep their wages and owner's earnings in Los Angeles.

For the City

Instant communications with Angelinos would be very desirable to a variety of city agencies, including emergency service providers and law-enforcement. Deploying a massive network of hundreds of signs across Los Angeles would cost tens of millions of dollars. Maintaining that infrastructure would require millions of dollars annually. RMSS offers a perfect solution.

RMSS providers, like Firefly, are proactively volunteering to support city agencies as well as affiliated non-profits with pro-bono messaging. They are also taking advantage of their real-time updates to participate in publicizing AMBER Alert notifications, which are reliant upon the timely dissemination of information about an abducted child. It's possible to imagine a wide number of scenarios in which transmitting a message *and* images to the public, across the city, would be of significant value.

It is further worth noting that increasing the economic viability of the taxi and ride hailing fleets offers the city significant non-monetary benefits. Los Angeles is globally notorious for its dedication of valuable real estate to parking lots and structures. These asphalt lots and concrete structures are also a visual blight on the city. Taxis and ride-hailing vehicles reduce demand for parking. They also enhance the attractiveness of public transportation by making the last miles commute more practical for many long-distance commuters arriving at Union Station from the Inland Empire, Orange County or the San Gabriel Valley.

Conclusion

Implementation of Rooftop Messaging Smart Screens in Los Angeles would improve the lives of some of the hard-working Angelinos at no cost to these lower income residents. These systems would also clearly contribute positively to the local economy, potentially injecting tens of millions of dollars annually, including up to \$16 million in primary spending from equipping the Los Angeles taxi fleet. This contribution will indirectly increase tax revenues with no cost to the city.

The RMSS systems also offer many other positive externalities including improved marketing access for local businesses, reduced demand for parking and help in supporting the point-to-point transportation solutions that local residents and commuters depend on. Meanwhile, prohibiting taxi and rideshare drivers from earning this supplemental income from RMSS, at a time when low-income Angelinos are facing housing and rental that is already unaffordable and getting worse, would be a particularly harmful policy choice for any City officials that otherwise seek to address homelessness and housing affordability.

Glossary of Terms, Abbreviations and Acronyms

Geofencing: A software technology utilizing the global positioning system to ensure that services on mobile devices, such as advertising, are relevant to the specific geographic area in which they operate.

Marginal Propensity to Consume (MPC): The marginal propensity to consume (MPC) is the proportion of an aggregate raise in pay that a consumer spends on the consumption of goods and services, as opposed to saving it. In general, lower paid workers spend more of their marginal income, in fact they often spend more than they receive. The MPC is the primary factor in estimating the strength of a multiplier for economic stimulus.

Rooftop Messaging Smart Screens (RMSS): a digital advertising and civic communications system utilizing roof mounted digital screens on taxi cabs and shared ride vehicles.