

NBER WORKING PAPER SERIES

DISRUPTIVE CHANGE IN THE TAXI BUSINESS:  
THE CASE OF UBER

Judd Cramer  
Alan B. Krueger

Working Paper 22083  
<http://www.nber.org/papers/w22083>

NATIONAL BUREAU OF ECONOMIC RESEARCH  
1050 Massachusetts Avenue  
Cambridge, MA 02138  
March 2016

We are extremely grateful to Jason Dowlatabadi, Hank Farber, Jonathan Hall, Vincent Leah-Martin, Craig Leisy, and Eric Spiegelman for providing comments and/or data tabulations. We are solely responsible for the content and any errors. In the interest of full disclosure, Krueger acknowledges that he has coauthored a paper that was commissioned by Uber in the past, although he has no ongoing relationship with the company. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

NBER working papers are circulated for discussion and comment purposes. They have not been peer-reviewed or been subject to the review by the NBER Board of Directors that accompanies official NBER publications.

© 2016 by Judd Cramer and Alan B. Krueger. All rights reserved. Short sections of text, not to exceed two paragraphs, may be quoted without explicit permission provided that full credit, including © notice, is given to the source.

Disruptive Change in the Taxi Business: The Case of Uber  
Judd Cramer and Alan B. Krueger  
NBER Working Paper No. 22083  
March 2016  
JEL No. D24,J01,J42,J44,O3

### **ABSTRACT**

In most cities, the taxi industry is highly regulated and utilizes technology developed in the 1940s. Ride sharing services such as Uber and Lyft, which use modern internet-based mobile technology to connect passengers and drivers, have begun to compete with traditional taxis. This paper examines the efficiency of ride sharing services vis-à-vis taxis by comparing the capacity utilization rate of UberX drivers with that of traditional taxi drivers in five cities. The capacity utilization rate is measured by the fraction of time a driver has a fare-paying passenger in the car while he or she is working, and by the share of total miles that drivers log in which a passenger is in their car. The main conclusion is that, in most cities with data available, UberX drivers spend a significantly higher fraction of their time, and drive a substantially higher share of miles, with a passenger in their car than do taxi drivers. Four factors likely contribute to the higher capacity utilization rate of UberX drivers: 1) Uber's more efficient driver-passenger matching technology; 2) the larger scale of Uber than taxi companies; 3) inefficient taxi regulations; and 4) Uber's flexible labor supply model and surge pricing more closely match supply with demand throughout the day.

Judd Cramer  
Industrial Relations Section  
Firestone Library, A-15-J-2  
Princeton University  
Princeton, NJ 08544  
cramer@princeton.edu

Alan B. Krueger  
Industrial Relations Section  
Firestone Library, Room A2H  
Princeton University  
Princeton, NJ 08544  
and NBER  
akrueger@princeton.edu

## Introduction

Occupational licensing has grown steadily in the U.S. since the 1950s, with nearly one third of private sector workers currently in jobs covered by occupational licensing requirements (Kleiner and Krueger (2010)). In many jurisdictions, taxi drivers are required to obtain an occupational license in order to transport passengers, and drivers are restricted from picking up passengers outside of the jurisdiction that issued their license. In addition, the number of taxi drivers is often limited by the number of medallions that are issued, and fares are often set by regulatory bodies. Although occupational licensing regulations can improve consumer safety and yield other benefits, they can also reduce the efficiency of the economy, raise costs for consumers, and lead to a misallocation of resources.

The innovation of ride sharing services, such as Uber and Lyft, which use internet-based mobile technology to match passengers and drivers, is providing unprecedented competition in the taxi industry. Weighted by hours worked, there were about half as many Uber and Lyft drivers as taxi and limo drivers operating in the U.S. at the end of 2015.<sup>2</sup> This paper examines the efficiency of the ride sharing service Uber by comparing the capacity utilization rate of UberX drivers to that of taxi drivers.

Capacity utilization is measured either by the fraction of time that drivers have a fare-paying passenger in the car or by the fraction of miles that drivers log in which a passenger is in the car. Because we are only able to obtain estimates of capacity utilization for taxis for a handful of major cities – Boston, Los Angeles, New York, San Francisco and Seattle – our estimates should be viewed as suggestive. Nonetheless, the results indicate that UberX drivers,

---

<sup>2</sup> In 2015 there were around 500,000 taxi drivers and chauffeurs in the U.S. according to our tabulation of the Current Population Survey, and Uber and Lyft combined had nearly 500,000 active drivers. Uber drivers, however, work about half as many hours per week as taxi and limo drivers according to Hall and Krueger (2015).

rate is 38 percent higher for UberX drivers than for taxi drivers. Ignoring fixed costs, if fares are linear, this implies that UberX drivers could charge 28 percent ( $=1-1/1.38$ ) less than taxis and earn the same amount of revenue per hour. In Los Angeles, which exhibited the biggest difference in capacity utilization, fares could be 37 percent lower. It is also worth emphasizing that differences in utilization rates have implications for resources other than passengers and drivers. For example, for every mile that taxi drivers in Los Angeles drives with a passenger in the car, they drive 1.46 miles without a passenger; the comparable figure for UberX drivers is 0.56 mile. This difference likely translates to greater traffic congestion and wasteful fuel consumption.

Lastly, our results bear on the literature on occupational licensing. Although occupational licensing can provide many benefits for consumers, workers and society, it could also reduce efficiency and distort markets. Occupational licensing has grown even in fields where there is little public safety or other societal benefit from licensing restrictions. Given that vested interests that benefit from occupational licensing (including the jurisdictions that collect licensing fees) have made it difficult to repeal occupational licensing, one way in which inefficient, unnecessary and counterproductive occupational licensing can be reduced is through disruptive change, such as brought about by a new technology.

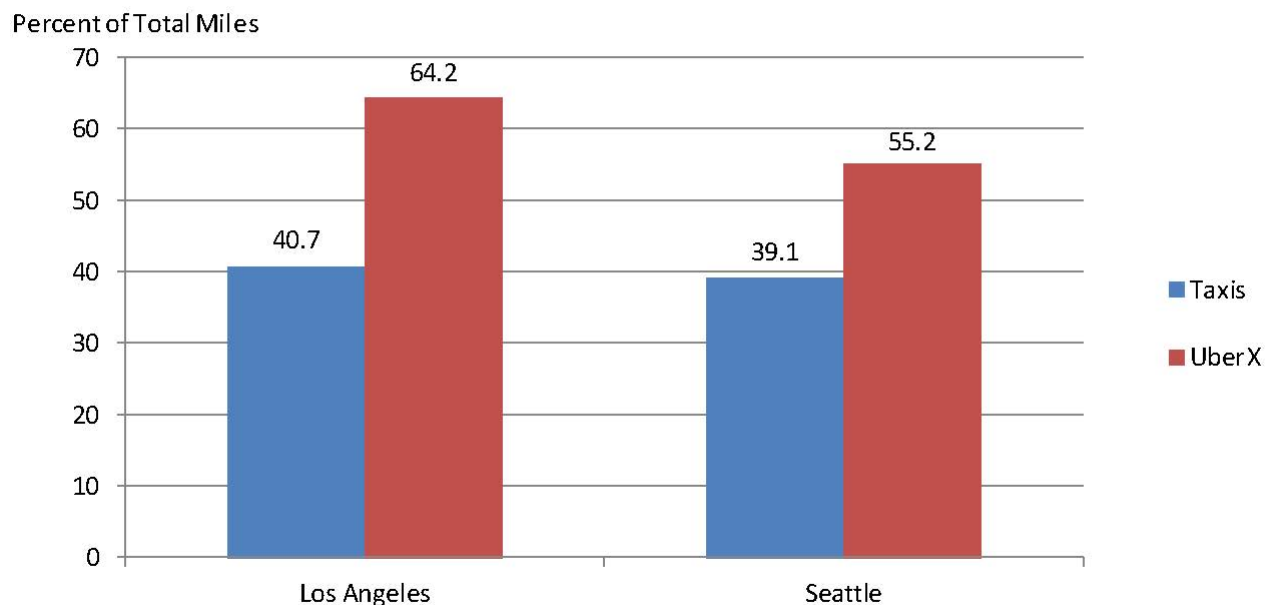
**Table 1: Capacity Utilization Rate (Percent of Work Hours with a Passenger) for Taxi and UberX Drivers, Select Cities**

	f		F	
	Taxi	UberX	Taxi	UberX
Boston	NA	46.8%	32.0%	46.1%
Los Angeles	NA	51.7%	NA	50.3%
New York	48.3%	50.9%	49.5%	51.2%
San Francisco	38.4%	54.9%	38.5%	54.3%
Seattle	NA	43.5%	NA	43.6%

Sources: Uber Technologies, Inc.; authors' calculations using NYCTLC Microdata; Leah-Vincent; and Nelson/Nygaard (2013); see text for further details.

Notes: f is the average across drivers. F is ratio of aggregate passenger hours to aggregate hours worked. Boston taxi data are average of three days in 2013, New York taxi data are for 2013, and San Francisco taxi data are for July-October 2013; Uber data for Boston are for three corresponding days in 2015, Uber data for San Francisco are for July-October 2015, and Uber data for all other cities are for the 12 months ending December 1, 2015.

**Figure 1: Capacity Utilization Rate (Percent of Miles Driven with a Passenger) for Taxi and UberX Drivers in Los Angeles and Seattle**



Source: Uber Technologies, Inc.; LADOT; City of Seattle, Regulatory Compliance and Consumer Protection Division; Authors' calculations.  
Notes: LA and Seattle are 2013-14 and Uber is the 12 months ending December 1, 2015; see text for further details.