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Class Counsel

REDACTED VERSION OF DOCUMENT(S) SOUGHT TO BE SEALED

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

BYRON MCKNIGHT, JULIAN MENA, TODD SCHREIBER, NATE COOLIDGE, and ERNESTO MEJIA, individually and on behalf of all others similarly situated,

Plaintiffs,

v.

UBER TECHNOLOGIES, INC., a Delaware Corporation, and RASIER, LLC, a Delaware Limited Liability Company,

Defendants.

Case No.: 4:14-cv-05615-JST

DECLARATION OF LESLIE E. SCHAFER, PH.D. IN SUPPORT OF PLAINTIFFS' RENEWED MOTION FOR ATTORNEYS' FEES AND EXPENSES AND FOR CONSIDERATION OF EXPERT TESTIMONY IN SUPPORT THEREOF UNDER 28 U.S.C § 1712(d)

Hon, Jon S. Tigar, Presiding

Date: May 6, 2020
Time: 2:00 P.M.
Location: Oakland Courthouse, Courtroom 6 – 2nd Floor, 1301 Clay Street, Oakland, CA 94612

I, Leslie E. Schafer, declare under penalty of perjury, pursuant to 28 U.S.C. § 1746 and based on my own personal knowledge, that the following statements are true:

I. EXPERIENCE AND QUALIFICATIONS

1. I am a Managing Director at Econ One Research, Inc. ("Econ One"), an economics and statistics research and consulting firm with offices around the U.S. and abroad.

2. I have master and doctoral degrees in Managerial Science and Applied Economics from the University of Pennsylvania. My doctoral coursework and dissertation were completed under the Graduate Group in Managerial Science and Applied Economics, administered by Wharton Doctoral Programs at The Wharton School of Business. My doctoral work concentrated on the fields within economics known as applied empirical microeconomics and industrial organization, which involve the study of markets, pricing, competition, antitrust, and regulation, among other things.

3. Additionally, I hold a Master of Public Policy from the University of Maryland School of Public Policy and a Bachelor of Arts in Political Science, *cum laude*, from Tufts University.

4. I specialize in the application of economic analysis and econometrics to litigation and consulting matters in antitrust, false advertising, health care reimbursement, intellectual property, and other commercial disputes. I have more than 14 years of economic consulting experience. During that time, I have worked extensively on the analysis of markets and pricing, including in the taxicab and ride sharing industries. A true and correct summary of my training, experience, and prior testimony is set forth in **Exhibit 1**.

5. Econ One is being compensated for the time spent by me and my staff on this matter at our normal and customary rates. Econ One's compensation is not contingent upon my findings or the outcome of this dispute.

II. SCOPE OF WORK

6. I was retained by Ahdoot & Wolfson, PC, to provide an expert opinion with respect to Settlement-related issues in the above-captioned matter. In particular, I was asked to determine the following:

a. The value of the injunctive relief agreed to in the Settlement;

b. The amount of the Settlement Fund expected to be redeemed by Class Members *via* payments to their Uber Rider Accounts or by direct payments to their financial accounts on file with Uber (collectively, the "Redeemed Credit Value"); and

c. The effect on the Redeemed Credit Value of an award of Attorneys' Fees and Expenses lower than requested by Class Counsel (referred to below as the "Sensitivity Analysis").

7. In the course of completing our work, my staff and I reviewed and analyzed certain documents and data provided to me by Class Counsel and the Settlement Administrator, including the Declaration of Jane E. Cloninger ("Cloninger Declaration") and the Declaration of Brian Young ("Young Declaration") in Support of Plaintiffs' Renewed Motion for Attorneys' Fees and Expenses and for Consideration of Expert Testimony in Support Thereof Under 28 U.S.C. § 1712(d). I understand the Cloninger Declaration and the Young Declaration will be provided to the Court along with this Declaration. We also reviewed and analyzed documents, data, literature, and other information gathered from publicly available sources. A true and correct list of the materials I relied upon is set forth in the footnotes of this Declaration and in **Exhibit 2**.

8. I have executed the document entitled "Exhibit A – Certification Re Confidential Discovery Materials" to the Stipulation and Protective Order entered by this Court on August 3, 2015 (ECF No. 51).

9. For the purposes of this Declaration, capitalized words and phrases that are not otherwise defined herein, have the same meaning as defined in the Amended Stipulation of Settlement filed in this matter on June 1, 2017 in ECF No. 125.

10. I have been informed by Class Counsel that this Declaration will be filed in support of a renewed motion for an award of $8.125 million in Attorneys' Fees in this case. In addition to the Cloninger and Young Declarations, Class Counsel have provided me with the following information:

a. For the purposes of this Declaration assume the following: (i) $2,500 as the total Service Awards to Class Representatives, (ii) $40,783.38 as the total expenses to be reimbursed to Class Counsel, and (iii) $487,000 for the total Settlement

Administration Expenses. Thus the Settlement Fund Balance is $23,844,716.62 million.

11. For certain of my opinions:

a. I rely on the following facts reported in the Young Declaration: (i) the amount to be paid to Class Members who requested to be paid in cash *via* submission of a Payment Election Form is $83,403.35, (ii) the amount to be paid to Class Members who submitted a Payment Election Form requesting the Settlement Share be paid into their Uber Rider Accounts is $34,541.99, and (iii) 24% of Class members took one Safe Ride during the Class Period.

b. I rely on the following conclusions from the Cloninger Declaration: (i) REDACTED REDAC REDACTED REDAC of the Uber Rider Accounts will continue to be open as of May 31, 2021; and (ii) the attrition rate among the Payment Rider Accounts (as this term is defined in the Cloninger Declaration)[1] is 14.1%.

III. SUMMARY OF OPINIONS

12. *Injunctive Relief*: As set forth in paragraphs 16 to 22 below, the estimated value of the Settlement's injunctive relief to the Class Members in this Action is approximately $56.01 million.

13. *Redeemed Credit Value*: As set forth in paragraphs 23 to 39 below, the estimated Redeemed Credit Value is approximately REDACTED REDAC REDACTED REDAC million. This estimate does not include (i) the amount to be paid to Class Members who requested to be paid in cash *via* submission of a Payment Election Form, or (ii) other Settlement value such as the Settlement Administration Expenses, Service Awards to the Class Representatives, and Attorneys' Fees and Expenses.

14. *Sensitivity Analysis*: As set forth in paragraphs 40 to 44 below, the use of sensitivity tests show that, for every 10% reduction in the amount of the requested Attorneys' Fees, the total Redeemed Credit Value would increase by approximately 3.4%. Thus, while any decrease in the requested $8.125

[1] The Cloninger Declaration defines Payment Rider Accounts as the "REDACTED REDAC REDACTED REDAC of the Settlement Class [that] does not use the Settlement Share in their Uber Rider Account during the year that the Settlement Share is available[.]" Cloninger Declaration at p. 3.

million in Attorneys' Fees would increase the overall Settlement Fund Balance, the resulting percentage increase in the Redeemed Credit Value would be relatively small.

IV. METHODOLOGY AND OPINIONS

15. The following is a discussion in support of my opinions regarding the value of the Settlement's injunctive relief and the Redeemed Credit Value in this matter.

A. Injunctive Relief Value

16. As I understand it, the injunctive relief provisions of the Settlement are memorialized in paragraph 54 of the Settlement Agreement (ECF No. 125). A conservative estimate of the value of these provisions to Class Members is approximately $56.01 million.

17. The economic foundation of this estimate is Class Members' "willingness to pay" for safety. "Willingness to pay" refers to the amount that people are willing to pay out-of-pocket to obtain some benefit.[2]

18. It is clear that safety is an important issue for Uber users. The recent interest in Uber's "US Safety Report" for 2017-2018 demonstrates that consumers care about their safety when taking rides with Uber.[3] Thus, a subset of Class Members likely used Uber during the Class Period, at least in part, because they valued Uber's safety and paid for it *via* the Safe Rides Fee. For those Class members, the alleged misstatements would be perceived as meaningful and therefore the injunctive relief would

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[2] *See, e.g.*, Baker, et al. 2014. "Willingness to Pay for Health." *Encyclopedia of Health Economics 3*, edited by Anthony J. Culyer, 495-501. Amsterdam: Elsevier at p. 495. While this citation describes willingness to pay in a health context, it can be extended also to safety ("The term [willingness to pay, or "WTP"] usually refers to individuals' willingness to spend money personally, *i.e.*, 'out-of-pocket,' to obtain health gains for themselves or to avoid health losses or reduce health risks for themselves. […] WTP is interpreted as an indicator of how much personal satisfaction or well-being (often called 'utility') individuals derive from (or believe they derive from) different health outcomes.").

[3] Uber. 2019 "US Safety Report, 2017-2018." (Dec. 5, 2019), *available at* https://www.uber.com/us/en/about/reports/us-safety-report/ (last accessed Feb. 18, 2020). Siddiqui, Faiz. 2019. "Uber discloses 3,000 reports of sexual assault on U.S. rides last year in its long-awaited safety study," *The Washington Post* (Dec. 5, 2019), *available at* https://www.washingtonpost.com/technology/2019/12/05/uber-disclosed-sexual-assaults-us-rides-last-year-its-long-awaited-safety-report/?arc404=true (last accessed Feb. 18, 2020).

have value for them going forward.

19. Survey evidence reported by Rayle *et al.* (2016), a research team from the University of California, Berkeley, establishes that there were actual ride-sharing customers in San Francisco during the Class Period (*i.e.*, a subset of Class Members) who valued safety.[4] When asked "what are the top two reasons you used uberX[sic]/Lyft/Sidecar for this trip?", 12% of respondents in this Spring 2014 survey answered "comfort/safety."[5]

20. Although the Rayle (2016) survey is limited to the San Francisco geographical area, I believe that its 12% result can be reliably used to approximate the share of fees paid by the Class Members overall for whom Uber's safety-related statements had perceived value.

21. Based on my review of the unredacted pleadings filed in this matter, I understand that Uber earned $470,706,387 in revenue from the Safe Rides Fee during the class period.[6] I understand also that the Cloninger Declaration estimates that REDACTED REDAC REDACTED REDAC of the Uber Rider Accounts will continue to be open as of May 31, 2021 (I will assume that the persons who closed their Uber Rider Accounts will not receive the benefit of the injunction).[7] Therefore, the value of the injunctive relief can be approximated by the following calculation: REDACTED REDACTED = $56.01 million.[8]

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[4] **Exhibit 3** is a true and correct copy of the following survey: Rayle, Lisa, et al. 2016. "Just a better taxi? A survey-based comparison of taxis, transit, and ridesourcing services in San Francisco." *Transport Policy,* Vol. 45. 168-178 ("Rayle (2016)") (bearing Bates numbers PMM00065023-PMM00065033.). Rayle (2016) is a reliable survey (*see* p. 177) which was published in a well-ranked, peer-reviewed journal. In 2016, *Transport Policy*'s ranking, based on citation frequency, was 53 out of 347 in economics journals and 12 out of 33 in transportation journals. *See* https://journalinsights.elsevier.com/journals/0967-070X/impact_factor (last accessed Feb. 18, 2020).

[5] Rayle (2016) at p. 173.

[6] ECF No. 126-1 (under seal), unredacted version of Ahdoot Decl. ISO Prelim. App. at ¶ 46.

[7] Cloninger Declaration at ¶ 11.

[8] The estimate assumes that this subset of Class Members, in the aggregate, continue to use the Uber App at approximately the same rate.

22. This is a conservative estimate when compared to the total revenue obtained by Uber (i.e. $470.7 million) and the fact that the injunction eliminated the use of the "Safety Fee" moniker which was the basis of the wrongful conduct alleged in the Complaint. Moreover, as I understand it, there is no expiration date on the injunctive relief, and over time the number of Uber services utilized by Class Members will likely eventually exceed those taken by Class Members during the Class Period (if not already).

B. Redeemed Credit Value

23. One potential mechanism used to pay class members their shares of a class action settlement is to give each class member a coupon to be applied to a future purchase of the Defendant's product(s).[9] I have been instructed by Class Counsel to treat the Settlement Share of the Class Members as a "coupon" for the purposes of this Declaration. Therefore, the Redeemed Credit Value estimates the value to Class Members of the Settlement Shares redeemed by Class Members as credits within one year or paid to Class Members thereafter. It includes the amount to be paid to Class Members who requested to be paid in credits *via* submission of a Payment Election Form but excludes the amount to be paid to Class Members who requested to be paid in cash *via* submission of a Payment Election Form.

24. In some cases, a coupon may be a percentage discount off a future purchase. For example, in a recent settlement in a security breach case involving the Internet shoe company Zappos.com, class members were given a coupon that provided 10% off an order on Zappos.com that must be used by the end of the year.[10] In this example, the face value of the coupons is not the actual amount that class members redeem because the prices of the goods purchased by the class members will likely vary.

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[9] *See, e.g.,* the Class Action Fairness Act ("CAFA"), 28 U.S.C. §1712.

[10] *In re: Zappos.com, Inc. Customer Data Security Breach Litigation*, Case No. 3:12-cv-00325-RCJ-VPC, MDL No. 2357 (U.S.D.C. Nev.) (the Settlement notice stated "[t] he case has settled, and you may use the unique code provided above for 10% off a single future online purchase of goods on Zappos.com[.]" and "[T]he short version is that you are getting a 10%-off discount code to use on an order placed before the end of the year. You may also transfer the code to someone else[.]"). *See also*, http://www.zapposdatasettlement.com/media/2391587/settlement_agreement_and_release.pdf at p. 12. (Last accessed Feb. 18, 2020).

25. In contrast, the "coupon" in this Action is an exact dollar amount added automatically to a Class Member's account and then credited automatically to future purchases. The Settlement provides that each Class Member will receive $0.25 for the first "Safe Rides Fee" paid during the Class Period. An additional amount of approximately $0.05 will be received for each additional "Safe Rides Fee" paid during the Class Period.[11]

26. As I understand it, the exact final amount to be paid to each Class Member depends upon the total amounts of the Settlement Administration Fees, Service Awards, and Attorneys' Fees and Expenses deducted from the Settlement Fund.[12]

27. Pursuant to the Settlement Agreement, Uber will automatically issue a payment equal to the Settlement Share of each Class Member (who did not choose to be paid in cash via PayPal or eCheck, or has since permanently closed his / her / their account) to each such Person's Uber Rider Account. Uber will automatically apply this amount to the first Uber Rideshare Services ordered by the Class Member until the Settlement Share is fully used. Unlike a coupon, Class Members need not affirmatively claim or invoke the Coupon to obtain this benefit; it is automatically applied upon use of Uber.[13]

28. In the event a Class Member does not use the Settlement Share as credit against an Uber Rideshare Service within the one year period, then Uber shall automatically pay any unused Settlement Share directly to the Class Member's individual payment method or account that is associated with their Uber Rider Account (defined as the "Uber Payment Account" in the Settlement Agreement). Furthermore, I understand any Settlement Shares (payments) that cannot be made to Class Members' Uber Payment Accounts are to be paid to the National Consumer Law Center, a non-profit organization ("NCLC").[14]

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[11] Amended Stipulation of Settlement (ECF No. 125) at ¶ 57.

[12] ECF No. 125 at ¶ 38.

[13] ECF No. 125 at ¶¶ 67-76.

[14] ECF No. 125 at ¶¶ 67-76.

29. In my opinion, the Redeemed Credit Value in this Action is approximately REDACTED REDACTED million. The Redeemed Credit Value is the total Settlement Share credit amount estimated to be redeemed by Class Members, calculated as the difference between the total aggregate potential credit ($23.76 million) and the residual award estimated to be paid to the NCLC REDACTED REDACTED as set forth below and presented in **Exhibits 4 to 6**.

1. Total Aggregate Potential Settlement Share Credit

30. The total aggregate potential Settlement Share credit in the Settlement (the total amount of Settlement Shares to be paid to Uber Rider Accounts under the assumptions herein) is approximately $23.76 million. This amount will include the value of the Settlement Share credits used by Class Members for Uber Rideshare Services and the unused Settlement Share amounts that will be paid out to Class Members' Uber Payment Accounts at the end of one year.

31. As demonstrated in **Exhibit 4**, this amount equals the sum of the Settlement Share credits provided to Class Members who submitted a Payment Election Form requesting payment to their Uber Rider Accounts ($34,485.62)[15] and the Settlement Share credits for Class Members who will receive automatic benefits by default ($23,726,827.65). It is also equal to the Settlement Fund Balance ($23,844,716.62) less the amount to be paid to Class Members who requested to be paid in cash *via* submission of a Payment Election Form ($83,403.35).[16]

32. Thus, the total potential Settlement Share Credit ($23,761,313.27) is calculated by deducting from the Settlement Fund Balance of $23,844,176.62, the amount of $83,403.35 (the amount of the Settlement Shares of the Class Members who elected to be paid in cash).

2. Residual Funds / Deductions for Invalid Payment Accounts

33. Payments that Uber is unable to make to the Class Members' Uber Payment Accounts will become Residual Funds.[17] As noted above, I understand these awards are to be paid to the NCLC.

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[15] Young Declaration at ¶ 6.

[16] Young Declaration at ¶¶ 5, 7.

[17] The Settlement Agreement provides that Residual Funds are any amounts that are not paid to Class Members via eCheck, Paypal, Uber Rider Accounts and Uber Payment Accounts. ECF No. 125

34. It is possible that some Class Members with open Uber Rider Accounts may not have a valid payment method retained in their accounts to receive payment for unused Settlement Shares at the end of one year. Therefore, it is necessary to estimate (i) what percentage of the Settlement Shares will be used by Class Members within one year, and (ii) of the remaining unused Settlement Shares at the end of the year, the amount that Uber will be unable to pay out to Class Members' Uber Payment Accounts.

35. As set forth in **Exhibit 5**, the estimate of the amount to be deducted for invalid Uber Payment Accounts is REDACTED REDACTED

36. The deduction for invalid Uber Payment Accounts is calculated as follows:

(Total aggregate potential credit) x (Unused credits) x (Uber Payment Accounts attrition rate).

37. First, as discussed below, Uber is expected to attempt to pay Settlement Shares to Uber Payment Accounts for about REDACTED REDACTED of the total potential aggregate credit amount not used within one year. It is reasonable to assume that about REDACTED REDACTED of the credit will be used during the year, based on the following information.

a. The Cloninger Declaration reports that REDACTED REDACTED of accounts are expected to be open as of May 31, 2021.[18]

b. More than 75% of Class Members took more than one ride during the Class Period.[19]

c. Defendants report that (i) REDACTED REDACTED of Class Members used the Uber Rideshare Services during the 12 months prior to May 8, 2017; (ii) REDACTED REDACTED of Class Members used the Uber Rideshare Services during the 12 months prior to September 26, 2019; and (iii) REDACTED REDACTED

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at ¶ 80. Given that those Class Members who will receive payment by eCheck and PayPal affirmatively chose to do so by submitting a Payment Election Form, I assume that all such payments will be successful. Given the terms of the Settlement Agreement, Residual Funds will likely result primarily from invalid payment account information in open Uber Rider Accounts.

[18] Cloninger Declaration at ¶ 29.

[19] Young Declaration at ¶ 11.

of Class Members used the Uber Rideshare Services during the 12 months prior to January 31, 2020.[20]

d. The REDACTED figure is a more recent assessment closer to the allocation of settlement amounts to Class Members than REDACTED or REDACTED.

Furthermore, rather than using a projection based on the three historical values, I have opted to use the REDACTED figure as an estimate of the percentage of the credit to be used. The reported share of Class Members who used Uber Rideshare Services in the last year is not adjusted for payment method attrition rate (or closed accounts, however that is small), as are my calculations. Therefore, utilizing this figure overcounts payment attrition in my analysis to some degree by including it here and through Ms. Cloninger's results, which are incorporated in step two, below. To project the share of Class Members who used the Uber Rideshare Services forward into the future based on these three data points could further over count payment attrition rate.

38. Second, the Cloninger Declaration estimates that the attrition rate for valid payment methods is 14.1%.[21]

39. Therefore, the estimate of the amount to be deducted for invalid Uber Payment Accounts, under the assumptions herein, is REDACTED

C. Attorneys' Fees Sensitivity Analysis

40. As noted above, the Settlement Fund Balance assumes a payment of $8.125 million for Attorneys' Fees. A decrease in the award for Attorneys' Fees would increase the Settlement Fund

[20] Defendants' Updated Responses to Plaintiffs' Information Requests (Highly Confidential), March 3, 2020 at p.4.

[21] Cloninger Declaration at ¶ 27. Two points related to the attrition rate are noteworthy. *First*, I understand that all holders of Uber Rider Accounts that do not use the Settlement Share while in those accounts during the one-year period will be sent a reminder email to ensure that the payment method on account with Uber is current. I would expect the email reminder to tend to reduce the payment method attrition rate, all else equal. *Second*, in this Action, the email bounce back rate was 5.69%, suggesting a large portion of Class Members with unused Settlement Share credits are likely to receive the email reminder successfully. ECF No. 164, ¶ 17 (Declaration of Cameron R. Azari, Esq., January 25, 2018).

Balance by the same dollar amount. However, the resulting percentage increase in the Redeemed Credit Value would be relatively small by comparison.

41. At the instruction of Class Counsel, I used the information provided to me by the Settlement Administrator to conduct sensitivity tests demonstrating the effect of lower awards of Attorney' Fees on the Redeemed Credit Value.[22] I tested the effect of reducing the Attorneys' Fees by 10%, 15%, and 20%. A summary of the results of these tests is reported in **Exhibit 7**. The calculations for each test are presented in **Exhibits 8 to 16**. These tests demonstrate that for every 10% reduction in attorneys' fees, the Redeemed Credit Value would increase by 3.4%. The total Redeemed Credit Value would increase by only 3.4% because (1) the portion of the settlement paid for initial rides is fixed and (2) the increase to the Redeemed Credit Value is partially offset by an increase in the Residual award.

42. For example, in the event the Attorneys' Fees and Expenses is reduced by 10% from $8.125 million to $7.313 million, the total Redeemed Credit Value estimated in paragraph 29 above would increase to REDACTED REDACTED REDACTED REDACTED

43. In the event the Attorneys' Fees and Expenses is reduced by 15% from $8.125 million to $6.906 million, the total Redeemed Credit Value estimated in paragraph 29 above would increase to $23.53 million.

44. In the event the Attorneys' Fees and Expenses is reduced by 20% from $8.125 million to $6.5 million, the total Redeemed Credit Value estimated in paragraph 29 above would increase to REDACTED REDACTED REDACTED REDACTED REDACTED REDACTED REDACTED REDACTED

I declare under penalty of perjury under the laws of California and of the United States that the foregoing is true and correct. Executed this 20th day of February, 2020 in Los Angeles, California.

Leslie E. Schafer, Ph.D.

[22] Young Declaration at ¶ 10.

Exhibit 1

Leslie Schafer, Ph.D.
Managing Director
Los Angeles, CA
213 624 9600
lschafer@econone.com

Dr. Leslie Schafer is a Managing Director with Econ One Research, Inc. As a testifying expert, she applies economic analysis and econometrics to liability and damages estimation for litigation matters concerning antitrust, intellectual property, false advertising, and health care reimbursement.

For intellectual property and false advertising matters, Dr. Schafer has analyzed plaintiff lost profits, defendant profits, and reasonable royalties in a wide variety of industries such as taxicab services, footwear, personal mobile communication devices and other consumer electronics, information technology, automobile parts, pharmaceuticals, and medical research. She has extensive experience with FRAND rates, comparable licenses, company financials, complex bills of materials, and extremely large datasets of company transactions and retail point-of-sale data.

Dr. Schafer has served as a testifying expert about the reasonable value for out-of-network health care services. Her health care-related work experience also includes calculating overcharges in class action antitrust matters due to most-favored nation clauses and other provisions in hospital-payer contracts, transactional analysis of pharmaceutical pricing for direct purchasers, statistical analysis of Medicare Advantage audits and Medicare claims in False Claims Act cases, and forecasting retiree health care benefits and workers' claims for occupational injury. Dr. Schafer has analyzed more than a billion claims filed with Medicare or commercial payers for health care services.

Dr. Schafer has testified in U.S. District Court. She has spoken at conferences, on webinars, and for continuing education about patent and trademark damages and about working with experts in class action matters for the ABA, the State Bar of California, the LA County Bar Association, the Beverly Hills Bar Association, NITA, Bridgeport Continuing Education, and the Daily Journal's Patent Disputes Forum.

EDUCATION

- Ph.D. & M.A. University of Pennsylvania, Wharton School of Business, Managerial Sciences and Applied Economics
- M.P.P. University of Maryland
- B.A. Political Science, Tufts University, *cum laude*

PROFESSIONAL EXPERIENCE

Econ One Research, Inc.
Managing Director, January 2019 – Present
Senior Economist, October 2011 – December 2018
McDonough School of Business at Georgetown University
Adjunct Professor, 2010 – 2011
Exponent, Inc., Health Sciences
Managing Economist, January 2010 – September 2011
PricewaterhouseCoopers LLP, Advisory Services
Manager, 2006 – 2009
Senior Associate, September 2005 – 2006
The Wharton School of Business, University of Pennsylvania
Lecturer & TA, Managerial Microeconomics (Undergraduate, MBA, and WEMBA), 1999 – 2004

PROFESSIONAL EXPERIENCE, CONTINUED

United States Government Accountability Office
Senior Evaluator, 1996 – 1998
Evaluator, 1992 – 1996

EXPERT REPORTS & TESTIMONY

Apollo MedFlight, LLC v. BlueCross BlueShield of Texas, a Division of Health Care Service Corporation
District Court for the Northern District of Texas, Amarillo Division

- Expert Report (February 2020)
- Expert opinions regarding the reasonable value of certain out-of-network emergency air ambulance transportation services.

ACS Primary Care Physicians Southwest, PA, & Emergency Services of Texas, PA v. Molina Healthcare, Inc. and Molina Healthcare of Texas, Inc.
District Court of Harris County, Texas

- Expert Report (October 2019)
- Rebuttal Expert Report (December 2019)
- Deposition (January 2020)
- Expert opinions regarding the reasonable value of certain out-of-network medical services.

Emergency Services of Oklahoma, PC, Oklahoma Emergency Services, PC, and South Central Emergency Services, PC v. GlobalHealth, Inc.
District Court of Cleveland County, Oklahoma

- Expert Report (June 2019)
- Supplemental Expert Report (August 2019)
- Expert opinions regarding the reasonable value of certain out-of-network medical services.

Southeastern Emergency Physicians, LLC and ACS Emergency Services of Mississippi, Professional Association v. Ambetter of Magnolia, Inc.
Circuit Court of the First Judicial District of Hinds County, Mississippi

- Expert Report (May 2019)
- Rebuttal Expert Report (January 2020)
- Deposition (January 2020)
- Expert opinions regarding the reasonable value of certain out-of-network medical services.

Southeastern Emergency Physicians, LLC v. Arkansas Health & Wellness Health Plan, Inc. and Celtic Insurance Company d/b/a Arkansas Health & Wellness Insurance Company
U.S. District Court for the Eastern District of Arkansas

- Expert Report (March 2019)
- Supplemental Expert Report (March 2019)
- Rebuttal Expert Report (May 2019)
- Expert opinions regarding the reasonable value of certain out-of-network medical services.

***Jacqueline Maldonado* v. Caleres, Inc. et al.**
U.S. District Court for the Central District of California

- Expert Report (May 2018)
- Expert opinions regarding a reasonable royalty for and defendants' profits from copyright infringement in the footwear industry.

***Benedict Ezeokoli et al.* v. Uber Technologies Inc.**
Superior Court of California, County of Alameda

- Declaration (October 2017)
- Reply Declaration (August 2018)
- Expert opinions regarding reliable methodologies to estimate defendant's revenues and plaintiffs' aggregate actual damages from alleged false representations.

Sanjiv Goel, MD v. Aetna Life Insurance Company, Inc.
U.S. District Court for the Central District of California

- Expert Report (February 2015)
- Expert opinions regarding the reasonable value of certain out-of-network medical services.

Sanjiv Goel, MD v. Aetna Life Insurance Company, Inc.
Superior Court of California, County of Los Angeles

- Declaration (February 2015)
- Expert opinions regarding the reasonable value of certain out-of-network medical services.

***Hannah's Boutique, Inc.* v. Barbara Ann Surdej, Roy Surdej, and Jeffrey Surdej, D/B/A Peaches Boutique**
U.S. District Court for the Northern District of Illinois, Eastern Division

- Expert Report (January 2015)
- Deposition (February 2015)
- Hearing Testimony (May 2015)
- Expert opinions regarding assessments of market power in the retail apparel industry.

***H. Cristina Chen-Oster and Shanna Orlich* v. Goldman, Sachs, & Co. and The Goldman Sachs Group, Inc.**
U.S. District Court for the Southern District of New York

- Expert opinions regarding duration of tenure in certain business units and frequency of cross-business unit performance reviews for potential class members involved in a gender discrimination lawsuit. (August 2014)

David Escamilla v. M2 TECHNOLOGY, INC.
U.S. District Court for the Eastern District of Texas, Sherman Division

- Expert Report (December 2013)
- Expert opinions regarding reasonable royalty, damages, and pre-judgment interest due to trademark infringement in the enterprise solutions and information technology industry.

Sanjiv Goel, MD v. Coalition America, Inc.; Multiplan, Inc.; Interplan Health Group, Inc.; Cigna Healthcare of California; Health Net Life Insurance Company; Health Net of California, Inc.; TC3 Health, Inc.
U.S. District Court for the Central District of California

- Expert Report (January 2013)
- Expert opinions regarding the reasonable value of out-of-network medical services.

Zdzislaw Ptak v Black & Decker Corporation, Black & Decker (U.S.) Inc., DeWALT Industrial Tool Co., and Home Depot U.S.A., Inc.,
U.S. District Court for the Northern District of Illinois, Eastern Division

- Expert Report (June 2010)
- Deposition (August 2010)
- Expert opinions regarding consumer willingness-to-pay and cost-benefit analysis of a table saw safety feature.

OTHER REPRESENTATIVE ENGAGEMENTS

Health Care Reimbursement

- Presently engaged as an expert in matters regarding the reasonable value of certain out-of-network medical services.

- Presently engaged as an expert in a class action matter regarding pharmaceutical-related hospital costs.

- For a class of direct purchasers of hospital health care services, performed economic and econometric analysis to establish that a hospital system's contract terms with payers artificially inflated class members' payments, that evidence common to members of the proposed class could be used to show that all or virtually all class members were overcharged, and calculated the aggregate amount of overcharge damages incurred by the proposed class. After settlement, presently calculating allocation amounts for Class members.

- For a class of direct purchasers of hospital health care services, performed economic and econometric analysis to establish that a payer's most-favored nation clauses in contracts with hospitals artificially inflated class members' payments, that evidence common to members of the proposed class could be used to show that all or virtually all class members were overcharged, and that the aggregate amount of overcharge damages incurred by the proposed class as a whole could be calculated on a class-wide, formulaic basis using a reliable methodology.

- For a class of direct purchasers of a vaccine, performed economic analysis to establish that evidence common to members of the proposed class could be used to show that all or virtually all class members were overcharged and that the aggregate amount of overcharge damages incurred by the proposed class could be calculated on a class-wide, formulaic basis using a reliable methodology.

- Retained as an expert in support of multiple health insurers in a series of disputes with a cardiology practice in Federal and CA courts to opine on the reasonable value of certain out-of-network medical services provided by the plaintiff. In addition to consulting work for certain matters, also filed two expert reports and a declaration.

- Estimated damages for False Claims Act matter involving Medicare reimbursements for health care services.

- For a defendant health insurance carrier involved in a class action antitrust matter, performed statistical benchmarking analysis of usual, customary, and reasonable ("UCR") billed charges for out-of-network health care services.

- For a health insurance provider with Medicare Advantage contracts, performed statistical analysis of enrollees sampled for government audits to examine appropriateness of statistical sampling methods selected and representativeness of the sample selected.

- For an energy company, forecasted retiree health care benefits and workers' claims for occupational injury. Designed economic models using publicly available data and extensive analysis of employees' claim records to present a distribution of potential liability outcomes.

Intellectual Property & False Advertising

- Presently engaged as an expert to estimate damages in a patent infringement matter.

- Presently engaged as an expert to estimate the coupon value for a settlement in a class action false advertising matter.

- For a class of consumers in a false advertising matter, retained as a consulting expert to estimate defendants' operating profits earned from the sale of a pharmaceutical to potential class members.

- For a U.S. seller of automobile parts, retained by defendant's counsel as a consulting expert to review plaintiff expert's assessment of actual damages and defendant's profits in a trademark and false designation of origin matter.

- For a Canadian pharmaceutical manufacturer, estimated reasonable royalties and damages for defendant in a patent infringement dispute.

- For a world-wide provider of communications technology, estimated reasonable royalties for a wide range of patents (some standard-essential) across multiple cases involving cellular communication, data transmission security, and certain hardware in mobile handsets, wearables, computers, tablets,

and user applications.

- For a U.S. software development and licensing company involved in multiple cases, estimated reasonable royalties and damages for defendants' use of its patented stateless packet-based processing technology in application delivery and security networking products.

- For a U.S. software development company, estimated reasonable royalties and damages for defendant's use of its patented instant search processing technology.

- For a U.S. manufacturer of consumer global positioning system devices, estimated reasonable royalties and damages for defendant's use of product features enabled by the patented technology.

- For a Taiwanese manufacturer of broadband networking and internet routing communication devices, estimated reasonable royalties for trade secrets to determine the company's shareholder contribution to a multi-national joint venture.

- Assisted a U.S. information technology outsourcer in negotiations to grant license rights to a U.S. Government department by valuing a large portfolio of information technology-related trade secrets.

- Assisted a U.S. software developer in its IP-licensing compliance efforts with antitrust-related rulings and settlement agreements with the European Commission related to FRAND rates set by standard setting organizations.

- For a U.S. property and casualty insurance carrier, retained as an expert to estimate the value of medical research samples that were lost due to a freezer malfunction at a major university.

- For a U.S. manufacturer of industrial chemicals involved in a patent infringement dispute and antitrust counterclaim, analyzed price erosion as a component of lost profits.

Other Antitrust Matters

- For a U.S. manufacturer of high-performance swimwear, estimated damages related to antitrust and other commercial claims. Analyzed market pricing and unit sales to assess the market dominance of the defendant.

- For a U.S. industrial chemicals manufacturer, designed an econometric model to estimate potential damages from class action civil litigation following resolution of a price fixing dispute with the U.S. DOJ.

Monitoring and Compliance Matters

Monitored the viability and competitiveness of business divestitures of merging multinational firms as part of their compliance with structural remedies. Reported to government authorities about pricing, marketing plans, viability of the divestment businesses, supply chain practices, respondent technical efforts to restrict access to confidential business information in IT systems, and divestiture transition progress.

Extensive experience analyzing retailer point-of-sale data from The Nielsen Company/Information Resources, Inc. (IRI).

- For the U.S. Federal Trade Commission (FTC) and the European Commission (EC), member of monitoring team for the P&G/Gillette merger. Divestitures of the SpinBrush toothbrush business, Rembrandt (a Gillette oral care product line), Right Guard, and other Gillette deodorant brands.

- For the FTC, case manager for team monitoring the Pernod Ricard/V&S merger. Analyzed the performance of Absolut and Stolichnaya in the "super-premium" vodka market, as well as distribution agreements for other distilled spirits.

- For the FTC and EC, case manager for U.S.-based team monitoring the BASF/Ciba merger in the chemical industry.

- For the German Bundeskartellamt (Federal Cartel Office), case manager for U.S.-German team monitoring compliance with structural remedies for the Stihl/ZAMA merger in the hand-held power tools industry. Directed meetings with parent company and potential buyers in Japan and Hong Kong and assessed controls in a Chinese manufacturing facility.

Other Commercial Litigation

- For an asset-based lender, retained as a consulting expert to estimate lost profits related to the denial of an insurance claim.

- For a real estate developer, analyzed fair market compensation in an eminent domain matter as well as aspects of property value diminution.

- Performed a literature review of the economics of vertical and horizontal market definition to support expert's rebuttal in MTBE litigation.

- For a food manufacturer, performed statistical and econometric analysis in response to allegations of employment discrimination.

Economics and Business Analytics Consulting

- Estimated the market size and strategic opportunity for a specific business unit of a U.S. technology company.

- For a consumer-packaged goods industry association, assessed a sub-industry's economic impact on the U.S. economy, including the direct and indirect economic flows that result from supply chain purchases.

- Estimated the market size and drivers of political risk insurance premiums and market share.

- Prepared an impact assessment of the free trade agreement between the United States and another country. Assessment included identification of industries and companies with highest potential to be affected by the agreement and therefore potential trading and investment partners.

INVITED PRESENTATIONS AND PUBLICATIONS

- "Supreme Court to Decide Whether Willfulness is Required for Trademark Infringement." Beverly Hills Bar Association, Member Articles, January 28, 2020. https://bhba.org/supreme-court-to-decide-whether-willfulness-is-required-for-trademark-infringement-damages/

- "Intellectual Property in Fashion Law: Hot Topics and Recent Developments." (Moderator) Beverly Hills Bar Association, December 5, 2019.

- "The Price of an Improperly Disclosed Social Media Ad." *Law360*, February 8, 2019 (with Vera Golosker).

- "A Look at the Numbers - Old Biases in New Media: Discussing Disparities and How to Eliminate Bias in IP, Internet and New Media Law." Beverly Hills Bar Association, January 10, 2019.

- "Royalty Accounting Demystified: Profit Participation & Contingent Compensation in Hollywood." (Moderator) Beverly Hills Bar Association, August 9, 2018.

- "An In-Depth Examination of Working with Class Action Experts," Bridgeport 2017 Class Action Litigation Conference - Los Angeles, April 7, 2017. http://bridgeportce.com/bridgeportce/live-programs/2017-class-action-litigation-conference-los-angeles.html

- "Trademark Infringement Damages: Fundamentals and Case Law," ABA Young Lawyers Practical Tips Series Webinar, January 24, 2017.

- "Presenting damages at trial: How to relate your damages case to the jury," Patent Disputes Forum North, Daily Journal Corporation, Menlo Park, CA, April 14, 2016. http://www.callawyer.com/events/patent-disputes-forum-north/

- Economic Expert Witness, National Institute for Trial Advocacy (NITA), Robert H. Hanley Advanced Trial Skills Program, San Francisco, CA, September 18, 2014.

- "Surveys Gaining Attention for Patent Damages," Patent Disputes 2014, Thomson Reuters Legal Executive Institute, Costa Mesa, CA, May 6, 2014.

- "Apportionment for Patent Damages," 2012 Patent Disputes Forum, Thomson Reuters West LegalEdCenter, Santa Clara, CA, November 14, 2012.

- "Expert Witness Cross-Exam Workshop," The State Bar of California 85th Annual Meeting (With the Trial Advocacy Group), October 13-14, 2012.

- "Cross Examining Expert Witnesses," LA County Bar Association (With the Trial Advocacy Group), October 8, 2012.

- "Unique Tips for Expert Witness Cross-Examination," Women Lawyers Association of Los Angeles E-

Newsletter: October 2012. http://www.wlala.org/displaycommon.cfm?an=1&subarticlenbr=231

- "If You Can't Measure Income, Then Track Consumer Preferences: Did Orbitz Side Step Omitted Variable Bias with Predictive Analytics?" Econ One Twitter feed, June 28, 2012.

- "Cross Examining Expert Witnesses," LA County Bar Association (with the Trial Advocacy Group), November 11, 2011.

- "Changes in the Patent Landscape: Legislative Bills and Judicial Decisions—How They Affect Life Sciences and Other Industries," Health News - Exponent Health Sciences News Release, June 3, 2011 (J. Vanderhart, M. Villarraga, and K. Ong.)

- "Emerging Issues in Health Care Reimbursement," Health News - Exponent Health Sciences News Release, August 20, 2010 (with R. Cantor, J. Schmier, and M. Mittelman).

- "Insights from an M&A monitor." *Executive Counsel – C-level Insights for Business Leaders* 2009; 6(3):62–64 (with E. Gold and S. Andreassen-Henderson).

- "Bringing innovation to supply chain risk." Textron ETC & OEC Joint Council Meeting, November 19, 2008.

- "Crossfire: Difficult-to-measure but important metrics." Presented at Aviation Week Management Forums – Metrics Used by Top Performing Companies, September 16 – 17, 2008.

- Economic Expert Witness, National Institute for Trial Advocacy (NITA), Robert F. Hanley Advanced Advocacy Skills Program, Louisville, CO, June 27 – 28, 2007.

- PwC-Ropes & Gray Financial Expert Witness Training Program, Washington, DC, 2006.

- "International Privatization: Estimating the Returns to U.S. Acquirers of Foreign State-Owned Enterprises," Ph.D. Dissertation, 2005.

PROFESSIONAL AND ACADEMIC HONORS

- PwC Chairman's Award, Washington, DC Metro - Technology Client Team, 2008
- PwC Chairman's Award, Florham Park, NJ - Grocery Manufacturers Association Team, 2007
- The Wharton School, University of Pennsylvania Doctoral Fellowship, 1998 – 2002
- GAO Special Commendation Award - Defense Acquisition Workforce Team, 1996
- The Honor Society of Phi Kappa Phi, 1992
- Excellence in Scholarship Award (For Best Graduating Student), University of Maryland School of Public Policy, 1992
- Gladys Noon Spellman Fellowship, University of Maryland School of Public Policy, 1991 – 1992
- Chessie Railroad Fellowship, University of Maryland School of Public Policy, 1990 – 1991

ACTIVE MEMBERSHIPS

- American Bar Association – Antitrust, Health Law, Intellectual Property, and Litigation Sections, *Associate Member*
- American Economic Association
- Beverly Hills Bar Association – IP, Internet & New Media Section, *Executive Board Vice Chair;* Litigation Section; Entertainment Section
- Los Angeles Intellectual Property Law Association

Exhibit 2
Byron McKnight, et al. v. Uber Technologies, Inc., et al.
Materials Relied Upon

Pleadings and/ or Court Documents

Amended Stipulation of Settlement, United States District Court for the Northern District of California, 6/1/2017 (ECF 125)
Declaration of Cameron R. Azari, Esq., 1/25/18 (ECF No. 164)
Declaration of Robert Ahdoot in Support of Plantiffs' Motion for Preliminary Approval of Class Action Settlement, United States District Court, Northern District of California, 7/6/2017 (ECF 126)
Defendants' Updated Responses to Plaintiffs' Information Requests (Highly Confidential), March 3, 2020
Order Granting Final Approval and Granting in Part and Denying in Part Plaintiffs' Motion for Attorney's Fees, Costs, and Incentive Awards, United States District Court, Northern District of California, 8/13/2019 (ECF 189)
Stipulation and Protective Order, Case No. 3:15-cv-00064-JST, 8/3/15 (ECF 51)

Declarations and/or Exhibits

Declaration of Jane E. Cloninger in Support of Plaintiffs' Renewed Motion for Attorneys' Fees and Expenses and for Consider of Expert Testimony in Support Thereof Under 28 U.S.C § 1712(d), 3/4/20
Declaration of Brian Young in Support of Plaintiffs' Renewed Motion for Attorneys' Fees and Expenses and for Consideration of Expert Testimony in Support Thereof Under 28 U.S.C § 1712(d), 3/4/20

Publicly Available Materials

Baker, et al. 2014. "Willingness to Pay for Health." *Encyclopedia of Health Economics*, Vol. 3., edited by Anthony J. Culyer, 495-501
Class Action Fairness Act ("CAFA"), 28 U.S.C. §1712.
Court Ordered Notice of Class Action Settlement. *In re: Zappos.com, Inc. Customer Data Security Breach Litigation*, United States District Court, District of Nevada, Case No. 3:12-cv-00325-RCJ-CBC, MDL No. 2357 http://www.zapposdatasettlement.com/media/2391587/settlement_agreement_and_release.pdf.
Elsevier. "Impact Factor & Ranking." *Elsevier Journal Metrics Visualization.* https://journalinsights.elsevier.com/journals/0967-070X/impact_factor
Rayle, Lisa, et al. 2016. "Just a better taxi? A survey-based comparison of taxis, transit, and ridesourcing services in San Francisco." *Transport Policy*, Vol. 45. 168-178. (bearing bates numbers PMM00065023-PMM00065033)
Siddiqui, Faiz. 2019. "Uber discloses 3,000 reports of sexual assault on U.S. rides last year in its long-awaited safety study." The Washington Post. https://www.washingtonpost.com/technology/2019/12/05/uber-disclosed-sexual-assaults-us-rides-last-year-its-long-awaited-safety-report/?arc404=true.
Uber. 2019. "US Safety Report, 2017-2018." https://www.uber.com/us/en/about/reports/us-safety-report/

All other materials cited in this Declaration and associated exhibits.

EXHIBIT 3

Just A Better Taxi? A Survey-Based Comparison of Taxis, Transit, and Ridesourcing Services in San Francisco

Article *in* Transport Policy · January 2016

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Just a better taxi? A survey-based comparison of taxis, transit, and ridesourcing services in San Francisco

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ABSTRACT

In this study, we present exploratory evidence of how "ridesourcing" services (app based, on demand ride services like Uber and Lyft) are used in San Francisco. We explore who uses ridesourcing and for what reasons, how the ridesourcing market compares to that of traditional taxis, and how ridesourcing impacts the use of public transit and overall vehicle travel. In spring 2014, 380 completed intercept surveys were collected from three ridesourcing "hot spots" in San Francisco. We compare survey results with matched pair taxi trip data and results of a previous taxi user survey. We also compare travel times for ridesourcing and taxis with those for public transit. The findings indicate that, despite many similarities, taxis and ridesourcing differ in user characteristics, wait times, and trips served. While ridesourcing replaces taxi trips, at least half of ridesourcing trips replaced modes other than taxi, including public transit and driving. Impacts on overall vehicle travel are unclear. We conclude with suggestions for future research.

1. Introduction

The recent emergence of app based, on demand ride services has sparked great debate over their role in urban transport. We refer to these services provided by companies like Uber and Lyft as "ridesourcing." Ridesourcing dynamically matches supply and demand by allowing travelers to request car rides in real time from potential suppliers using a smartphone application. Distinct from ridesharing, ridesourcing drivers operate for profit and typically provide rides not incidental to their own trips. Ridesourcing is distinguished from traditional taxicabs by its use of smartphone technology and a dynamic matching algorithm which some taxis have also adopted. It is also distinct because ridesourcing in the U.S. has not been subject to taxi regulations, which in many cities limit supply, determine fares, and set safety standards. Bolstered by support from customers, ridesourcing companies have grown quickly and received regulatory support across the U.S. However, they have also provoked the ire of the taxi industry and generated concern among many regulators.

Ridesourcing raises a number of public interest questions. Supporters view ridesourcing as part of a suite of transport options that provides fast, flexible, and convenient mobility in urban areas. By providing an attractive alternative to driving and filling gaps in the public transit network, these services can potentially reduce auto use, ownership, and associated environmental impacts (e.g., see Laurent and Katz, 2013; Metcalfe and Warburg, 2012; Silver and Fischer Baum, 2015). However, critics charge that ridesourcing services increase congestion, compete with public transit, mislead consumers through opaque pricing practices, cater only to the young and well to do, and endanger public safety (Flegenheimer and Fitzsimmons, 2015; Laurent and Katz, 2013; Sabatini, 2014). Regulations may be needed to counteract negative externalities and other market failures inherent in the sector.

Ridesourcing has attracted significant criticism from its most direct competitor, the taxi industry, which views ridesourcing as an illegal service that flouts existing laws and competes unfairly. Ostensibly, taxis would fill the role played by ridesourcing services (Austin and Zegras, 2012; Gilbert and Samuels, 1982; King et al., 2012; Wohl, 1975), but in many cities they have not, due to regulations and monopolistic behavior that restrict supply and give rise to reliability and service quality problems (Cervero, 1997; Gilbert and Samuels, 1982; Hara Associates, 2013; Wohl, 1975). Some also argue that ridesourcing differs from traditional taxis due to the efficiency and reliability of the matching platform and pricing mechanisms, along with the accountability of the rating system. On the one hand, proponents maintain that ridesourcing, unlike taxis, enables more efficient use of vehicles that drivers

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0967-070X/

already own. On the other hand, ridesourcing's apparent efficiency advantages may also be explained by its exemption from the supply restrictions that often govern taxis.

As city leaders deliberate policies on ridesourcing, there is an urgent need for independent data on their use and analysis of their environmental impacts. To date, little data on travelers' use of ridesourcing has been publicly available. The only studies of ridesourcing's impacts, to our knowledge, have been in the popular media (Bialik et al., 2015; Silver and Fischer Baum, 2015), conducted by the companies themselves (Hall and Krueger, 2015), based on qualitative interviews with drivers (Anderson, 2014). In this exploratory study, we aim to fill this research gap and provide initial evidence on the use of ridesourcing in San Francisco. We focus on three questions: (1) Who uses ridesourcing and for what reasons? (2) How does the ridesourcing market compare with that of traditional taxis? (3) How does ridesourcing impact the use of public transit and overall vehicle travel?

We begin the paper by describing how ridesourcing operates in San Francisco and reviewing related literature. After explaining the survey methodology, we discuss results and conclude with a discussion on policy implications and suggestions for future research.

1.1. Background

Ridesourcing allows travelers to request a ride in real time through a smartphone application, which communicates the passenger's location to nearby drivers. After a driver accepts a ride request, the passenger can view the vehicle's real time location and estimated arrival time. The app provides GPS enabled navigation, which helps non professional drivers find destinations and reduces the chances of them taking a circuitous route. The payment and sometimes tips are automatically charged to the passenger's credit card. The driver keeps a portion of the fare, with the balance going to the ridesourcing company. Prices can respond dynamically to demand, which could increase the likelihood of finding a ride at peak times, but this can also make prices less predictable. Drivers and passengers rate each other at the ride's completion, creating an incentive system that rewards polite behavior. Unlike taxis, ridesourcing services like uberX, Lyft and Sidecar typically use drivers who lack a commercial vehicle license, drive their personal vehicle, and work part time. Because of these characteristics, these services are considered "pure" ridesourcing compared to Uber' other options like UberBlack and UberSUV, which use dedicated vehicles and drivers with a for hire license.

Much debate has gone into terminology for these services. Other names currently include: "Transportation Network Companies (TNCs)," "real time ridesharing," "parataxis," "ride hailing," and "on demand rides." We chose to use "ridesourcing" because we believe it succinctly conveys the essential technology a platform used to "source" rides from a driver pool. However, definitions are elusive, especially as these services continue to evolve. Taxi companies have also adopted app based dispatch, some before the advent of Uber and Lyft.[1] App enabled ridesharing (i.e., carpooling) also preceded Uber and Lyft. More recently, options like UberPOOL and Lyft Line allow unrelated passengers whose routes overlap to split rides and fares. Moreover, ridesourcing is not a new idea (e.g., Wright and Curtis (2005)); it falls into broader, more familiar categories, such as paratransit (Cervero, 1997) and demand responsive or flexible transport (Brake et al., 2007; Davison et al., 2014). What is new about recent ridesourcing by Uber, Lyft, and others is the combination of a model that leverages GPS enabled smartphone technology and exemption from traditional taxi regulations, which allows more flexibility in supply and service characteristics.

That combination appears enormously successful among consumers. According to the San Francisco Municipal Transportation Agency's (SFMTA) annual travel survey, in 2014, ridesourcing served an estimated 47,000 trips per day in San Francisco, or 1% of all trips, while taxis made about 22,000 trips per day. The same survey found 25% of San Francisco residents used ridesourcing at least monthly, compared to 19% for taxis (SFMTA, 2014a). A 2015 poll of registered voters in the U.S. found 12% used Uber or Lyft at least once a month, compared to 13% for taxis (Morning Consult, 2015). Among voters aged 18 44, that proportion jumped to 26% for Uber or Lyft, slightly edging out the 25% for taxis. Ridesourcing is indeed proving tough competition for taxis in San Francisco, the number of taxi trips per month dropped by more than half between March 2012 and July 2014 (SFMTA, 2014b).

1.2. Related literature

Because independent research on the use of ridesourcing is very limited, we turn to related research on ridesharing (carpooling/vanpooling) and taxis to provide insights into expected usage characteristics and potential impacts. Compared to driving alone, ridesharing reduces vehicle miles traveled and for this reason federal and local policies have for decades promoted ridesharing (Altshuler et al., 1979). Individually, ridesharing participants benefit from shared travel costs, travel time savings from high occupancy vehicle lanes, and reduced commute stress (Chan and Shaheen, 2012). Despite its benefits, increased ridesharing use has faced several barriers, including reluctance to sacrifice the flexibility and convenience of the private automobile (Dueker and Levin, 1976), desire for personal space and time (Bonsall et al., 1984), and personal security concerns about riding with strangers.

Taxis have historically accounted for a very small share of urban travel and are much less extensively studied than other transport modes. Past surveys have shown taxis to serve several markets older residents, higher income groups, and lower income households without a car (Webster et al., 1974). Despite their small modal share, taxis fill a critical gap by providing transportation when driving or other public transit modes are not possible (Gilbert and Samuels, 1982; Wohl, 1975). Notably, authors have found taxis to be both complements and substitutes for public transit (Austin and Zegras, 2012; King et al., 2012). Shared taxis can potentially bring benefits, including increased efficiency, lower costs for passengers, and reduced congestion and overall vehicle travel (Cervero, 1997; Enoch et al., 2004; Santi et al., 2014; Wohl, 1975). However, most cities in the U.S. prohibit unrelated passengers from sharing a taxi.

Research suggests unregulated taxi services can create public costs, and almost all large and medium sized cities have regulated taxis since the 1930s (Dempsey, 1996; Gilbert and Samuels, 1982). The taxi industry has at various times suffered from numerous market failures, providing the rationale for regulation (Dempsey, 1996; Gilbert and Samuels, 1982; Schaller, 2007). Lack of information is a problem in street hail and cab stand markets riders cannot compare information on price or service quality before choosing a vehicle, often resulting in poor service quality. Low barriers to entry in these markets tend to enable over competition, leading to aggressive and unsafe driver behavior, poor vehicle maintenance, and congestion (Schaller, 2007). Regulatory responses include restrictions on market entry and supply (i.e., medallion systems); fare regulation; and vehicle and driver safety standards. The taxi industry in San Francisco is particularly heavily regulated, especially in terms of supply a 2013 report concluded that the existing supply of 1585 taxis needed to be increased by at

[1] For example, as of October 2014, 80% of San Francisco's 1450 taxis were using the e-hail app Flywheel, according to the company.

least 50% to meet demand (Hara Associates, 2013a). Technological advances, moreover, bring into question how the need for regulation may have changed. Hailing a for hire vehicle no longer requires standing on a street corner or placing a telephone call, and rating systems might resolve the lack of information problem. With characteristics similar to taxis, but also the potential to realize some of the benefits of both taxis and ridesharing, ridesourcing poses a challenge for regulators. Addressing these challenges clearly requires better data on how ridesourcing is actually used in cities.

2. Methodology

To collect data on ridesourcing users and trips, we conducted an intercept survey in San Francisco during May and June 2014. The survey was conducted by intercepting ridesourcing customers on the street in key locations expected to have a high concentration of such users. We identified potential locations based on conversations with drivers and our own observations. After conducting pretests at these locations, we chose the three with the highest response rates (see Fig. 1):

1. The Mission District (Valencia Street between 16th Street and 19th Street, and 16th Street between Mission Street and Guerrero Street);
2. The Marina District (Chestnut Street between Pierce Street and Laguna Street); and
3. North Beach (Columbus Avenue between Broadway and Union Street).

The pretests yielded an acceptable response rate (of roughly 4 5 completed responses per hour) only in evenings and during peak hours Thursdays from 5:30 to 8:30 p.m., Fridays 6:30 9:30 p.m.,

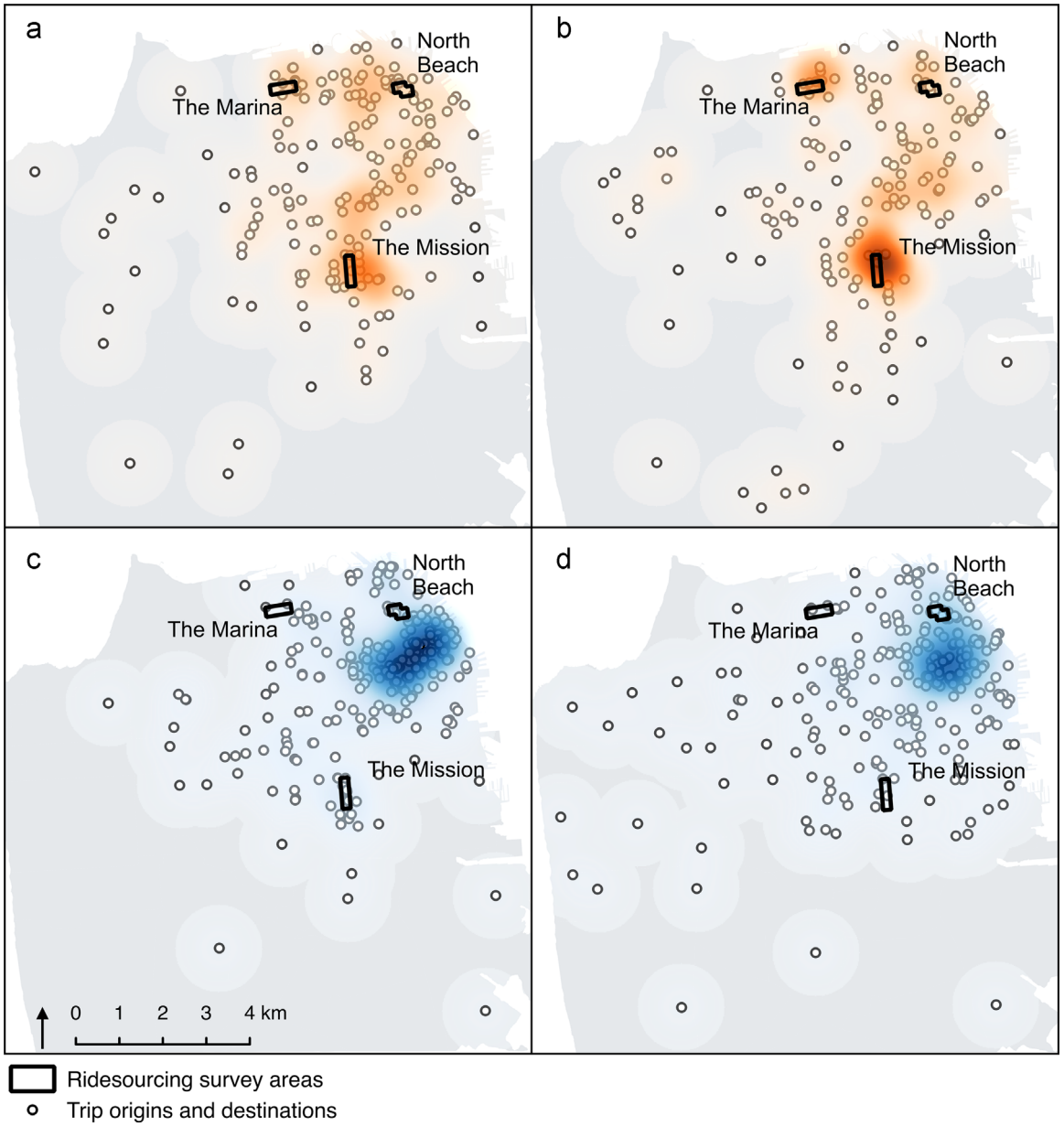

Fig. 1. (a) Sampled ridesourcing trip origins, (b) ridesourcing trip destinations, (c) sampled taxi trip origins, and (d) taxi trip destinations in San Francisco. Heavier shading indicates a higher concentration of trips. Several trips for both services also began or ended at San Francisco International Airport, which is not shown. (Ridesourcing n 294, taxi sample n 290).

and Saturdays 7:30 10:30 p.m. In June, surveying on Wednesdays from 6:30 9:30 p.m. was added, and Saturday surveying was shifted to 6:30 9:30 p.m. in response to surveyor feedback from the field. While ridesourcing companies and drivers advised that many trips are taken throughout the day, including the AM and PM commute, pretesting conducted downtown during commute times yielded an extremely low response rate; hence, we did not attempt to survey at these times and locations.

Surveyors recruited two types of potential respondents: individuals who had just completed a ridesourcing trip ("intercept trips"), and individuals passing on the street who had used ridesourcing within the last two weeks ("previous trips"). Both groups responded to identical surveys. Surveyors were instructed to prioritize intercepting anyone exiting a ridesourcing vehicle, which were identifiable either by a sign (e.g., the company's logo or Lyft's pink mustache), passengers riding in the backseat, or a driver using the company's smartphone app. Our pretests suggested it was relatively easy to distinguish ridesourcing vehicles and passengers from those getting a ride from a friend or family member simply based on the passenger and driver behavior. The intercepted respondents were asked about the trip they just completed (i.e., an intercept trip). For the "previous trips," surveyors were instructed to intercept every fifth person encountered on the sidewalk. These individuals were asked if they had taken a ridesourcing trip within the past two weeks. If not, they were not eligible to complete the survey. If so, they were asked to recall their most recent trip. Those approached who did not have time to complete a survey were given a link to an equivalent online survey, which they could complete later on a computer or smartphone.

Of the 757 approached to participate in the survey over two months, 380 completed the questionnaire (i.e., response rate of 50.2%). Of the $n=380$ completed responses, 294 (77%) were about trips within San Francisco, but 21 (6%) had at least an origin or destination elsewhere in the Bay Area, and 24 (6%) answered about trips entirely outside of San Francisco. Another 41 (11%) were discarded due to missing data (e.g., missing origin/destination, unintelligible locations). This analysis focuses mainly on trips taken within San Francisco. Of the 380 trips, 316 (83%) were "previous trips," while 64 (17%) were "intercept trips." For analysis of demographics and non location specific topics, we include all Bay Area trips, as noted in the findings.

The survey asked 18 questions regarding trip origin and destination, trip purpose, previous and alternative modal choice, car ownership, and basic demographics. After survey completion, respondents received a US$5 gift card to a local coffee vendor. Survey instruments were pre tested and modified slightly based on user feedback.

We compared ridesourcing intercept survey data with data from three other sources: (1) a survey of taxi users conducted for the SFMTA, (2) GPS trip logs from one medium sized taxi company in San Francisco, and (3) the American Community Survey (ACS) 2013 one year estimates. The SFMTA taxi user survey, completed in early 2013, was a telephone survey of a representative sample of San Francisco households. This survey asked questions about respondents' typical taxi usage and opinions about taxi service, but did not ask about specific trips and did not include detailed location information (Hara Associates, 2013b). The taxi trip log data included origins, destinations, fare, distance, and number of passengers for all trips provided by the company's vehicles in October 2013. To enable a matched comparison between taxis and ridesourcing, a random sample of taxi trips was generated to match the day of the week and time of day of surveyed ridesourcing trips. For example, for each surveyed ridesourcing trip that took place on Fridays between 7:00 8:00 p.m., one taxi trip was randomly selected from the same Friday, 7:00 8:00 p.m. time period. From the approximately 150,000 logged taxi trips, 290 trips overlapped with ridesourcing trips. While the dates of the ridesourcing survey did not align with the taxi trip logs, all observations excluded summer vacation and rainy seasons, which are factors that can influence travel behavior. The ACS data provided information on demographic characteristics of the San Francisco population for comparison.

2.1. Limitations

Like all intercept surveys, this survey was not completely representative of the ridesourcing market. Data were collected from three neighborhoods, capturing primarily evening trips to dining and entertainment venues. While these social, evening trips likely comprise a large and perhaps the largest part of the ridesourcing market, other types of trips are underrepresented. Informal conversations with drivers tell us many people use ridesourcing services for their commute, airport trips, and other errands. Thus, the survey does not adequately capture these trips. Respondents did not represent all ridesourcing users in San Francisco or the greater Bay Area. The survey oversampled users who were likely to be in the survey locations in the evenings. A further limitation is that, while the ridesourcing survey data are roughly comparable to data from the existing taxi survey and sampled taxi trip data, these three sets were collected via different methods with different sampling strategies, and thus rigorous statistical comparisons between them are not meaningful.[2] Given these limitations, we intend this as an exploratory study on which future research can build.

3. Results

3.1. Ridesourcing market share

Of all surveyed trips, uberX provided the majority (53%), while other Uber services (black car, SUV) represented another 8%. Lyft provided 30% of trips, Sidecar 7%, and the remainder was other services. This is consistent with anecdotal information on the market share of each service.

3.2. Respondent demographics

Ridesourcing survey respondents were generally younger and better educated than the average population in San Francisco (see Table 1). The age distributions for both ridesourcing and those who use taxis at least once a week skew younger than that for the city as a whole. Ridesourcing survey respondents were generally even younger than frequent taxi users, although this difference may be influenced by the sampling method individuals surveyed may be younger on average than the actual ridesourcing user base.

Respondents were relatively well educated 84% of ridesourcing customers had a bachelor's degree or higher, more than for the general San Francisco population. Surveyed ridesourcing customers matched the income profile of San Franciscans fairly closely, with the prominent exception that households making less than US$30,000 were underrepresented. However, a high percentage of respondents (12%) refused to answer, and these individuals may not have the same distribution as the rest of the sample. Income and education data for taxi users are not available. While the majority of respondents said they had a vehicle at home,

[2] Surveyed ridesourcing trips were matched with logged taxi trips based on time and day, but the intercept nature of the ridesourcing survey likely biased the sample toward trips made by people likely to be on the street in certain neighborhoods, whereas that bias was not present for the taxi sample.

the proportion that was car less (43%) was greater than that for frequent taxi users (35%) and for the overall city population (19%).

Measured by home zip code, survey respondents reflected most of the spatial distribution of the population in the city, except respondents were more likely to live in the centrally located Russian Hill, Nob Hill, and Castro neighborhoods, as well as the Marina, a neighborhood known for poor public transit connections. Neighborhoods in the outlying southern part of the city, like Outer Mission and Bayview, were underrepresented. In all, the survey data do not refute the claim that ridesourcing disproportionately serves younger residents of higher socio economic status; however, it is not clear whether or not the findings are biased by the sampling method and whether the ridesourcing market differs from taxis.

Table 1
Demographics of ridesourcing survey respondents compared to taxi survey.
Sources: [a] 2013 SFMTA taxi user survey; [b] 2013 ACS one-year estimates, City of San Francisco.

	Ridesourcing		*Taxi*[a]		*San Francisco population*[b] (%)
	Responses	%	*Uses taxis at least once a week* (%)	*Uses taxis less than once a week* (%)	
Age					
15–24	50	16%	3%	11%	10%
25–34	178	57%	43%	23%	22%
35–44	59	19%	27%	21%	16%
45–54	20	6%	13%	17%	14%
55–64	3	1%	9%	15%	12%
65–74	0	0%	4%	8%	7%
75+	0	0%	2%	9%	7%
n	*310*		*94*	*369*	
Gender					
Female	124	40%	42%	48%	49%
Male	184	60%	56%	53%	51%
n	*308*		*94*	*378*	
Vehicle availability					
No vehicle at home	139	43%	35%	20%	19%
n	*323*		*94*	*375*	
Household Income					
$30 K or less	28	9%	n/a	n/a	24%
$30–70 K	74	23%	n/a	n/a	22%
$71–100 K	56	18%	n/a	n/a	13%
$100–200 K	86	27%	n/a	n/a	25%
$200 K+	35	11%	n/a	n/a	16%
No response	37	12%	n/a	n/a	n/a
n	*316*				
Education					
Less than a bachelor's degree	51	16%	n/a	n/a	47%
Bachelor's degree	173	54%	n/a	n/a	31%
Graduate degree	87	27%	n/a	n/a	22%
Other degree	10	3%	n/a	n/a	n/a
n	*321*				

Household income and education were not included in the taxi survey.

3.3. Trip origins and destinations

The survey captured trips from across San Francisco and elsewhere in the Bay Area, as did the sampled taxi trips. The spatial distribution of trip origins and destinations within San Francisco is shown in Fig. 1. As expected, the ridesourcing destinations were concentrated in the three survey locations, while the taxi origins and destinations were heavily concentrated in the downtown area. Still, both cover similar areas: in comparing the two samples, more than half (58%) of ridesourcing trips began within 200 m of the taxi trip, and 81% within 400 m (the same numbers for destinations were 51% and 86%, respectively). Since we lack data on the overall spatial distribution of ridesourcing trips, we cannot say how representative our data are.

While the vast majority of both ridesourcing and taxi trips served San Francisco's central area, a smaller number of trips began or ended in lower density areas outside of San Francisco or in the city's outer neighborhoods. Fig. 1 suggests that taxi trips were more likely to begin in the downtown core, even if they ended in outlying neighborhoods, whereas ridesourcing trips outside of the downtown might begin or end in outlying neighborhoods.

3.4. Trip purpose

Table 2 presents reported trip purposes from the ridesourcing survey and from the taxi survey. The two sets of responses are not directly comparable because the ridesourcing survey asked for the nature of the trip's origin and destination, whereas the taxi survey asked respondents for the “most common reason” they use taxis. Of all ridesourcing responses, 67% were social/leisure (e.g. bar, restaurant, concert, visit friends/family). A smaller 16% were commuting to or from work, 4% were to or from the airport, and 5% were other (e.g. doctor's appointment, volunteer). A large percentage (47%) of trips began somewhere other than home or work a restaurant, bar, gym, etc. and 40% were home based. Although the survey did not specifically request it, 5% of ridesourcing respondents named a specific public transit station as their origin or destination, suggesting they used ridesourcing to access transit. Almost half (48%) of ridesourcing trips occurred on Friday or Saturday. While evening hours are heavily represented,

Table 2
Trip purpose for ridesourcing and taxi surveys.[a]

Ridesourcing survey			**Taxi survey**		
Trip purpose	*Responses*	*Percent*	**Most common reasons to use taxis**	*Uses taxis at least once per week*	*Uses taxis less than once per week*
Social/leisure	213	67%	Going out at night	45%	46%
Work	52	16%	Work	27%	7%
To/from airport	13	4%	To/from airport	23%	34%
Shopping/errands	8	3%	Shopping/daytime activities	14%	15%
School	3	1%	Other business or employment needs	11%	9%
Other (medical, volunteer)	16	5%	Medical	6%	4%
To/from transit	15	5%	Avoid parking	3%	1%
n	*320*		Transit not running/inconvenient	2%	1%
			Car trouble/car not available	1%	2%
			n	*94*	*376*

[a] Ridesourcing and taxi responses are not directly comparable due to differences in survey questions. The ridesourcing survey asked, “What was your reason for coming here (or going there)?” and accepted only a single response. The taxi survey asked, “What is the most common reason you use taxis?” and accepted multiple responses.

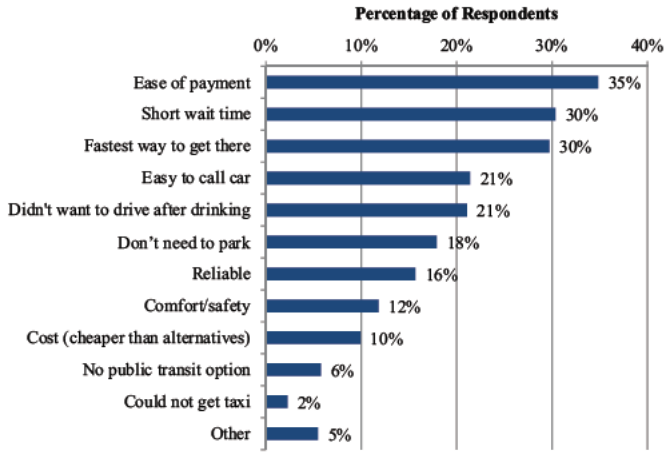

Fig. 2. Responses to "what are the top two reasons you used uberX/Lyft/Sidecar for this trip?" (n 313). "Other" included, for example, need to carry stuff, friendly driver, car being repaired, and company pays for it.

the survey did capture trips at times throughout the day and night. Given that we oversampled nighttime and social trips, it is un surprising that the majority were social/leisure trips. Perhaps more notable is that 16% were work trips, implying the true of proportion of work trips is higher. In comparison, 27% of frequent taxi users, or 5% of all taxi users, said commuting to work was one of the most common reasons they used taxis. These figures sug gest ridesourcing is not merely used for "going out at night," as sometimes believed, and it may be a more common commute mode than taxis.

3.5. Reasons for choosing ridesourcing

When asked why they chose ridesourcing, variations on speed and convenience were the main attractions (Fig. 2), but other reasons were important too. More than 20% said they wanted to avoid drinking and driving. Only 2% said they could not get a taxi, and only 6% said public transit was not available.

Reasons for using ridesourcing varied by alternative mode. Among those who would have taken the bus, the most common responses were: fastest way to get there (24%) and short wait time (12%). For those who would have taken a taxi, the top reasons were about convenience 25% said ease of payment, 17% said short wait time, and 11% said easy to call car. These particular re spondents did not consider ridesourcing to be generally cheaper or more reliable only 3% said they chose ridesourcing due to cost and only 7% cited reliability. Users who would have otherwise driven appeared to want to avoid driving hassles. Of these re spondents, the greatest number (25%) said: "do not need to park," and 19% "did not want to drive after drinking." Overall, speed (shorter wait times and travel times) and convenience appear to make ridesourcing more appealing than the alternatives.

3.6. Wait time

Ridesourcing wait times are dramatically shorter than typical taxi dispatch and hail times (see Table 3). When calling a taxi to their home, only 35% of San Francisco residents said they usually waited less than ten minutes on a weekday during the day; on nights and weekends, this figure dropped to 16%. By comparison, close to 90% of ridesourcing respondents said they waited ten minutes or less at all times, and 67% waited five minutes or less. Ridesourcing wait times are also much more consistent across day of week, time of day, and area of the city. Ridesourcing customers could expect a wait of ten minutes or less any time and anywhere in the city. In contrast, taxi wait times varied considerably by time, day, and location and were notably longer in the city's outer neighborhoods (Zones 2, 3, 4 and 5; see Fig. 3).

The discrepancy in wait times might result from location biases in our sample, since most surveyed ridesourcing trips did not begin at home, while the taxi survey asked about home location. However, when we analyzed the data by city zone, as defined in the taxi survey, the pattern of shorter and more consistent wait times held. Ridesourcing response times were longer in Zone 1 (which includes downtown) than other parts of the city, but the difference was very small compared with the variation in taxi times. For instance, on a weekday before 6 p.m., 88% of ridesour cing wait times in Zone 1 were ten minutes or less, whereas only

Table 3
Ridesourcing wait times compared with taxi dispatch and hail times.

	Ridesourcing[a]						Taxi Dispatch to Home[b]						Taxi Hail Near Home					
	All	Zone[c]					All	Zone					All	Zone				
		1	2	3	4	5		1	2	3	4	5		1	2	3	4	5
Mon–Fri 4 a.m. - 6 p.m.																		
≤ 10 min	**93%**	88%	100%	n/a	83%	100%	**35%**	43%	42%	23%	25%	36%	**39%**	53%	46%	6%	24%	30%
10–20 min	**7%**	12%	0%	n/a	17%	0%	**41%**	41%	42%	41%	48%	38%	**29%**	32%	27%	17%	29%	36%
> 20 min or never[d]	**0%**	0%	0%	n/a	0%	0%	**23%**	16%	16%	36%	27%	26%	**32%**	15%	27%	78%	48%	33%
n	***97***	*43*	*24*	*n/a*	*6*	*14*	***282***	*79*	*57*	*39*	*56*	*47*	***226***	*81*	*48*	*18*	*42*	*33*
Mon–Fri 6 p.m. - 4 a.m.																		
≤ 10 min	**92%**	89%	100%	n/a	93%	100%	**16%**	17%	16%	14%	6%	27%	**33%**	38%	40%	0%	24%	36%
10–20 min	**6%**	10%	0%	n/a	7%	0%	**47%**	43%	54%	45%	54%	35%	**31%**	39%	21%	17%	31%	38%
> 20 min or never	**1%**	2%	0%	n/a	0%	0%	**37%**	40%	30%	41%	40%	38%	**36%**	23%	38%	83%	44%	26%
n	***144***	*61*	*30*	*n/a*	*15*	*23*	***254***	*77*	*56*	*29*	*52*	*37*	***230***	*82*	*42*	*18*	*45*	*39*
Sat–Sun																		
≤ 10 min	**88%**	85%	100%	n/a	100%	89%	**16%**	23%	16%	12%	7%	17%	**25%**	33%	18%	0%	20%	32%
10–20 mins	**12%**	15%	0%	n/a	0%	11%	**39%**	28%	36%	54%	50%	37%	**35%**	43%	36%	19%	33%	32%
> 20 min or never	**0%**	0%	0%	n/a	0%	0%	**45%**	49%	47%	35%	43%	46%	**39%**	24%	45%	81%	48%	37%
n	***75***	*39*	*13*	*n/a*	*8*	*9*	***251***	*75*	*55*	*26*	*56*	*41*	***232***	*86*	*44*	*16*	*46*	*38*

n/a indicates there were too few observations available to calculate percentage.

[a] The ridesourcing survey question read: "about how long did you wait for your ride (from the time you made the request to the time the vehicle arrived)?".

[b] Taxi survey questions read: "thinking about the times you've used a San Francisco taxi in the past 6 months, approximately how long does it take…" "…for a cab to arrive to your home after you have called taxi dispatch?" and "… to hail a cab in a street near your home?".

[c] See Fig. 3 for zone definitions.

[d] The taxi survey included the response option: "often never arrives." This was not included in the ridesourcing survey.

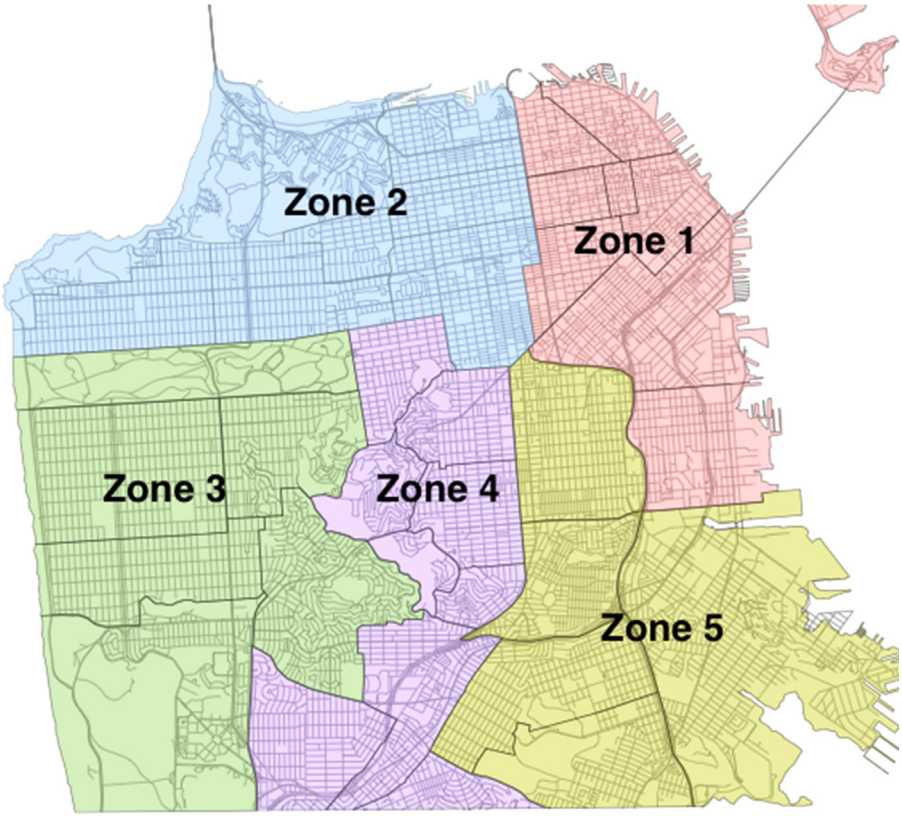

Fig. 3. Definition of zones for wait time analysis. Downtown San Francisco is located in Zone 1. Source: City of San Francisco.

43% of taxi dispatches were as quick. Wait times for taxi street hails show the same pattern of longer and less consistent wait times relative to ridesourcing. The lowest wait times for street hails were in Zone 1 during weekdays; even then only 53% of respondents said they could hail a taxi in ten minutes or less.

Bias and inaccuracy in respondent perception or recollection of wait time might partially account for the difference between modes. For instance, ridesourcing apps provide the user with an estimated wait time, but the actual wait time may be longer without the user noticing or recalling the longer wait. In contrast, respondents may overestimate taxi wait times; for example, they may recall one negative experience more than several positive ones. Even so, ridesourcing's short wait times and consistency across time and location or at least perceptions of quick, consistent response represent an important difference between ridesourcing and traditional taxis services from the user's perspective

3.7. Trip distance and vehicle occupancy

Comparing surveyed ridesourcing trips with taxi trip logs, we found that ridesourcing trips were slightly shorter than matched taxi trips, but they carried more passengers. Trip distances for ridesourcing trips were calculated by entering the geocoded origins and destinations into Google Directions API; trip lengths therefore reflect the street network distance. For surveyed ridesourcing trips, the average length was 5.1 km (3.2 miles), while equivalent taxi trips were on average 6.2 km (3.8 miles).

Vehicle occupancies were somewhat higher than for taxi trips and about the same as for driving journeys to work. Half of ridesourcing trips had more than one passenger (not including the driver), and the average number of passengers was 2.1. For the matched taxi sample, the average was only 1.1. The difference is likely due to the fact that the ridesourcing trips overrepresented social trips. Considering work trips alone, according to the 2011 ACS, the average vehicle occupancy for work trips of San Francisco workers was 1.15. For surveyed ridesourcing journeys to work trips within San Francisco, the average occupancy was nearly the same, 1.14.

3.8. Vehicle ownership and driving frequency

As previously noted, ridesourcing survey respondents were less likely to have a car at home than both taxi users and the general population. Ninety percent of vehicle owners said they had not changed their ownership levels since they began using ridesourcing and those who did change ownership were as likely to own more cars as fewer cars, so the presence of ridesourcing probably did not influence car ownership behavior. However, ridesourcing users who did have a car drove it relatively infrequently 38% of car owners said they typically drove once or twice per week, while only 24% said they drove every day. In addition, ridesourcing appears to have allowed some people to drive less frequently. Of the respondents who owned a car, 40% said they drove less often “as a result of using Lyft/Uber/Sidecar,” while 58% said they had not changed how often they drove.

3.9. Modal shift and induced travel

Respondents were asked if they still would have made the trip had ridesourcing services not been available and, if so, how they would have traveled. The vast majority (92%) replied they still would have made the trip, while 8% said they would not have made the trip at all, suggesting that ridesourcing induces a small but not inconsequential amount of travel. Of those who still would have made the trip even if ridesourcing were not available, a large number (39%) said they would have otherwise used a taxi, while 33% said bus or rail, and 6% drive their own car (Table 4).

Table 4
Ridesourcing survey responses to "How would you have made this trip if UberX/Lyft/Sidecar were not available?".

	All respondents	Do you have a car at home?	
		Yes	No
Taxi	39%	41%	35%
Transit (bus or rail)	33%	24%	43%
Walk	8%	9%	6%
Bike	2%	2%	3%
Drive my own car	6%	10%	0%
Get a ride with friend/family	1%	1%	2%
Other*	11%	12%	10%
n	*302*	*175*	*124*

* The majority of responses in the "Other" category include another ridesourcing service, even though they were instructed not to, followed by carsharing (i.e., City CarShare, Zipcar). One respondent noted Flywheel and another a local shuttle service.

Notably, responses of car owners differed from those of non car owners. As Table 4 shows, car owners were more likely to say they would have otherwise driven themselves, unsurprisingly, but compared to non owners, they were also more likely to have otherwise taken a taxi. Respondents without a car at home, however, were more likely to substitute ridesourcing for public transit (43% of non car owners vs. 24% of car owners).[3] These differences indicate car owners were generally more inclined toward car use, whether a private car, taxi, or ridesourcing vehicle. Non car owners, in contrast, were more inclined toward public transit, and they seemed to consider ridesourcing a replacement for transit as much as a replacement for taxis.

3.10. Comparison with public transit

We investigated the extent to which ridesourcing complements or competes with public transit by examining whether or not the surveyed trips were accessible by transit. We considered two measures of transit accessibility: proximity to transit stops and relative transit travel time. For proximity to transit, we defined a trip as transit accessible if it began and ended within a typical walking distance, 400 m (1/4 mi) of a rail transit station (streetcar, subway, or commuter train), or 200 m (1/8 mi) of a bus stop, during service hours. Of the ridesourcing trips, 28% began and ended within 400 m of rail transit (Table 5). Thus, just over a quarter were plausibly rail transit substitutes. Many more (81%) were accessible by bus, although fewer (63%) of these did not require a transfer. We observed similar values for the sampled taxi trips (Table 5).

Next, we estimated travel time for the surveyed trips by public transit and by driving, using the Google Directions API. Departure time was defined using the survey response for time and day. Transit wait time required estimation because Google Directions calculates the travel duration as the sum of in vehicle time, walking time to and from the public transit stop, and, if there are transfers, the transfer wait time. The trip duration does not include wait time for the first trip leg, but directs the traveler exactly when to depart so as to minimize wait time. In reality, most travelers will not time their departures so precisely, so to estimate wait time, we calculated the difference between the given departure time as defined by the survey response time and the suggested departure time returned by Google Directions. This method may slightly overestimate wait time, since some travelers may time their departures more carefully. The estimated total transit travel time equals the travel duration returned by Google plus the estimated wait time.[4]

Table 5
Public transit accessibility indicators.

	Ridesourcing trips	%	Taxi trips	%
< 400 m of rail station	79	28%	85	31%
< 200 m of bus stop	230	81%	213	77%
Requires transfer	78	28%	64	23%
< 200 m of bus stop, no transfer	177	63%	166	60%
n	*283*		*277*	

Table 6
Estimated travel times for the surveyed ridesourcing trips, sampled taxi trips, and comparable transit travel times.

	Ridesourcing trips	Taxi trips
Average total time by transit (mins) (wait + travel)	32.5	31.0
Average total time by ridesourcing/taxi (mins) (wait + travel)	22.1	23.7
Average travel time by transit (mins) (in-vehicle + walk access + transfer wait)	27.8	26.6
Average travel time by ridesourcing/taxi (mins) (in-vehicle only)	17.0	18.7
Average wait time by ridesourcing/taxi (mins)	4.9	5.0
Average wait time by transit (mins)*	5.7	5.5
Trips that are twice as long by public transit	185 (65%)	169 (61%)
Trips that are 50% or longer by public transit	243 (86%)	242 (87%)
n	*283*	*277*

* Excludes "transit" trips that are walking only.

For ridesourcing trips, we estimated the wait time as the midpoint of the interval provided in the survey response (e.g., 1 5 min, 6 10 min). The taxi trip log did not include wait times, so we conservatively assumed a wait time of five minutes, at the low end of the wait times suggested by the taxi user survey. The estimated total travel time by ridesourcing (or taxi) equals the travel duration by driving returned by Google plus the estimated wait time. This method may underestimate actual driving times because it cannot account for traffic conditions at the trip time. Of trips that began and/or ended in San Francisco, we were able to obtain public transit and driving directions for 283 observations (the remainder were missing departure time information).

Not surprisingly, estimated total travel times, including wait and in vehicle times, were consistently greater for public transit than ridesourcing, although a few trips would have been faster by transit (Table 6 and Fig. 4). The estimated average total travel time was 22 min for ridesourcing trips, while the same trips would have taken on average 33 min by public transit; a typical ridesourcing trip saves about 10 min of travel time. These figures do not appear to be significantly different for taxis. Overall, 66% of ridesourcing trips would have been at least twice as long in minutes, if taken by public transit.

[3] Tests of statistical significance comparing car owners and non-car owners on all responses to this question are meaningful because the variables are not independent: the "drive my own car" category is dependent on whether the respondent has a car at home. But, a pairwise Fisher's exact test comparing the two groups on taxi and public transit is significant at the 0.05 level (p-value 0.0128).

[4] In the few cases in which walking was faster than public transit, we assumed the trip would be made by foot, with the corresponding walking time as travel time.

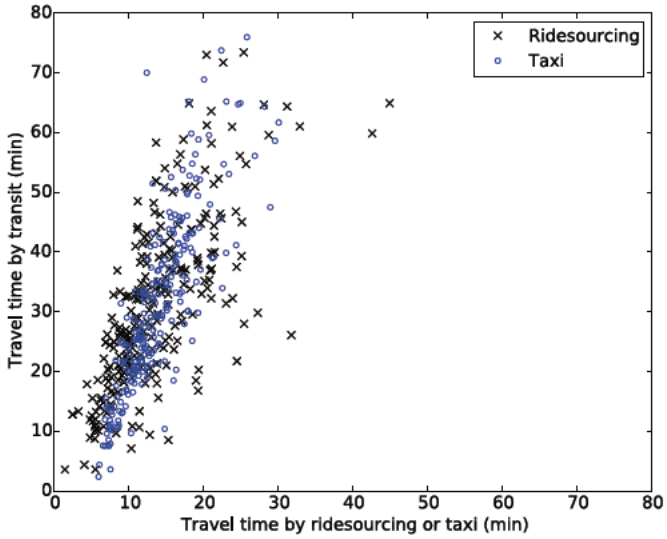

Fig. 4. Comparison of transit travel time with ridesourcing travel times (total travel time = wait + in-vehicle time).

4. Discussion

Ridesourcing is often seen as catering specifically to a young and smartphone equipped population. Indeed, ridesourcing survey respondents were younger and better educated than the general population, and were younger than frequent taxi users. In all, the survey data do not refute the claim that ridesourcing disproportionately serves younger residents of higher socio economic status; however, it is not clear whether or not the findings are biased by the sampling method and whether the ridesourcing market differs from taxis. A larger and more representative survey would be needed to address this question. Whether ridesourcing becomes popular among a more diverse population as it expands is a question for future research as well.

The survey data suggest that ridesourcing services and taxis serve a similar market demand – the plurality of ridesourcing users said they would otherwise have used a taxi for the same trip, and the two types of services covered similar areas and trip lengths. Yet our data suggest ridesourcing is doing more than just replacing taxi trips. Approximately half of the ridesourcing trips we surveyed replaced modes other than taxi, including public transit, walking and biking, and driving. Non car owners were even less likely to have used ridesourcing in place of a taxi; instead, they were most likely to have shifted from transit. We expect this observation holds even when we consider that our survey oversampled nighttime and social trips. Compared to trips for other purposes and at other times of day, nighttime and social trips are probably more likely to be made by taxi, so we would expect taxi replacement trips to be overrepresented in our sample. It is quite probable, therefore, that more than half of all San Francisco ridesourcing trips substitute for modes other than taxi, and thus lie outside the traditional taxi market.

One reason ridesourcing is drawing more customers than taxis may be that users of each service apparently experience very different wait times. Reported ridesourcing wait times were not only much shorter overall, but they were also markedly more consistent across day, time, and location. While there may be some bias in respondent recall of wait time, it is unlikely this would affect the consistency across time or space. Previous studies have found short wait times and real time arrival information to be critical for public transit (Evans, 2004; Turnbull and Pratt, 2003), and these factors are likely equally critical for ridesourcing users, as noted by the respondents themselves. Notably, wait times appear to be reliably short in outer parts of the city, where public transit and traditional taxi service are sparser and auto dependency is higher. Ridesourcing's gap filling role may be especially important in improving access to these neighborhoods. It is unclear whether ridesourcing's wait time advantage arises from technological efficiencies (i.e., smartphone enabled matching rather than telephone dispatch) or a greater vehicle supply (i.e., ridesourcing is not subject to regulations that restrict supply). Identifying the source of each advantage is a task for further research and will be essential as cities consider revised regulations.

In addition to replacing taxi trips, ridesourcing also draws from public transit. The survey provides evidence that ridesourcing both complements and competes with public transit, at least with respect to individual trips. The majority of trips were accessible by bus or rail; however, they would have taken more than twice as long using those modes. Respondents confirmed they often chose ridesourcing due to travel time savings, indicating a potentially competitive relationship. If ridesourcing mainly serves mass transit's core demand, offering faster alternative to trips that could be made by transit, ridesourcing could "skim the cream" from public transit ridership and erode transit's ridership base. At the same time, our survey offers tentative evidence that ridesourcing sometimes serves a niche demand that mass transit inherently does not serve well, like connections to transit, trips to or from low density areas, or late night trips when waiting for transit might feel unsafe. Moreover, in San Francisco transit is often overcrowded at peak times. Travelers may use public transit for a trip in one direction and ridesourcing for the return trip, as observed in taxi use (King et al., 2012). Habitual transit users might rely on ridesourcing in specific situations – e.g., in bad weather or when carrying heavy items. In these cases, ridesourcing would serve as a gap filling mode that allows a generally car free lifestyle. Future research to investigate whether the "gap filling" or "cream skimming" effect dominates would have important implications for policymakers. Such research could be done with more representative survey data, as well as with data on the time and location of ridesourcing trips.

This study provides some insights into ridesourcing's influence on vehicle miles traveled (VMT), but the full impact remains unclear. The survey does provide tentative evidence that ridesourcing enables lower levels of driving among vehicle owners. A small proportion of respondents said they used ridesourcing rather than driving their own cars. Notably, several car owners used ridesourcing to avoid drinking and driving – clearly a positive effect although we cannot say if taxis would have performed this function equally. However, ridesourcing seems to have had little impact on auto ownership to date, which is not surprising given the newness of these services. We also found a small induced travel effect from people who took trips they otherwise would not have, accounting for 8% of all trips. The data may underestimate this effect. San Francisco contains several neighborhoods with poor transit access, poor taxi availability, or scarce parking. Travelers who previously avoided these neighborhoods might now consider them accessible, perhaps without being conscious of the effect. Without ridesourcing, they may have chosen a different destination or forgone the activity altogether; our intercept survey may not have captured this decision making process. Thus, our results should be interpreted as a lower bound on the induced travel effect. To the extent that these induced trips represent improved mobility, they are a positive effect, but they also add to VMT.

Compared with taxi users, surveyed ridesourcing customers appear to own fewer vehicles and travel with more companions. Both of these findings might be associated with less vehicle travel – ridesourcing might allow users to own fewer cars, and passengers get more mobility for fewer VMT – at least for the surveyed trips. However, these findings might be a consequence of the

sampling method, ridesourcing user age, or both. People at the survey locations might be younger and more social than average and hence might be less likely to own a car and more likely to travel in groups. Moreover, we lack data on the extent to which drivers cruise for passengers, which would clearly added to VMT. Ridesourcing drivers may tend to circulate less than taxi drivers because they do not rely on street hails. However, anecdotal ac counts suggest the high demand in San Francisco attracts ride sourcing drivers from more distant suburbs, whereas this effect for taxis is limited by regulation.

Future research into the impacts of ridesourcing on VMT should take into account the induced travel effect, travel made by drivers when no passenger is present, potential substitution from public transit, and the impact of ridesourcing on users' driving. A com prehensive assessment of VMT impacts would require both more representative user survey data and data on drivers' behavior. Ef fects on users' driving behavior and vehicle ownership may re quire longer term study.

To reiterate, the survey was not representative of the ride sourcing market, but oversampled social and leisure trips, likely underrepresenting trips made for work purposes, airport trips, and other errands. Despite this limitation, our intercept survey pro vides the best data available in our study area on this emerging service. At present, ridesourcing is a new and controversial subject, and access to industry and membership data for research purposes is limited. Since data on ridesourcing market size and user char acteristics are unavailable, we are unable to describe the sample relative to the larger user population.

San Francisco may not be a typical market for ridesourcing. As the birthplace of these services, San Francisco probably has the highest adoption rate, implying a greater density of drivers and users, and hence efficiency, compared with other cities. The city is well suited for ridesourcing for several other reasons: it has a restricted taxi supply (Hara Associates, 2013a), scarce parking, a limited and underfunded public transit system, an urban form that lies somewhere between walkable and car oriented (Henderson, 2013), and a large population of highly paid young professionals. Cities like Boston, Seattle, and Washington, D.C. share these traits, although other cities in which ridesourcing operates do not.

5. Conclusions

In this paper, we presented exploratory evidence of ride sourcing's role in urban transportation using an intercept survey of ridesourcing users in San Francisco and comparing the survey results with data from a previous taxi survey and taxi trip logs. The findings suggest ridesourcing meets a latent demand for urban travel, appealing to generally younger, well educated users look ing for short wait times and fast point to point service, while avoiding the inconveniences of driving like parking and having to drink and drive. Despite similarities, ridesourcing differs from taxis in important ways, especially in consistently shorter waiting times. We found that at least half of ridesourcing trips replaced a mode other than taxi, indicating the two services have overlapping but different markets. Ridesourcing competes with public transit for some individual trips, but it may sometimes serve as a com plement. The majority of ridesourcing trips would have taken more than twice as long if made by public transit. Finally, ride sourcing might replace some private automobile use, but because it might also induce travel, the impacts on overall VMT are un certain. These findings fill an important gap in our understanding of this emerging travel mode on which publicly available data remains scarce.

Although exploratory, these findings nevertheless indicate that ridesourcing expands mobility options for city dwellers, particularly in large, dense cities like San Francisco where parking is constrained and public transit is insufficient. Thus, outright bans on ridesourcing would negate these mobility gains. Ridesourcing may also have negative aspects not addressed in this study such as increased congestion, labor abuses, and access for the disabled that might call for regulation.

The popular media often pits ridesourcing against taxis.[5] Ri desourcing undeniably poses direct competition to the incumbent taxi industry; however, our study suggests the narrative of ride sourcing vs. taxis is only half the story. Ridesourcing appears to allow car owners to drive less, which should leave policymakers cautiously optimistic about its impact on vehicle use and owner ship. Future research should assess these impacts over time. At the same time, the fact that ridesourcing often draws travelers, and especially non car owners, from public transit suggests that re searchers and policymakers should pay more attention to its im pact on transit use.

Future research should investigate the potential hypotheses outlined in this study using more complete and representative data. Access to ridesourcing trip and user data would provide a much more detailed and representative picture, and researchers and policymakers should advocate for policies that require ride sourcing companies to make such data publicly available. Data from ridesourcing companies on trip times and locations will likely be insufficient to answer questions such as vehicle owner ship changes, thus publicly sponsored travel surveys should be designed with these questions in mind. As ridesourcing and si milar travel modes continue to rapidly evolve, other questions will surely emerge.

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[5] Examples are countless. See, e.g., Flegenheimer and Fitzsimmons (2015) and Green (2015).

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Exhibit 4
Redeemed Credit Value

		Value	Source
		(Dollars)	
Potential Uber Credit			
Potential Uber credit for Class Members who requested to be paid via payment to their Uber Rider Accounts	[a]	$ 34,486	Young Declaration ¶ 6
Potential Uber credit available to Class Members who did not submit a claim form	[b]	$ 23,726,828	6. Sources
Total potential Uber credit	[c] = [a] + [b]	$ 23,761,313	
Residual Award			
Residual due to attrition rate of Payment Rider Accounts	[d]	$ REDACTED REDAC REDACTED REDAC REDACTED REDAC	5. Residual Award
Redeemed Credit Value	**[e] = [c] - [d]**	**$** REDACTED REDACTE REDACTED REDACTE	

Note: Residual award assumes Uber is unable to make payments to accounts lacking valid payment method.

Exhibit 5
Residual Award

		Value	Source
Potential Uber credit for Class Members who requested to be paid via payment to their Uber Rider Accounts	[a]	$ 34,486	Young Declaration ¶ 6
Potential Uber credit available to Class Members who did not submit a claim form	[b]	$ 23,726,828	6. Sources
Total potential Uber credit	[c] = [a] + [b]	$ 23,761,313	
Class Members who did not use Uber Rideshare Services during the 12 months prior to January 31, 2020	[d] = 100% - 59 03%	REDACTED RE REDACTED RE REDACTED RE	Defendants' Updated Responses to Plaintiffs' Information Requests, p. 4
Attrition rate for valid payment methods	[e] = 100% - 85 9%	14.1%	Cloninger Report ¶ 13
Residual award due to accounts lacking valid payment methods	**[f] = [c] * [d] * [e]**	**$** REDACTED REDAC REDACTED REDAC	

Exhibit 6
Sources

Description			Value	Source
Total Settlement Fund	[a]	$	32,500,000	Young Declaration ¶ 4
Attorneys' Fees award	[b]	$	8,125,000	Young Declaration ¶ 4
Total incentive awards	[c]	$	2,500	Young Declaration ¶ 4
Settlement Administration Fees	[d]	$	487,000	Young Declaration ¶ 4
Litigation expenses award	[e]	$	40,783	Young Declaration ¶ 4
Total award for Class Members who requested to be paid via PayPal	[f]	$	50,861	Young Declaration ¶ 5
Total award for Class Members who requested to be paid via eCheck	[g]	$	32,542	Young Declaration ¶ 7
Total award for Class Members who requested to be paid via payment to their Uber Rider Accounts	[h]	$	34,486	Young Declaration ¶ 6
Net Settlement fund balance	[i] = [a] - [b] - [c] - [d] - [e]	$	23,844,717	
Total award for Class Members who did not submit a claim form	[j] = [i] - [f] - [g] - [h]	$	23,726,828	
Percentage of Class Members who used Uber Rideshare Services during the 12 months prior to January 31, 2020	[k]		REDACTED RED REDACTED RED REDACTED RED	Defendants' Updated Responses to Plaintiffs' Information Requests, p. 4
Percentage of Uber accounts that will have a valid form of payment as of May 31, 2021	[l]		85.9%	Cloninger Declaration ¶ 13

Exhibit 7
Sensitivity Analysis - Impact of Reductions to Attorneys' Fees & Expenses

Description	Main Model	10% Reduction	15% Reduction	20% Reduction
	(1)	(2)	(3)	(4)
Attorneys' Fees	$ 8,125,000	$ 7,312,500	$ 6,906,250	$ 6,500,000
Redeemed Credit Value	$ [redacted]	[redacted]	[redacted]	[redacted]
% Change from Exhibit 4 - Main Model		[redacted]	[redacted]	[redacted]

Sources: Young Declaration ¶ 10; Exhibits 4, 8, 11, 14.

Exhibit 8
Sensitivity Analysis 10% Reduction – Redeemed Credit Value

		Value	Source
		(Dollars)	
Potential Uber Credit			
Potential Uber credit for Class Members who requested to be paid via payment to their Uber Rider Accounts	[a]	$ 35,810	Young Declaration ¶ 10
Potential Uber credit available to Class Members who did not submit a claim form	[b]	$ 24,534,989	10. Sources
Total potential Uber credit	[c] = [a] + [b]	$ 24,570,799	
Residual Award			
Residual due to attrition rate of Payment Rider Accounts	[d]	$ REDACTED REDAC REDACTED REDAC REDACTED REDAC	9. Residual Award
Redeemed Credit Value	**[e] = [c] - [d]**	**$** REDACTED REDACTI REDACTED REDACTI	

Note: Residual award assumes Uber is unable to make payments to accounts lacking valid payment method.

Exhibit 9
Sensitivity Analysis 10% Reduction – Residual Award

		Value	Source
Potential Uber credit for Class Members who requested to be paid via payment to their Uber Rider Accounts	[a]	$ 35,810	Young Declaration ¶ 9
Potential Uber credit available to Class Members who did not submit a claim form	[b]	$ 24,534,989	10. Sources
Total potential Uber credit	[c] = [a] + [b]	$ 24,570,799	
Class Members who did not use Uber Rideshare Services during the 12 months prior to January 31, 2020	[d] = 100% - 59 03%	REDACTED REDACTED REDACTED	Defendants' Updated Responses to Plaintiffs' Information Requests, p. 4
Attrition rate for valid payment methods	[e] = 100% - 85 9%	14.1%	Cloninger Report ¶ 13
Residual award due to accounts lacking valid payment methods	**[f] = [c] * [d] * [e]**	**$** REDACTED REDACTED	

Exhibit 10
Sensitivity Analysis 10% Reduction – Sources

Description			Value	Source
Total Settlement Fund	[a]	$	32,500,000	Young Declaration ¶ 4
Attorneys' Fees award	[b]	$	7,312,500	Young Declaration ¶ 10
Total incentive awards	[c]	$	2,500	Young Declaration ¶ 4
Settlement Administration Fees	[d]	$	487,000	Young Declaration ¶ 4
Litigation expenses award	[e]	$	40,783	Young Declaration ¶ 4
Total award for Class Members who requested to be paid via PayPal	[f]	$	52,699	Young Declaration ¶ 10
Total award for Class Members who requested to be paid via eCheck	[g]	$	33,719	Young Declaration ¶ 10
Total award for Class Members who requested to be paid via payment to their Uber Rider Accounts	[h]	$	35,810	Young Declaration ¶ 10
Net Settlement fund balance	[i] = [a] - [b] - [c] - [d] - [e]	$	24,657,217	
Total award for Class Members who did not submit a claim form	[j] = [i] - [f] - [g] - [h]	$	24,534,989	
Percentage of Class Members who used Uber Rideshare Services during the 12 months prior to January 31, 2020	[k]		REDACTED RED REDACTED RED REDACTED RED	Defendants' Updated Responses to Plaintiffs' Information Requests, p. 4
Percentage of Uber accounts that will have a valid form of payment as of May 31, 2021	[l]		85.9%	Cloninger Report ¶ 13

Exhibit 11
Sensitivity Analysis 15% Reduction – Redeemed Credit Value

		Value	Source
		(Dollars)	
Potential Uber Credit			
Potential Uber credit for Class Members who requested to be paid via payment to their Uber Rider Accounts	[a]	$ 36,472	Young Declaration ¶ 10
Potential Uber credit available to Class Members who did not submit a claim form	[b]	$ 24,939,070	13. Sources
Total potential Uber credit	[c] = [a] + [b]	$ 24,975,542	
Residual Award			
Residual due to attrition rate of Payment Rider Accounts	[d]	$ REDACTED REDAC REDACTED REDAC REDACTED REDAC	12. Residual Award
Redeemed Credit Value	**[e] = [c] - [d]**	**$** REDACTED REDACTE REDACTED REDACTE	

Note: Residual award assumes Uber is unable to make payments to accounts lacking valid payment method.

Exhibit 12
Sensitivity Analysis 15% Reduction – Residual Award

		Value	Source
Potential Uber credit for Class Members who requested to be paid via payment to their Uber Rider Accounts	[a]	$ 36,472	Young Declaration ¶ 10
Potential Uber credit available to Class Members who did not submit a claim form	[b]	$ 24,939,070	13. Sources
Total potential Uber credit	[c] = [a] + [b]	$ 24,975,542	
Class Members who did not use Uber Rideshare Services during the 12 months prior to January 31, 2020	[d] = 100% - 59 03%	REDACTED RE REDACTED RE REDACTED RE	Defendants' Updated Responses to Plaintiffs' Information Requests, p. 4
Attrition rate for valid payment methods	[e] = 100% - 85 9%	14.1%	Cloninger Report ¶ 13
Residual award due to accounts lacking valid payment methods	**[f] = [c] * [d] * [e]**	**$** REDACTED REDAC REDACTED REDAC	

Exhibit 13
Sensitivity Analysis 15% Reduction – Sources

Description			Value	Source
Total Settlement Fund	[a]	$	32,500,000	Young Declaration ¶ 4
Attorneys' Fees award	[b]	$	6,906,250	Young Declaration ¶ 10
Total incentive awards	[c]	$	2,500	Young Declaration ¶ 4
Settlement Administration Fees	[d]	$	487,000	Young Declaration ¶ 4
Litigation expenses award	[e]	$	40,783	Young Declaration ¶ 4
Total award for Class Members who requested to be paid via PayPal	[f]	$	53,617	Young Declaration ¶ 10
Total award for Class Members who requested to be paid via eCheck	[g]	$	34,307	Young Declaration ¶ 10
Total award for Class Members who requested to be paid via payment to their Uber Rider Accounts	[h]	$	36,472	Young Declaration ¶ 10
Net Settlement fund balance	[i] = [a] - [b] - [c] - [d] - [e]	$	25,063,467	
Total award for Class Members who did not submit a claim form	[j] = [i] - [f] - [g] - [h]	$	24,939,070	
Percentage of Class Members who used Uber Rideshare Services during the 12 months prior to January 31, 2020	[k]		REDACTED RED REDACTED RED REDACTED RED	Defendants' Updated Responses to Plaintiffs' Information Requests, p. 4
Percentage of Uber accounts that will have a valid form of payment as of May 31, 2021	[l]		85.9%	Cloninger Report ¶ 13

Exhibit 14
Sensitivity Analysis 20% Reduction – Redeemed Credit Value

		Value	Source
		(Dollars)	
Potential Uber Credit			
Potential Uber credit for Class Members who requested to be paid via payment to their Uber Rider Accounts	[a]	$ 37,134	Young Declaration ¶ 10
Potential Uber credit available to Class Members who did not submit a claim form	[b]	$ 25,343,151	16. Sources
Total potential Uber credit	[c] = [a] + [b]	$ 25,380,285	
Residual Award			
Residual due to attrition rate of Payment Rider Accounts	[d]	$ REDACTED REDAC REDACTED REDAC REDACTED REDAC	15. Residual Award
Redeemed Credit Value	**[e] = [c] - [d]**	**$** REDACTED REDACTE REDACTED REDACTE	

Note: Residual award assumes Uber is unable to make payments to accounts lacking valid payment method.

Exhibit 15
Sensitivity Analysis 20% Reduction – Residual Award

		Value	Source
Potential Uber credit for Class Members who requested to be paid via payment to their Uber Rider Accounts	[a]	$ 37,134	Young Declaration ¶ 10
Potential Uber credit available to Class Members who did not submit a claim form	[b]	$ 25,343,151	16. Sources
Total potential Uber credit	[c] = [a] + [b]	$ 25,380,285	
Class Members who did not use Uber Rideshare Services during the 12 months prior to January 31, 2020	[d] = 100% - 59 03%	REDACTED RE REDACTED RE REDACTED RE	Defendants' Updated Responses to Plaintiffs' Information Requests, p. 4
Attrition rate for valid payment methods	[e] = 100% - 85 9%	14.1%	Cloninger Report ¶ 13
Residual award due to accounts lacking valid payment methods	**[f] = [c] * [d] * [e]**	**$** REDACTED REDAC REDACTED REDAC	

Exhibit 16
Sensitivity Analysis 20% Reduction – Sources

Description			Value	Source
Total Settlement Fund	[a]	$	32,500,000	Young Declaration ¶ 4
Attorneys' Fees award	[b]	$	6,500,000	Young Declaration ¶ 10
Total incentive awards	[c]	$	2,500	Young Declaration ¶ 4
Settlement Administration Fees	[d]	$	487,000	Young Declaration ¶ 4
Litigation expenses award	[e]	$	40,783	Young Declaration ¶ 4
Total award for Class Members who requested to be paid via PayPal	[f]	$	54,536	Young Declaration ¶ 10
Total award for Class Members who requested to be paid via eCheck	[g]	$	34,895	Young Declaration ¶ 10
Total award for Class Members who requested to be paid via payment to their Uber Rider Accounts	[h]	$	37,134	Young Declaration ¶ 10
Net Settlement fund balance	[i] = [a] - [b] - [c] - [d] - [e]	$	25,469,717	
Total award for Class Members who did not submit a claim form	[j] = [i] - [f] - [g] - [h]	$	25,343,151	
Percentage of Class Members who used Uber Rideshare Services during the 12 months prior to January 31, 2020	[k]		REDACTED RED REDACTED RED REDACTED RED	Defendants' Updated Responses to Plaintiffs' Information Requests, p. 4
Percentage of Uber accounts that will have a valid form of payment as of May 31, 2021	[l]		85.9%	Cloninger Report ¶ 13