International Transport Forum

Regulating App-Based Mobility Services
Summary and Conclusions

175 Roundtable

Regulating App-Based Mobility Services

Summary and Conclusions

175

Roundtable

The International Transport Forum

The International Transport Forum is an intergovernmental organisation with 60 member countries. It acts as a think tank for transport policy and organises the Annual Summit of transport ministers. ITF is the only global body that covers all transport modes. The ITF is politically autonomous and administratively integrated with the OECD.

The ITF works for transport policies that improve peoples' lives. Our mission is to foster a deeper understanding of the role of transport in economic growth, environmental sustainability and social inclusion and to raise the public profile of transport policy.

The ITF organises global dialogue for better transport. We act as a platform for discussion and pre-negotiation of policy issues across all transport modes. We analyse trends, share knowledge and promote exchange among transport decision-makers and civil society. The ITF's Annual Summit is the world's largest gathering of transport ministers and the leading global platform for dialogue on transport policy.

The Members of the Forum are: Albania, Armenia, Argentina, Australia, Austria, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Canada, Chile, China (People's Republic of), Croatia, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, India, Ireland, Israel, Italy, Japan, Kazakhstan, Korea, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Mexico, Republic of Moldova, Montenegro, Morocco, the Netherlands, New Zealand, North Macedonia, Norway, Poland, Portugal, Romania, Russian Federation, Serbia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Tunisia, Turkey, Ukraine, the United Arab Emirates, the United Kingdom and the United States.

International Transport Forum
2 rue André Pascal
F-75775 Paris Cedex 16
contact@itf-oecd.org
www.itf-oecd.org

ITF Roundtables

ITF Roundtables bring together international experts to discuss specific topics notably on economic and regulatory aspects of transport policies in ITF member countries. Findings of ITF Roundtables are published in a Summary and Conclusions paper. Any findings, interpretations and conclusions expressed herein are those of the authors and do not necessarily reflect the views of the International Transport Forum or the OECD. Neither the OECD, ITF nor the authors guarantee the accuracy of any data or other information contained in this publication and accept no responsibility whatsoever for any consequence of their use. This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

Cite this work as: ITF (2019), *Regulating App-based Mobility Services: Summary and Conclusions*, ITF Roundtable Reports, No. 175, OECD Publishing, Paris.

Acknowledgements

This summary report of the ITF Roundtable on Regulating App-based Mobility Services was prepared by Rex Deighton-Smith with support from Tatiana Samsonova and Stephen Perkins, Co-Chair of the Roundtable. It draws on the input papers prepared by Ciro Biderman, Rex Deighton-Smith, Onésimo Flores Dewey and Dana Yanocha, the rich conversation which took place during the Roundtable meeting and the comments and other inputs received from participants during the drafting process. However, a wide range of views were presented and the conclusions presented in the report do not necessarily reflect the views of all participants.

The ITF Secretariat wishes to thank the 35 participants, from 13 ITF member countries, who took part in the Roundtable.

Table of contents

Executive summary

What we did

App-based mobility services have a brief history which essentially commenced early in the current decade. But these services have grown exponentially and now constitute a significant part of the urban mobility landscape. The ITF Roundtable on which this report is based focused primarily on ridesourcing and bikeshare, as these currently constitute both the most-developed and the most controversial parts of the sector. Emerging services such as e-scooters, vanpooling and demand-responsive transport were also discussed and their potential future role in the urban mobility landscape addressed.

The Roundtable discussed experiences in these areas, including the different and sometimes rapidly evolving regulatory responses to app-based mobility services. It sought to identify key lessons learned and, on this basis, set out relevant regulatory principles that can help to ensure that the consumer benefits of app-based mobility are maximised and that they contribute effectively to the achievement of wider public policy objectives.

What we found

App-based mobility services have brought substantial consumer benefits. They have expanded choice and enhanced important aspects of service quality including availability, timeliness, comfort and the subjective customer experience, while often driving down prices.[1] These benefits derive in part from the technological innovation they embody. For example, they have allowed rapid and reliable matching of services and customers, provided for reliable, cashless payment and enabled effective identification of riders and drivers and recording of journeys. GPS location and app-based communication and payment services have also enabled new business models in several sectors.

The welfare gains also derive in part from these innovations sweeping away major regulatory failures in many jurisdictions and bringing transformative change to the urban mobility sector. They have effectively unblocked some long-standing political economy problems. For example, ridesourcing pioneer Uber was founded as a response to the sustained failure of the taxi industry and its regulators to meet passenger demand in San Francisco. The extent of ridesourcing's disruptive impact is indicative of this factor, in that it reflects the rapid removal of monopoly rents flowing from artificial supply restrictions enforced by regulation.

The rapid growth of some new mobility services, notably ridesourcing, dockless bikeshare and e-scooters, has also given rise to concerns about a range of actual or potential negative impacts. This has posed new challenges for policy makers and regulators and exacerbated some pre-existing concerns. With regard to ridesourcing, include the safety and security of users, insurance cover for users and third-parties in case of accident or injury, the labour conditions of drivers and externalities such as congestion and pollution. Questions have also been raised as to whether ridesourcing competes fairly with taxis, given that the major players consistently incur substantial operating losses and rely on raising large amounts of venture capital to remain solvent.

In relation to dockless bikeshare and e-scooters, areas of concern include safety, not least arising from potential conflict with other modes, consumer protection and externalities, notably the cluttering of public spaces with excessive numbers of sometimes derelict bicycles or scooters.

Disquiet about the potential impact of new mobility services has often been exacerbated by the operators' launch strategies. Many ridesourcing companies have exploited regulatory ambiguity to enter markets and establish market share quickly. Attempts to assert their right to operate outside the regulatory systems that apply to competing services have necessarily raised concern within governments about their ability to address negative impacts. These factors, plus the disruptive effects that app-based services have had in many markets have initially led some governments to attempt to block their entry, particularly in the case of ridesourcing.

However, strong consumer demand for these services has in many cases led to rapid changes in government stances, with prohibition giving way to light-handed regulatory approaches. These, in turn, have sometimes been criticised as failing to deal adequately with the downsides of new mobility services, giving rise to demand for more restrictive regulation. Complaints that incumbents are unfairly disadvantaged in competing with disruptors are also common.

While there have been rapid shifts in government approaches, they have often not been underpinned by strategic and thorough approaches to reforming existing regulatory structures to reflect changed market realities. Such an approach would remove or modify long-standing restrictions that inhibit incumbents from competing on a level playing-field with the disruptors, while also developing new regulatory structures that are better-adapted to the new business models. For example, the elimination of anonymity and the often part-time use of private vehicles for ridesourcing services encourage improved safety performance in terms of driver behaviour, road safety and the security of passengers in places where robbery and assault are significant risks for users of traditional taxis. Significant safety concerns remain, however, and are unlikely to be addressed effectively without regulation.

While many of the negative impacts identified above are, or may become, significant, careful analysis of the case for further regulation is, as always, needed. This should take the form of regulatory impact assessment,[2] which can clarify the relative merits of possible policy interventions. A central issue is that of determining when sector-specific regulation should be the preferred tool and when broader approaches are more effective and equitable.

Addressing congestion and pollution provide a case in point. Ridesourcing increases congestion and pollution because of the circulation of additional private vehicles. However, the whole vehicle fleet contributes to congestion and pollution, and the most effective responses will therefore be those that apply to all private vehicles. Regulation that specifically targets ridesourcing is likely to have a limited effect in most circumstances, since ridesourcing accounts for only a small part of the fleet. Even in large and very dense city centres where taxi and ridesourcing vehicles may account for a significant proportion of the fleet, a sector-specific congestion charge will remain both less effective than a general one and raise equity concerns. The former policy imposes congestion charges on relatively infrequent users of ridesourcing services while exempting people who commute daily in private vehicles. Moreover, the flat, per-ride fees that have usually been imposed to date do not discriminate according to the time and location of the ride and are thus poorly targeted with respect to congestion.

Generally applicable congestion charges or low-emission zones which apply to private vehicles as well as ridesourcing will likely be more effective and avoid risking the welfare benefits generated by the sector. If sector-specific congestion charges are used they should, at a minimum, apply equally to taxis and ridesourcing services, in order to avoid distorting competition between the sectors. Caps on the number of vehicles in the ridesourcing fleet will likely have particularly negative impacts and should be a least-preferred option.

Regulators should be wary of self-serving arguments from incumbents seeking to prevent or slow the entry of new app-based services by having them held to higher standards than the existing players. This has been particularly evident in relation to ridesourcing. Taxi interests have criticised ridesourcing on safety, employment policy and tax compliance grounds, despite evidence that the taxi industry often performs poorly in these areas and that better perceived safety standards have been drivers of consumer demand for the new entrants. In relation to safety, key features of the ridesourcing model such as the absence of cash payments, the removal of anonymity, and real-time journey tracking should be taken into account when determining the nature and extent of regulatory interventions required - as should the fact that ridesourcing vehicles do not operate in the street hail and rank markets.[3] The equal treatment of competing sectors is an important principle in considering regulatory intervention in these areas. Adoption of this principle in the face of lobbying from all types of operators will promote both economic efficiency and equity goals, while also helping to ensure that safety, consumer protection and other public-policy objectives (which may vary from country to country) are consistently achieved across all sectors.

What we recommend

Maintain a permissive regulatory environment for new app-based mobility services

The substantial welfare benefits from app-based mobility services have driven their rapid growth. This makes it important that regulatory restrictions do not unnecessarily act as an impediment to realising these gains. Regulation should reflect an essentially permissive and facilitative approach to innovation, which accepts market disruption, rather than seeking artificially to slow or impede the adoption of new business models and technologies. This does not imply inaction where there is a clear need to protect consumers from the risk of significant harm. Minimising regulatory barriers is particularly important where new modes and business models with uncertain viability, such as dockless bikeshare and e-scooters are concerned. Small trial schemes with limited regulation can often provide valuable insights. To encourage innovation, governments should consider bearing the initial regulatory costs in such circumstances, rather than seeking to recover them from new businesses.

Treat incumbent mobility providers and new market entrants equally

Regulatory structures should enable welfare gains from app-based mobility services. At the same time they must ensure that safety and other necessary consumer protections are maintained and other public policy objectives are not undermined. A fundamental principle in this context is equal regulatory treatment of incumbents and entrants; i.e. that regulation should be pro-competitive. This does not mean that all market segments must be subject to identical regulation, as different business models may require different regulatory arrangements. However, it does imply that regulation should not favour incumbents over new entrants or vice-versa. It also implies that regulation that would have substantially different impacts on incumbents and entrants ought to be carefully reviewed. Where governments seek to cushion the effect of disruption on traditional services, this should generally be done through other policy instruments, in order to avoid the risk of distorting competition and placing artificial constraints on welfare-enhancing innovation.

Revise outdated and fragmented regulatory frameworks for mobility services

Where new regulation is adopted to accommodate entrants, existing standards should be reviewed to ensure they do not unreasonably constrain incumbents from competing. Where wider public objectives are pursued, regulators should favour generally applicable regulation over sector-specific rules. This is likely to be more effective and better respect the principle of competitive neutrality. Governments should recognise that the rapid evolution of app-based mobility services implies substantial risks and difficulties for shaping regulation, and even well-designed regulation may quickly become outdated. Scheduled reviews, based on transparent and rigorous methodologies, are needed to ensure that regulation is systematically refined, improved and adapted to new realities over time. Ensuring the collection and analysis of performance data will contribute much to the quality of such reviews.

Focus regulation on addressing clearly-identified market failures

Regulation should be based on a clear understanding of the dynamics of the relevant market and the identification of significant market failure(s) or equity issues. While governments may wish to regulate ex ante to address clearly foreseeable harm, the nature of new services and the emerging market in which they operate needs to be well understood in order to avoid imposing ineffective regulation with unanticipated costs.

Take the broader urban policy environment into account when designing regulations

App-based mobility options have numerous implications for urban policy objectives. Mitigating greenhouse gas emissions and addressing congestion and air pollution by providing alternatives to the use of private cars, enhancing accessibility and connectivity and encouraging active travel are among the most important. Regulatory design for mobility services should account for such factors, while distinguishing clearly between objectives that are appropriately pursued through sector-specific regulation and those that can only be effectively addressed through broader regulatory interventions. Any negative impacts on broader urban policy objectives from the growth of app-based mobility services need to be assessed in the light of the significant consumer benefits conferred by these new transport modes. At the same time, businesses seeking to introduce new mobility services should engage with urban planning authorities to identify and minimise the external costs of their operations. Such pro-active coordination can reduce the need for potentially intrusive and distorting regulation.

Consider subsidies for app-based mobility services where appropriate and invest in supporting infrastructure

Reaping the welfare benefits offered by app-based shared mobility may involve public expenditure, in addition to regulatory accommodation. For some vanpooling services and perhaps dockless bikeshare, direct subsidies to service providers could help to achieve desired connectivity improvements at lowest cost and highest quality. A rapid expansion of the use of shared bicycles and (in particular) e-scooters in line with governments' active mobility policies is likely to require increased expenditure on providing segregated road space and parking areas, as well as supporting regulation concerning, for instance, speed limits for cars and trucks and rules for overtaking. This can maximise the take-up of these modes and thus help realise their wider benefits for urban policy. At the same time, it would reduce nuisance and ensure safety standards are maintained, by minimising conflicts between modes.

Introduction

The current decade has seen rapid growth in, and diversification of, mobility services based on smartphone apps and global positioning technology (GPS) services, which exploit real-time information and are tailored to user needs. Ridesourcing services were some of the earliest to emerge and have grown extremely rapidly across the world over the last five years, with companies such as Uber, Lyft, DiDi Chuxing, Grab and Ola being among the most prominent. However, there have also been rapid developments in other modes, including carsharing, bikesharing and scootersharing services. Prominent names in these fields include Car2Go, BlaBlaCar, Zipcar, Mobike, Ofo, Jump, Bird and Lime. The field of demand-responsive transit, or para-transit, is also developing, with its flexible, mini-van based services both challenging and potentially expanding the reach of traditional bus services.

In addition to their reliance on common technologies, these services share the characteristic of being in a state of rapid evolution as they seek to understand, respond and adapt to changing consumer preferences and develop more compelling market offers. This includes bringing new modes of mobility to market: for example, bikeshare has quickly been supplemented by e-bike options, often provided by the same suppliers, while e-scooter services have expanded rapidly since being introduced in 2017. It also increasingly involves a consolidation of market offerings across sub-sectors, so that individual businesses are now offering more than one mobility option. In particular, a number of leading ridesourcing companies (e.g. Lyft, Uber) have bought bikeshare and scootershare companies and now offer two or more shared mobility services through a single app. This seems to reflect movement toward the development of the mobility as a service (MaaS) concept.

Overall, urban transport and development policy priorities provide a key contextual factor for the regulation of these services. The externality issues of congestion and pollution are central urban policy concerns and are driving the adoption of a range of government policies aiming to encourage modal shift in inner urban areas, away from private vehicle use and toward public and active transport options. These include enhancing cycling infrastructure, improving frequency and reliability in public transport, expanding public transport networks and improving their integration.

Regulatory responses to app-based mobility services must recognise and take account of this context. However, the rapid evolution of this market sector poses major challenges in terms of understanding the impact of the various services, particularly in a medium- and longer-term perspective in which convergence toward the mobility as a service concept seems likely to be the direction of development. There may be compelling reasons to regulate many new forms of mobility, which governments should carefully assess. However, a fundamental requirement is to ensure that any regulatory interventions avoid distorting markets or unnecessarily restricting the development of innovative market offers.

Taxis and ridesourcing

While app-based technologies have yielded innovative business models and large efficiency gains in many sectors, a major spur to the development of ridesourcing came in the form of governments' long-term failures in regulating the taxi industry in many countries and consequent high levels of customer dissatisfaction. The extent of the disruption caused to the taxi industry is also substantially attributable to this factor.[4] Taxi supply was tightly constrained by regulatory restrictions in most major cities, giving rise to large monopoly rents and poor-service standards. These supply constraints had typically given rise to competing limousine and mini-cab services prior to the advent of ridesourcing. However the combination of the then recently-developed technologies of smart-phones, apps and GPS into a convenient and efficient means of connecting drivers and riders was a key innovation, in large part because it enabled these services to profit from wider network effects. The use of privately owned vehicles on a part-time basis also yielded important efficiency gains, in terms of short-term supply responsiveness. The resulting growth in ridesourcing services quickly overturned the artificial supply constraints imposed by regulation, causing major disruption to a formerly static, heavily regulated industry.[5]

The swift reversal of fortune faced by taxi medallion owners, who saw medallion values plummet as supply expanded, led to strong lobbying for a restrictive regulatory response. Many governments initially responded positively to this lobbying and sought to block the entry of app-based ridesourcing. However, this response was rapidly revealed as unsustainable in most markets. From a policy perspective, the substantial economic efficiency benefits implicit in the new model became increasingly apparent while, from a political perspective, the high level of customer demand for the new services made continued attempts to banish it from the market untenable. These negative initial responses were therefore often succeeded by the adoption of broadly-accommodating regulation. Where this has yet to occur the restrictive approaches adopted typically remain under challenge.

Where ridesourcing has been accommodated by regulation, a common complaint is that the reformed regulatory regimes fail to establish a level playing field - i.e. a non-discriminatory regulatory approach between taxis, ridesourcing and other private hire vehicles.[6]

Regulation in many countries creates, or recognises, a distinction between taxis and other for-hire vehicles (FHVs) at ranks whilst FHVs are restricted to offering pre-booked services. FHVs are typically subject to lighter-handed regulation as a result, since many of the underlying issues that regulation seeks to address are either unique to the rank and hail markets or are more acute in those contexts than in the pre-booked market. In particular, the taxi enjoys a limited spatial monopoly in the street hail context (i.e. the consumer does not know when the next taxi option will arrive, or its price or quality), while various information asymmetries are also significant.

Jurisdictions that have decided to accommodate the ridesourcing model have typically regulated ridesourcing vehicles in a lighter-handed manner, more similar to FHVs than taxis. However, there have sometimes been significant differences in approach between levels of government. In the United States, in particular, many attempts at local government level to adopt more stringent regulation in respect of ridesourcing have been unsuccessful due to State governments adopting regulation which limits the scope for local rules, typically following strong lobbying by ridesourcing interests.

The extent of the difference in regulatory treatment between taxis and ridesourcing is a common source of complaint from the taxi sector, which argues that it undermines its ability to compete with ridesourcing. These complaints have become more acute as ridesourcing has grown to a size that means it is seen as an existential threat to the taxi industry in many markets, unlike traditional FHVs. A key issue is that moves to accommodate ridesourcing explicitly within the regulatory system have often not been accompanied by detailed review and reform of taxi regulation. The ad hoc accumulation of regulatory requirements over long periods itself creates a compelling argument for reform in many jurisdictions, while the substantial changes to the market environment brought by the entry of ridesourcing give rise to another. Despite this, initiatives such as Finland's move to substantially deregulate key aspects of the taxi market (including restrictions on the numbers of licences issued, fare regulation and meter requirements) in 2018 remain rare.[7]

Regulatory restrictions on taxis

Common areas of regulatory concern include the fact that taxis are effectively prevented from using apps to take bookings in many jurisdictions, while they are also typically prevented from adopting the flexible pricing strategies adopted by ridesourcing services, particularly in relation to the use of dynamic (or surge) pricing to respond to demand peaks. That is, maximum price regulation applies to taxis in many jurisdictions and constrains flexible supply-response to periods of high demand, while regulations setting the actual (cf maximum) fare to be charged by taxis can also prevent them offering lower rates in contexts of low demand, or for promotional purposes. There is a case for reviewing the continued need for price regulation in the taxi sector, given that the typically rapid response times for ridesourcing vehicles mean that effective competition now exists in respect of the traditional rank and hail markets in most circumstances in which ridesourcing companies operate in the market.[8] An example of a move in this direction is that adopted in Hawaii in 2018. This enables taxis to quote a fixed fare for the journey, which is accepted by the passenger at the beginning of the trip. If this process is followed, the regulated cap on per mile fares does not apply (Pacific Business News 2018).

The continuation of other, restrictive regulatory requirements – for example in relation to vehicles and modes of operation - is also increasingly costly in an environment in which ridesourcing is typically not subject to the same constraints (Deighton-Smith, 2018). The maintenance of poorly-funded public service obligations, notably in relation to provision of services to people with restricted mobility is also a common source of complaint, given that ridesourcing has not had similar requirements applied to it.

The principle of equal treatment implies the need for this legacy regulation of the taxi industry to be reviewed and reformed to eliminate out-dated and unnecessary provisions, or those that unreasonably impede taxis' ability to compete in the current marketplace. New means of achieving some regulatory objectives may also be required to ensure fair competition between the sectors.

The distinction between taxis, other hire vehicles and ridesourcing is, to a substantial degree, a product of regulation; indeed, while app-based booking and dispatch systems initially seemed to be defining features of ridesourcing, this technology has also been adopted by taxis in most markets where regulation does not preclude it, with significant benefits for users and taxi operators alike. It is important to explore policy to enable the dissemination of innovation such as app-based technologies to the taxi industry to expand consumer benefits.

Given that taxis and ridesourcing vehicles are close substitutes, both equity and efficiency principles imply a need for a non-discriminatory regulatory approach. As some important differences between the service models remain, at least as they are currently configured, a non-discriminatory regulatory structure may not necessarily imply a single regulatory regime which makes no distinction at all between the sub-sectors. However, it does imply that regulatory provisions should avoid distorting consumer choices by imposing unnecessary costs or constraints on particular sectors.

There is a clear case for reviewing and streamlining the 'legacy' regulation applied to the taxi sector. Conversely, the rapid expansion of the ridesourcing sector in many jurisdictions has also led policy makers to identify an increasing range of issues that potentially require regulatory responses. This is leading, in many cases to an expansion in the scope and rigour of the initially light-handed regulatory frameworks applied to ridesourcing in most cases. However, the expansion of ridesourcing regulation has, in some cases, raised issues as to whether sector-specific regulation is the most effective and equitable tool to address the identified policy concerns or whether alternative, generally applicable tools should be preferred. The relative treatment of the taxi and ridesourcing sectors also raises issues.

These issues must be assessed carefully to ensure that the regulatory structure does not distort competition between the sectors or unnecessarily reduce the substantial economic efficiency and customer-service benefits that ridesourcing has brought. The following sections discuss five key areas in which significant expansions to current bodies of ridesourcing regulation have been proposed or are being implemented.

- rider and driver safety
- equity in service provision
- the economic position and employment conditions of drivers
- congestion and pollution concerns
- other, sector-specific taxes and levies.

In addition, a discussion of potential competition issues arising from the long-term reliance of many new mobility services on large venture capital raisings to remain solvent in the face of substantial operating deficits is included.

Rider and driver safety

Three aspects of the ridesourcing model have been widely promoted by transnational corporations (TNCs) as having significant safety benefits and as substantially reducing the need for traditional safety regulation as applied to taxis. These are:

- the removal of anonymity for rider and passenger due to the exclusively app-based nature of the transaction. This provides accountability for both parties and acts as a disincentive to illegal and inappropriate behaviours.
- the non-cash-based payment system, which largely eliminates the risk of robbery for drivers
- the bilateral rating system, whereby riders and drivers rate each other after each ride. While some research points to problems with the dynamics of the rating process (MacEachen et al., 2018), it is also widely seen as operating as an incentive for appropriate behaviour for both riders and drivers.

The adoption of relatively light-handed approaches to safety regulation for ridehailing by many governments appears to have been motivated at least in part by acceptance of these arguments. At the same time, the fact that ridesourcing vehicles effectively operate exclusively in the "pre-booked" segment of the market (i.e. do not engage in rank and hail work) also seems to be a factor, since much of the case for taxi regulation has historically been based on characteristics of the rank and hail segments. That is, FHVs that, by definition, do not operate in these sectors have also been less highly regulated than taxis in many jurisdictions. Ridesourcing has, in a number of jurisdictions, either been regulated as part of the FHV category or in a similar manner to traditional FHVs.

More recently, there have been increasing calls for more stringent safety-based regulation of the ridesourcing sector. These may, in part, reflect the rapid move of ridesourcing from being a niche market to a mass-market product. They also appear to be the result of some negative press coverage of ridesourcing's passenger safety performance, such as that received by Uber in the London market in 2017 (Deighton-Smith, 2018). Governments in a number of jurisdictions have responded by adopting more stringent requirements, while ridesourcing companies have also taken voluntary steps.

One aspect of this change in approach is that, while many jurisdictions have effectively relied on ridesourcing platforms to undertake their own driver vetting, this approach may increasingly be replaced by vetting undertaken by regulators. The New York City Taxi and Limousine Commission (TLC) now applies the same driver vetting arrangements to both taxi and ridesourcing drivers, although this is not a common approach among US regulators at present. Equivalent vetting requirements are also applied to taxi and Private Hire Vehicle (PHV) drivers in the United Kingdom, while several Australian States, including Victoria, also apply a single driver accreditation requirement, including criminal record checks, to all taxi, FHV and ridesourcing drivers.

The recent experience of Boston (Massachusetts), which moved from reliance on vetting by ridesourcing platforms to government vetting during 2017, provides some indication of the practical implications of the change. Among the cohort of current Uber and Lyft drivers subject to government vetting when the new legislation came into effect – all of whom had previously passed vetting by at least one platform – some 11% were rejected. Public discussion of this result included both the view that it was a demonstration of the inadequacy of the vetting undertaken by platforms and concerns expressed that the Massachusetts background checks are too stringent, for example, disqualifying applicants who may have committed minor offences in the distant past, or those whose cases were settled without a conviction (Boston Globe, 2017). The role of other elements in the ridesourcing model in helping ensure appropriate driver behaviour, notably the rating system and the ready identification of both drivers and riders, is also relevant in this context.

OECD (2018, p.22) reports that a number of competition authorities have recognised that the digital features of ridesourcing services do not mitigate some information asymmetries related to the mechanical condition of the vehicle or its insurance coverage, though "authorities recognise that regulation ensuring safety must be proportionate to the market failure in question and non-discriminatory between different types of market participants". A range of other safety issues may continue to require regulatory intervention equivalent to that adopted with respect to taxis. These include assuring drivers' technical competence (notably in defensive driving), regulating driving hours and the management of operations.

The context for safety regulation is also evolving, particularly as a result of technological advances. For example, Uber now uses telematics to assess driving behaviour, monitoring data including rapid acceleration and braking, speeding and dangerous cornering. This is, or can be, used for a variety of purposes including providing direct feedback to drivers, monitoring and analysing location-specific trends and removing unsafe drivers from the platform. Uber has also recently introduced limits on shift length.[9] These steps provide examples of new opportunities for pursuing safety improvements via the technological possibilities arising from the use of GPS-enabled apps, whether in the ridesourcing or taxi sectors and whether led by operators or underpinned by regulation.

The Roundtable did not discuss the case for regulating various specific elements of passenger or driver safety and consumer protection in detail. However, while there was a widespread view that the key characteristics of ridesourcing identified above are significant factors contributing to improved rider and driver safety, there were differing opinions as to the extent to which these can or should be seen as substitutes for more traditional approaches to safety regulation. In particular, the fact that ridesourcing is typically subject to less stringent requirements in respect of vehicle inspection and aspects of driver safety such as health standards and technical competence than those contained in taxi regulation was noted, as was the fact that the key features of ridesourcing outlined above offer no guarantee of adequate safety in these areas. The OECD (2018, p.18) warns:

> *"However, the new systems (voluntary measures such as screening driver behaviour, panic button, ride information sharing) leave their efficacy open to debate since, for example, there is no public overview and enforcement behind them."*

At the same time, other rationales for less interventionist approaches can be identified. In relation to vehicle standards and maintenance, ridesourcing vehicles are typically driver-owned and also used for private purposes, thus suggesting that stronger private incentives for good maintenance practice will exist in many or most cases. They also tend to cover far smaller distances than taxis. The driver standards enforced in relation to ridesourcing may be lower than those applied to taxis in many jurisdictions, but are usually similar to those applied to other FHVs, which can be considered to be a closer comparison, given that both operate exclusively in the pre-booked market.

The broader context is one in which little data is available on the comparative safety performance of the taxi and ridesourcing sectors. Data on consumer perceptions of rider safety suggests that ridesourcing is considered to be substantially safer than taxis in some jurisdictions, particularly where regulatory capacities are relatively low. For example, consumers in Mexico and the Philippines have cited safety as a key reason for favouring ridesourcing over taxis, whereas those in Toronto rarely cited safety as a differentiating factor between the sectors. The OECD argues that the added value of ridesourcing apps may depend on the robustness of safety regulation of taxi and FHV services and the level of its enforcement (OECD, 2018, p 9). Some Roundtable participants argued that high levels of consumer confidence do not justify continued acceptance of lower standards of safety regulation for ridesourcing, such as background checks being conducted privately rather than by regulators. In this view, consumers may be unduly positive in their assessment of ridesourcing's safety due to lack of knowledge of the fact that regulatory standards in key areas such as these are low, while the key safety features of ridehailing are arguably poor substitutes for on-going driver vetting using criminal databases as means of ensuring drivers of poor character are excluded from the industry.

The OECD (2018, p. 17) has highlighted the advantages and disadvantages of ratings systems, arguing on the one hand that rating systems in the ridesourcing context seem to be working well, perhaps better than traditional quality regulations, while also having a flexibility advantage. Conversely, there is evidence that passengers are more likely to rate and comment on positive experiences, while negative feedback is vital to the effectiveness of ratings systems.

A further factor is that ridesourcing companies, as major brands, appear to be increasingly sensitive to reputational issues. A recent example is that cited above of negative press for Uber regarding passenger safety, arising in London in 2017. This led to Uber introducing a number of new safety initiatives, notwithstanding that analysis suggested that its drivers were not over-represented in offences, vis-à-vis taxi or mini-cab drivers (Deighton-Smith, 2018). However, while this suggests an effective self-regulatory dynamic, it can also imply that, to the extent that increased self-regulation proves insufficient to maintain high levels of consumer confidence, ridesourcing services may increasingly take a more positive view of increased driver vetting by regulators.

Equity in service provision

Taxis are often conceptualised as forming part of the public transport system, notwithstanding that the service is provided exclusively by private operators. Arguably, there has been an implicit linkage between the regulatory protections accorded to incumbent taxi medallion owners and the regulatory obligations to provide universal service. The universal service obligation – or accessibility principle – has two main elements. First, taxis are obliged to pick up whoever seeks their services, subject only to ability to pay and basic behavioural and safety requirements. Second, various obligations to ensure that a proportion of the taxi fleet is accessible to people with limited mobility (notably including wheelchair users) and generally address the needs of this group have been adopted via a combination of regulation and implicit and explicit subsidy programs.

The ridesourcing sector has been criticised as falling short in relation to both of these elements. In relation to the obligation to provide services to all, a key criticism is that the ridesourcing model is predicated on the use of both smart-phones and credit cards, thus excluding people without access to one or both of these. US research indicates that users there are disproportionately younger, better-educated and higher-income urban dwellers (Clewlow and Mishra, 2017; Schaller Consulting, 2018). This has led to suggestions that ridesourcing providers engage in cream-skimming and to this extent compete unfairly with taxis.

Some early data also suggested that ridesourcing did not serve as wide a geographical area as the taxi industry. For example, OECD 2018 (p.9) cites 2015 data from Portland, Oregon, which found that the pattern of ridesourcing rides was less dispersed overall than those of taxis. However, the municipal government had only formally allowed ridesourcing companies to operate in May 2015 and the market share of ridesourcing has greatly increased since the time of that report (Portland Tribune, 2018).

Virtually all other available data on this issue suggest the opposite conclusion – i.e. that the availability of ridesourcing significantly increases mobility options for those who are poorly served by the taxi industry. For example, 2018 data for New York City show that, while ridesourcing accounted for slightly fewer trips than taxis in Manhattan, it completed ten times as many trips as yellow and green taxis combined in the "outer boroughs".[10] More significantly, the total number of pickups by taxis and ridesourcing vehicles in the outer boroughs increased by over 150% in less than four years, from a little over 3 million in 2014, prior to the entry of ridesourcing, to almost 8 million in early 2018. This clearly represents a significant increase in service availability.

Similarly, Brown (2018) found that in Los Angeles, ridesourcing "extends reliable car access to travellers and neighbourhoods previously marginalised by the taxi industry". Moreover, while audit data revealed high levels of racial discrimination in the provision of taxi services, ridesourcing data revealed almost no racial-ethnic difference in service quality. Consistent with this observation, the freeze on the issue of new ridesourcing licences adopted in New York City in 2018 was opposed by a number of major human rights groups on the grounds that it would adversely affect non-white consumers who are often refused service by the taxi industry (The New York Times, 2018).

A 2016 survey by Pew Research found that 54% of respondents believed ridesourcing is a good option for people who have trouble hailing cabs, while only 9% disagreed (Pew Research Center, 2016). Deloitte

(2016) argued that the booking process of some ridesourcing apps prevents drivers cherry-picking the most convenient and profitable requests, in contrast to taxis, as destinations are not immediately communicated (cited in OECD 2018). Lam and Liu (2019) found that

> *"…ridesharing promotes inclusive mobility through tech-aided matching, which makes ride-hailing service conveniently available for consumers in areas that are underserved by other transportation modes."*

They conclude that technology may play a key role in mitigating geographical disparity in transport, and hence contribute to a more inclusive society. Similarly, Conway, Salon and King (2018) find that

> *"Perhaps the largest impact of the advent of ridehailing has been to make for-hire vehicles both more available and easier to hire across a much wider geographic area than was traditionally served by taxis"* and that
>
> *"These data provide evidence that ridehailing is bringing this useful service to a large new population that did not previously have ready access to for hire vehicles."*

In sum, most research on this issue, including more recent data relating to periods when ridesourcing is better established in the market, suggests that ridesourcing provides a more inclusive service than the traditional taxi industry in a number of important respects.

The proportion of the population without access to smartphones in most OECD countries is both relatively low and continuing to decline. For example, Deloitte found average smartphone penetration of more than 80% across a group of 23 developed and developing countries surveyed in 2017, with limited inter-country variation (Deloitte 2017). Penetration rates also tend to be higher in the urban areas in which ridesourcing predominantly operates. Importantly, data show that age is a more significant determinant of smart-phone ownership than income. For example, 99% of French 18 – 24-year-olds now have smartphones.[11] These factors suggest that the extent of exclusion on this account is likely to be limited in most contexts and that it will fall relatively quickly as the penetration rate of smartphones continues to rise. It may also suggest that the different age profile of users highlighted above may, to a significant extent, constitute self-selection by early adopters of new technology and services. Ridesourcing services have also taken some steps to improve access for people without smart phones. For example, Uber has partnered with a third party in California to provide phone-booking access, as well as enabling account holders to book rides for third parties. Both initiatives have been targeted at older users.[12]

Concurrently, providers increasingly appear to be implementing alternative, cashless options. For example, Uber enables payment to be made via debit cards and PayPal accounts, while Lyft accepts debit cards tied to cheque accounts, pre-paid cards and PayPal. These options effectively mean that people without access to credit are not prevented from using ridesourcing. The debit card option does require access to a basic level of banking services, although the pre-paid card option accepted by Lyft appears to remove even this requirement. This option has also been adopted by Via.

Data are not available regarding the take-up of these options. However, the cashless nature of the payment systems for ridesourcing is, as noted above, the key to some of the important benefits of the mode, including improved driver safety due to removal of robbery risks and increased certainty of payment. In addition, the wider context is one of rapid movement away from cash transactions across the economy. This suggests the need to consider any potential government intervention to address access within this wider context.

Notwithstanding the initiatives identified above, the potential exclusion of people without access to credit (or debit) cards and smartphones could become a significant issue should the availability of traditional taxis become restricted, while the size of this issue may be greater in middle- and lower-income countries. Ensuring that taxis are able to compete with ridesourcing on equal terms, without unnecessary regulatory impediments, will necessarily reduce the likelihood of such an outcome. Removing remaining restrictions on taxi numbers is one key element of such a process.

The potential for ridesourcing to have negative impacts in relation to the provision of access for people with impaired mobility has also been identified as a key issue, potentially requiring a regulatory response. Mass transit services have historically been largely inaccessible to people with mobility problems, both due to infrastructure investment constraints (a factor progressively being addressed) and the difficulties some people with disabilities face in connecting with the transit network. This has led policy makers to focus on taxis as an important substitute form of mobility. The taxi industry has, in many places, been encouraged to provide services to this section of the population via incentives adopted as part of restrictive taxi-licensing system. Thus, where the supply of medallions (taxi licences) has been highly restricted, medallions for wheelchair accessible vehicles have often been made available by regulators at substantially discounted prices, with the corollary that specific service obligations attach to these licences (i.e. requirements to give priority to customers with disabilities).

The sustainability of these arrangements has been undermined by the disruptive effect of ridesourcing. That is, the de facto removal of supply restrictions and the associated monopoly rents renders the above strategy effectively inoperable. The supply of wheelchair accessible taxis appears to have diminished in many markets, as their high capital cost and the higher time costs of serving people with mobility difficulties makes them less attractive than the ridesourcing option (or, where taxi medallions have been made available at low cost, to this alternative). However, ridesourcing services have generally provided few wheelchair accessible services. While some ridesourcing providers notionally allow riders to request a wheelchair accessible vehicle, they have been widely criticised for poor service provision. A 2018 report found that, even in New York City, the availability of wheelchair accessible vehicles is inadequate, with a vehicle located by Uber in only 55% of cases and by Lyft in only 5% of cases. (New York Lawyers for the Public Interest, 2018).

Reflecting this, recent US data show that the market share of ridesourcing among people with mobility problems is substantially smaller than it is for the general population: while people with disabilities use PHVs twice as frequently as the general population, ridesourcing accounts for a significantly smaller proportion of their total PHV trips (i.e. taxis plus ridesourcing) than is the case in the general population: while ridesourcing accounted for 79% of all PHV trips taken in 2017, ridesourcing trips account for only 28% of total PHV trips by people with disabilities (Schaller Consulting, 2018:13).

While taxi regulators have long focused on provision of wheelchair accessible services, the results were already subject to strong criticism prior to the entry of ridesourcing. Long waits were often reported, with wheelchair accessible vehicles alleged to prefer serving the general population. This reflects the fact that public policy objectives in this area have generally not been fully funded. That is, public subsidies have not been designed and implemented in a way that would provide adequate financial incentives for providing a high-quality service. At the same time, it has not proven practicable to enforce effectively the regulatory requirements that accessible vehicles give priority to booking requests by users with disabilities.[13]

Ridesourcing representatives at the Roundtable argued that past regulatory approaches in this area had had limited success and suggested that the provision of adequate policy support would greatly enhance their service offer for people with restricted mobility. Some unique elements of the ridesourcing model suggest opportunities to improve accessibility performance, though they have been little pursued to date. For example, recent trials in the United States (notably in Boston and New York) have involved using ridesourcing platforms to pool accessible vehicle data in otherwise competing services, in pursuit of shorter waiting times and cost savings (Massachusetts Bay Transit Authority, 2018). In late 2018, Uber partnered with MV Transportation to offer improved accessible vehicle services, promising 15-minute average waiting times in six US cities. In addition, ridesourcing platforms may provide the opportunity to improve the utilisation rates of privately-owned accessible vehicles, by providing an opportunity for their part-time participation in providing accessible ridesourcing services.

In sum, it is arguable that the disruption of the taxi industry by ridesourcing has highlighted an area in which public policy has long been poorly developed and given impetus to a pre-existing need for substantial reform, rather than being itself the source of the problem.

The broader context in which this issue must be resolved is one in which accessibility for people with mobility difficulties has increasingly been addressed from a human rights perspective. Broadly applicable legislation such as the Americans with Disabilities Act and the Australian Disability Discrimination Act were passed in the early 1990s and required service providers to avoid discrimination in service provision on the basis of disabilities. The translation of this principle into concrete obligations applicable in specific contexts has been a long-term process. However, significant obligations now exist in most OECD countries in relation to a wide range of areas including access to publicly accessible buildings, public transport and education. In this view, the fact that the cost of providing services to particular groups of customers may be higher must be regarded as part of the "cost of doing business", rather than being the basis for a claim for subsidy. This does not, however, rule out the provision of subsidies by government for specific types of trips, or to specific sub-groups.

The approach has already been adopted for London's black cabs, all of which are now required to be wheelchair accessible. In New York City, a 2013 settlement of a discrimination suit brought by disability activists[14] led to the adoption in of a Rule requiring that 50% of the taxi fleet be wheelchair accessible by 2020. This was followed in late 2017 by a rule requiring that 5% of FHV dispatches (including ridesourcing) be of accessible vehicles from January 2019, rising progressively to 25% by 2024 (NYTLC 2019). The Rule sets the target in terms of the number of dispatches, which provides FHV dispatchers with flexibility to determine how many accessible vehicles they need in order to meet the 5% requirement. The NYC Rule may be the first to regulate the provision of accessible services by ridesourcing companies. The application of accessibility requirements to only a proportion of cabs was determined on the basis that this would be sufficient to provide an adequate service in the street-hail market while imposing lower costs than a 100% accessibility requirement, as in London.[15] The lower requirement for FHVs appears to reflect the fact that these vehicles operate on a dispatch basis, rather than in the street hail/rank markets and, as such, a smaller proportion of accessible vehicles would be needed to provide an adequate service.

The costs of the accessible taxi rule are funded via a USD 0.30 surcharge on all taxi fares, with USD 0.25 being used to subsidise the higher cost of accessible vehicles and USD 0.05 being used to provide training in assisting people with disabilities and to cover higher fuel costs. Eligible medallion owners who put accessible taxis into service are paid USD 30 000 from the Taxi Improvement Fund.[16] No equivalent funding mechanism appears to have been put in place for ridesourcing.

The high proportion of ridesourcing trips undertaken by full-time drivers in New York City may mean that the accessibility rule can be complied with, without significant disruption. However, in other contexts where more ridesourcing services are provided by part-time drivers, the adoption of such a policy could potentially give rise to feasibility issues due to an inadequate supply of accessible vehicles on ridesourcing platforms and undermine a key source of ridesourcing's efficiency benefit – i.e. the ability to use private vehicles on a part-time basis.

Economic position and employment conditions of drivers

Conditions of employment

Major ridesourcing companies have been widely criticised for their employment practices, both by disaffected drivers and more broadly. A threshold concern is that drivers are not treated as employees, but rather as independent contractors. Ridesourcing companies have argued that they simply provide a platform that links service providers to customers, rather than being service providers and employers themselves. A key implication of the 'independent contractor' status of drivers is that they do not receive employment-related benefits, such as sick leave and paid holidays, even where they are full-time workers using a single platform. Their position in this regard is similar to that of a high proportion of taxi drivers, albeit that some taxi and FHV companies treat drivers as employees, particularly in the small number of jurisdictions, like Las Vegas, that have mandated this.

In jurisdictions where taxi medallions have been in limited supply and exchanged for high prices, a large proportion of drivers lease the taxis they drive, typically on a short-term (sometimes shift-by-shift) basis, and receive only the residual fare-box income. This is often the position even where drivers work for the same medallion owner for extended periods and on a regular basis. This situation has existed at least since the 1980s and reflects attempts by regulators to limit the size of the costs and distortions associated with the failure to issue new taxi medallions.[17]

Given that ridesourcing drivers own or lease their own vehicle, it is arguable that a closer analogy, in terms of their employment status, is between ridesourcing drivers and self-employed truck drivers. Again, self-employed truck drivers are treated as independent contractors in most jurisdictions, even where they are substantially economically dependent on a single contractor. They have, in many cases, opposed proposals to treat them as employees. Where governments have sought to intervene to improve the economic position of self-employed truck drivers it has often been via the lighter-handed mechanism of providing information regarding cost functions to assist them to understand the relationship between gross payments and net income. Such an approach may also be feasible in the ridesourcing context.

Taxi medallion owners have long resisted suggestions that drivers are, or should be regarded as, employees, with incentive effects often being cited as a key rationale. Similar considerations would clearly be relevant in the ridesourcing context. Despite the persistence of low taxi-driver incomes in many or even most jurisdictions, regulators have generally avoided adopting minimum wage requirements, while legal challenges based on the interpretation of standard employment law have also had little success. While ridesourcing drivers are in a broadly similar position to taxi drivers who do not own medallions, the fact that a higher proportion undertake ridesourcing work on a part-time basis in most jurisdictions[18] suggests that they would be less likely to be found to be in an employee-like relationship in the context of such challenges.

Notwithstanding this broader background, a recent appeal court judgement in the United Kingdom declares ridesourcing drivers to be employees, rather than independent contractors (Business and Human Rights Resource Centre 2018). Although subject to a further, final appeal at the time of writing, confirmation of this decision could both have substantial impacts on the ridesourcing industry in the United Kingdom and, potentially, more widely. It would necessarily also raise the question of the employment status of taxi drivers, from both legal and policy perspectives. As highlighted in reporting on the verdict (Financial Times, 2018) the ruling is consistent with other recent decisions declaring workers in a range of industries within the United Kingdom to be employees.

As noted, the treatment, to date, of ridesourcing drivers as independent contractors is consistent with long-term practice in the taxi industry and the road freight sector. However, the broader background is one of rising concern over the spread of precarious employment throughout much of the economy. Employment insecurity is clearly a legitimate public policy concern and one which arguably requires an economy-wide policy response. However, to the extent that a sector-specific approach is considered appropriate, equity principles suggest it should be applied across both the taxi and ridesourcing sectors.

Other driver concerns

In addition to the broad issue of their employment status, drivers have highlighted more specific concerns, such as unilateral moves by ridesourcing firms to reduce fare levels and/or to increase their commission percentages. Another element of the critique is that of information asymmetry: it is argued that many drivers do not understand the full running costs of the vehicles they use and, hence, are unaware of the low effective hourly rates they make from ridesourcing. Some evidence of misleading statements regarding potential earnings on the part of ridesourcing companies also exists.[19]

Quantitative evidence on the incomes of ridesourcing drivers is limited, though some US data are available. A recent report based on New York City data (Parrott and Reich, 2018) reports average compensation (net of expenses) of USD 14.25 per hour, while around 25% of drivers were found to earn less than the 2019 minimum wage for New York City of USD 13.50 per hour.[20] A broader US-based study (Mishel, 2018) reports average compensation of USD 11.77 per hour, with a wage equivalent[21] of only USD 9.21 per hour, which is below most State-established minimum wages, but above the Federal minimum wage.

Regulating driver incomes

The first attempt to regulate the incomes of ridesourcing drivers has recently been adopted in New York City (New York Taxi and Limousine Commission, 2018a) and took effect in February 2019. The Driver Income Rule sets a minimum per-trip payment to drivers, based on a formula developed by economists (Parrott and Reich, 2018), which includes time and distance elements, modified by an utilisation rate. This will be determined for each ridesourcing company and creates an inverse relationship between the minimum per-trip driver payment and the utilisation rate. This is intended to create incentives for ridesourcing companies to increase utilisation rates, thus reducing the impact of ridesourcing vehicles on congestion, while at the same time ensuring that average driver incomes are constant, regardless of actual utilisation rates.

The rule is expected to yield a post-expenses wage equivalent for drivers of USD 17.22 per hour.[22] This amount was determined by the NYTLC as being the “independent contractor equivalent” of the NYC minimum wage of USD 15 per hour, which will take effect from 31 December 2019. That is, it includes additional components in the hourly rate in lieu of benefits, such as paid leave, to which drivers would be entitled if classified as employees.

Parrott and Reich’s data indicate that the effective (i.e. post-expenses) income of 85% of ridesourcing drivers in NYC is currently below the proposed 2020 minimum wage, while the adoption of the formula is expected to ensure minimum wage standards are met for a substantial majority of current drivers. The authors estimate that the application of the rule will result in an average increase in gross (i.e. preexpense) income of 14% among those currently paid less than the proposed minimum, and that this is equivalent to an increase in net pay of 22.5%. This, plus the fact that the formula apparently guarantees the minimum pay standard will be met regardless of changes in utilisation rates, implies that it will have a strongly positive equity effect. Conversely, while several adjustment scenarios are modelled, all imply that consumer costs, in terms of fare increases and increases in waiting times due to higher utilisation rates, will be modest. This outcome is largely predicated on assumed reductions in ridesourcing platform commission rates from a current 16.6% to between 5.6% and 10.1%.[23]

A recently published analysis of the proposal, based on mathematical modelling, (Li et al., 2019), finds that:

> *" …a floor placed under driver earnings pushes the ride-hailing platform to hire more drivers, at the same time that passengers enjoy faster and cheaper rides, while platform rents are reduced. Contrary to standard economic theory, enforcing a minimum wage for drivers benefits both drivers and passengers, and promotes the efficiency of the entire system. This surprising outcome holds for a large range of model parameters, and it occurs because the quality of service measured by passenger pickup time improves as the number of drivers increases. In contrast to a wage floor, imposing a cap on the number of vehicles hurts drivers, because the platform reaps all the benefits of limiting supply…"*

This modelling thus concludes that the adoption of a minimum driver income would benefit both drivers and passengers, while reducing the profits of ridesourcing platforms. The results also imply some increase in the congestion impact of ridesourcing.

However, as discussed below, the NYC driver income rule is being adopted in conjunction with a temporary freeze on the issue of ridesourcing vehicle licences, which will prevent any customer benefits from being reaped in the short term and would be expected to increase average waiting time and reduce availability – two key dimensions of service quality – if maintained over time, as demand increases while supply remains constant. Li et al. (2019) have apparently not addressed the impact of regulated supply restrictions in their analysis, but both the current 12 month freeze on the issue of ridesourcing licences and the permanent power for NYTLC to control FHV licence numbers will have a significant effect on the consumer costs (or benefits) of the driver income rule. Similarly, the Parrott and Reich study was released prior to the adoption of the legislation freezing FHV licence issue and does not address the likely impact of the adoption of the rule in the presence of such restrictions.

The fact that the nature and extent of future restrictions (if any) on FHV fleet size are yet to be determined means the actual impact of the driver income rule necessarily remains uncertain. However, the significant increase in average driver incomes will necessarily lead to an increase in both the demand for driver licences and the demand for work by currently licensed drivers. Conversely, the licence moratorium means intending new drivers are unable to enter the industry, while fleet size limits, if adopted, would limit ridesourcing companies' ability to accept new or previously inactive drivers. Conversely, the expected price increase associated with the driver income rule will reduce consumer demand to some extent.[24]

The driver income rule applies to the ridesourcing sector only. NYTLC officials note that the combination of regulated fares and a regulated cap on lease payments, which has been in place for many years[25], has the same purpose of underpinning taxi driver incomes. While acknowledging that these measures have not been successful in achieving this objective in the post-ridesourcing context, they do not believe that other, viable means of improving taxi driver incomes are readily identifiable. They note that it would not be possible to apply the specific, formula-based approach to improving ridesourcing driver incomes developed by Parrott and Reich to the taxi sector's different business model.[26]

The fact that no equivalent steps are apparently contemplated for taxi drivers raises a question regarding horizontal equity within the sector regulated by NYTLC. That is, drivers in one part of the industry will benefit from substantially higher, regulated minimum incomes, while others will not. This, in turn, arguably gives rise to a competitive distortion, in that the cost base for ridesourcing companies will rise significantly, while that of taxi operators will be unchanged. The fact that taxi and ridesourcing drivers operate under the same driver permit would generally suggest the potential for the ridesourcing rule to have an indirect impact on driver income in the taxi sector, as it would tend to encourage taxi drivers to switch to ridesourcing activity. However, a continuation of the current freeze on licence issues would prevent this dynamic from operating.

In sum, the recent New York City experience appears to demonstrate that it is possible to establish an effective minimum income for ridesourcing drivers, although the fact that the specific mechanism is not likely to be applicable to taxis raises issues of competitive neutrality. The larger picture is that the issue of inadequate driver incomes may ultimately be addressed through court determinations that drivers are entitled to employee status. In addition to the UK court decisions noted above, an April 2018 California Supreme Court decision[27] proposed a broadly applicable test for determining employee status which would apparently have the potential to see both taxi and ridesourcing drivers, as well as “contractors” in a wide variety of other industries, classified in this way. This highlights the fact that the issue of inadequate driver incomes is part of a broader public policy issue.

Addressing externalities

Congestion and pollution concerns

The growth of ridesourcing has occurred in a period of increasing focus on the issue of the “liveability” of cities and the potential for urban policies to improve this. The issues of congestion and pollution have been increasingly prominent in this discussion, as has the potential contribution of ridesourcing to these problems. There is also increased understanding of the economic cost of congestion; for example, it is estimated to have cost USD 124 billion in 2013 in four major countries alone (France, Germany, the United Kingdom and the United States), and is predicted to rise to USD 151 billion by 2020 (CEBR, 2014).

Concern over the impact of an unregulated industry on congestion and pollution has long been cited as a rationale for limiting taxi supply, although the significance of taxis’ contribution to these problems has never been convincingly demonstrated from a quantitative perspective. The current context in virtually all cities in which ridesourcing is well-established is that the supply of private FHVs has expanded greatly. Total trip numbers have also increased significantly, albeit at significantly smaller rates, reflecting the predominantly part-time nature of ridesourcing in most markets.

In effect, ridesourcing has both gained significant market share from taxis and expanded the size of the market as a whole. US data show that the modal share of FHVs doubled between 2009 and 2017 (Conway, Salon and King, 2018). The increase in the size of the total FHV market represents both a correction of the economic distortion caused by regulatory restrictions on taxi supply and a demand response to the availability of new, higher quality and lower priced services.

However, while the size of the FHV market has grown strongly, much of this increase has occurred outside the urban centres in which congestion concerns are greatest, in areas that have historically been poorly served by taxis. For example, data for New York City as a whole show that total FHV trips per day increased by 73.4% in the three years to the end of 2017 (Schneider 2019).[28] However, data for Manhattan – the key focus of congestion concerns – show that, while the number of trips completed by ridesourcing vehicles increased more than tenfold, from around 600 000 to 8 million, in the four years to end-2017, the net increase in the number of trips completed by FHVs over the same period was less than 20% (The Economist, 2018a).

The increase in vehicle miles travelled (VMT) resulting from the expansion of the overall FHV market necessarily adds to urban congestion. However, to the extent that ridesourcing services complement public transport, particularly by providing first/last mile services, they will tend to have an offsetting impact, reducing the use of private vehicles and, hence, VMT. The overall impact of ridesourcing on VMT will depend on the relative size of these effects. Ridesourcing's impact on congestion will depend on both the size and direction of VMT changes and the times and places at which the changes occur.

Several researchers have sought to assess ridesourcing's impact on congestion indirectly, by focussing on modal substitution patterns – i.e on which modes have lost riders while ridesourcing has gained them – and on the extent to which new trips are generated. This research yields varying conclusions. Several authors find significant increase in total trip numbers and/or reductions in transit ridership. For example, Schaller (2018) finds that modal substitution toward ridesourcing has, in large part, occurred at the expense of public and active transport modes, while significant numbers of new trips have also been generated. A recent study prepared for the ITF reports the results of a longitudinal analysis of the determinants of public transit ridership and concludes that, for each year after the entry of ridesourcing, heavy rail ridership declines by 1.3% on average and bus ridership by 1.7% (Graehler, Mucci and Ehrhardt, 2018). This effect is found to be cumulative and is considered by the authors to potentially be a major explanation of recent transit ridership declines in the United States. Tirachini and Gomez-Lobo (2019) conclude, on the basis of a Monte-Carlo simulation, that VMT will increase unless ridesourcing "substantially" increases vehicle occupancy levels. Henao and Marshall (2018) find an 83.5% VMT increase following the entry of Uber, though their dataset is limited to Denver, Colorado and is derived from a small-scale survey designed by the authors.

Other authors have reached more equivocal conclusions, with several suggesting that ridesourcing may substitute for bus travel but complement urban rail. Rayle et al. (2016) conclude that ridesourcing's impact on VMT is unclear. Clewlow and Mishra (2017) similarly find that 49% to 61% of ridesourcing trips would have not been made at all, or would have been made by walking, biking, or transit, were ridesourcing not available. However, they find that while ridesourcing has led to a 6% decline in bus ridership and a 3% decline in light rail use in the United States, it is also associated with a 3% increase in commuter rail use. Overall, they conclude that ridesourcing is "likely" to lead to an increase in VMT. Babar and Burtch (2017) reach similar conclusions to Clewlow and Mishra regarding impacts on specific transit modes, finding that the entry of ridesourcing leads to reductions in urban bus use, but increases in both subway and commuter rail services. Importantly, the size of these impacts is found to be correlated with the quality of transit services, with higher quality transit being associated with lesser degrees of substitution and higher complementarity.

Doppelt (2018) also concludes that Uber substitutes for bus travel but complements metros and subways, but highlights the fact that the size of these effects varies considerably across cities and modes. Possible reasons for the difference identified include each mode's service area network, passenger demographic, and primary reason of use. While he finds that Uber is a substitute for public transport in the aggregate, Doppelt concludes that, because the impacts vary widely at city level, the results imply that a single approach to regulating ridesourcing is insufficient and municipal governments and policy makers must understand their specific local dynamics in order to address key regulatory issues.

Conway, Salon and King(2018) reaches a more positive conclusion, finding that ridesourcing use is associated with greater use of both transit and active transport, as well as reduced rates of car ownership. They argue that the question of whether ridesourcing complements or substitutes for transit has more than one dimension, in that it can both "compete with transit for individual trips, while complementing transit as part of a low-car lifestyle". That is, if the availability of ridesourcing leads individuals to reduce their car ownership they are likely to increase their use of both ridesourcing and transit. Hall et al. (2018) find that Uber is a complement for public transit, increasing ridership by 5% after two years on average, although the size of this effect varies widely between cities, being generally stronger in larger cities and for smaller transit agencies.

To the extent that ridesourcing substitutes for bus travel but complements urban rail, the net impact on congestion may potentially be positive. This is because bus routes tend to be located in outer-urban areas, where urban rail networks were often not expanded in response to post-war urban sprawl, while urban rail networks are more likely to serve more congested inner urban areas. Moreover, the significant variation in effect sizes highlighted in some studies suggests the potential for investment in improved transit networks to increase complementarity with ridesourcing and increase positive effects on congestion. Similarly, the balance of impacts may lean more toward ridesourcing being complementary to transit in many dense, European cities with extensive and high-quality transit networks than has been found in the mainly US-based research cited above.

As noted above, research on modal substitution provides only an indirect indicator of the likely impact of ridesourcing on congestion. However, a smaller body of research has sought to measure congestion impacts directly, albeit that few studies have been published in peer-reviewed journals (Tirachini and Gomez-Lomo, 2019).

A notable example looks at the impact of ridesourcing in San Francisco. The regulatory authority initially measured the proportion of vehicle trips accounted for by ridesourcing and found that taxis and ridesourcing vehicles together accounted for 16% of weekday vehicle trips in 2016, compared with 2% for taxis in 2010-12, prior to the establishment of ridesourcing (San Francisco County Transportation Authority, 2017). It subsequently published a report directly estimating ridesourcing's contribution to both total congestion and congestion growth. This concludes that ridesourcing is responsible for 47% of the increase in congestion observed in the city between 2010 and 2016 and 25% of total 2016 congestion, despite accounting for only around 5% of VMT in 2016 (San Francisco County Transportation Authority, 2018). This result reflects the concentration of ridesourcing journeys near urban centres and in peak periods, when congestion is greatest.

San Francisco may be an atypical case, in that it had a particularly heavily-regulated taxi industry before the advent of ridesourcing. Certainly, in some other cities for which data are available, the impact of ridesourcing on congestion seems to have been much more limited. For example, Nie (2017) found that in Shenzen, China, travel speeds dropped by an average of 5% following the entry of ridesourcing services, and concluded that" ridesourcing worsens congestion for taxis in the city, but the impact was relatively mild". A similar conclusion was drawn in a 2016 study published by the New York City Major's office. The report found that recently observed reductions in vehicle speeds were driven primarily by increased freight movement, construction activity and population growth, and that while ridesourcing contributes to overall congestion, it did not drive the recent increase in congestion in the CBD. However "e-dispatch could drive modest increases in congestion in the future" if it were to lead to a reduction in public transit use (City of New York, 2016).

Lee et al. (2018) find that there is an overall complementary relationship between Uber and public transit, but that in total Uber does not have a significant impact on either public transit use or on traffic congestion in cities with high "urban centrality". This outcome is found to be the result of two offsetting effects: ridesourcing has allowed walkers as well non-commuters to travel more conveniently, while drivers substitute combinations of ridesourcing and public transit for private vehicle use. Thus, the increased traffic congestion from the walker and rider segments switching to ridesourcing offsets the reduction of traffic congestion resulting from drivers, who use Uber to solve the last mile problem.

Another study, an empirical analysis by Li, Hong and Zhang (2019) has concluded that ridesourcing services significantly decrease traffic congestion in urban areas and conclude that "on-demand ride sharing could actually be a part of a solution to urban congestion in major urban areas." The authors provide various hypotheses as to the dynamics which could underlie the observed results, but do not directly test them.[29]

In sum, Conway et al. (2018) conclude that the evidence on the impact of ridesourcing on congestion is inconsistent, with ridesourcing "…found to increase, decrease and have no effect on traffic congestion" by different researchers.

While research literature provides no clear conclusion as to whether resourcing has a significant impact (positive or negative) on congestion overall, a number of large, dense cities have concluded that it is a major exacerbating factor in their own central areas and adopted policies to address this concern. In some cases, such as New York City, there has apparently been a rapid shift in perspective, from the 2016 conclusion that ridesourcing was not a significant contributor to increased congestion.

Policies adopted to-date to address concerns over ridesourcing's impact on congestion include the imposition of caps on the size of ridesourcing fleets (Seattle, New York City), the imposition of flat per-trip taxes on ridesourcing (New York City) and the imposition of congestion-based charges specific to ridesourcing (Sao Paulo).

In some cases, combinations of these approaches have been adopted. A notable example is that of New York City where, in the wake of data showing vehicle speeds had fallen from 9.1 mph to 7.1 mph on average in the seven years to 2017 (The Economist, 2018b), the New York State government adopted a flat per journey surcharge on both the taxi and ridesourcing sector in April 2018.[30] This was followed by legislation adopting a one-year freeze on the issue of licences for "for hire vehicles" (i.e. car services and ridesourcing) and establishing permanent powers for NYTLC to regulate fleet numbers in August 2018. The legislation also required a review of the impact of the sector on congestion, authorised the regulation of the utilisation rate of ridesourcing vehicles and required the regulator to establish a minimum income for ridesourcing drivers.[31]

While a cap on ridesourcing vehicle numbers was first proposed as long ago as 2014 (in Seattle), the concept appears to be capturing more interest as the ridesourcing industry reaches a mature phase in some countries. For example, following the adoption of NYC's cap, London's mayor called for legislation to enable ridesourcing vehicle numbers to be capped in the interests of congestion and pollution control (The Guardian, 2018) and members of Chicago's city council have put forward a similar proposal (Chicago Tribune, 2018).

Sao Paulo (Brazil) began levying a congestion charge on ridesourcing vehicles in 2016. This is a charge per (occupied) mile, which is higher in the city centre and during peak periods and less expensive in suburban areas, off-peak and during weekends. The charge was set with the intention of limiting the total mileage covered by ridesourcing vehicles to a target level (initially 5 000 "taxi equivalents", later doubled to 10 000). The charge is intended to address congestion, as well as yielding a contribution toward road maintenance costs. Revenue from the tax is hypothecated to transport investments. The charge also initially had a pro-competitive objective, in that it was levied at a higher rate on providers with a market share above 20%. The market share of Uber subsequently declined from 95% to 70%

within six months (Biderman, 2018). However, this aspect of the policy was subsequently the subject of a successful legal challenge.

These policies have been adopted too recently to enable their practical impacts to be analysed in detail. However, the potential role of sector-specific policies such as these in addressing congestion and pollution can be considered from a regulatory policy perspective, as discussed in the following sections.

Capping fleet numbers

Capping ridehailing fleets

As noted, the need to control congestion and pollution has historically been cited as a key rationale for limiting taxi numbers by the proponents of this intervention. However, this prescription has enjoyed little support among economists (Moore and Balaker, 2006). From a theoretical perspective, targeting one small element of the vehicle fleet as a means of addressing a major externality to which all vehicles contribute fails both efficiency and equity tests. Moreover, placing a cap on the ridesourcing fleet size is an indirect means of addressing ridesourcing's impact on congestion and one that is likely to have negative side-effects. A key problem is that caps do not distinguish between areas of the city. They therefore provide insufficient incentives for ridesourcing vehicles to avoid congested, central areas. At the same time, they are likely to reduce the number of vehicles serving outer areas by increasing the expected returns from serving the highest-demand central areas. While ridesourcing has, in many cases, significantly improved service provision in previously poorly-serviced outer urban areas (Conway, Salon and King, 2018), the imposition of caps on fleet numbers may put these important gains at risk.

From a regulatory perspective, the task of identifying and maintaining an optimal level of supply restriction is a demanding one, particularly in the light of the political economy of the industry. Historically, widespread evidence of high and rising taxi medallion prices provided evidence that the task was rarely undertaken successfully, though it is arguable whether the observed outcomes of increasing taxi scarcity and monopoly rents accruing to taxi medallion owners were primarily the result of technical difficulties in determining optimal supply levels or regulatory capture. In any case, there is little reason to believe that the same dynamics would not operate in respect of ridesourcing in the longer term.

Perhaps as a result of the historical experience of mismanaged taxi supply restrictions, some proposals for caps on ridesourcing numbers have met strong opposition. For example, a cap proposed in New York City in 2015 was abandoned, while one adopted in Seattle in early 2014 was overturned within a month, following receipt of a petition in opposition from citizens. However, in both cases, caps were subsequently adopted. In Seattle the fact that the cap initially adopted was set at an extremely low level, limiting the number of ridesourcing drivers on the road at any one time to only 150, suggests that the underlying rationale had more to do with protecting the taxi industry than with addressing congestion concerns. The fact that the "compromise proposal" which replaced the initial cap involved issuing new taxi licences also arguably points to this dynamic (Sightline Institute 2014).

In New York City, the 2015 proposal would have seen numbers capped at a time when there were around 12 500 vehicles providing ridesourcing services. While the cap was proposed to be temporary, it appears unlikely that fleet numbers would have reached their July 2018 level of 78 000 (Schneider 2019) had the precedent for capping numbers been set at that time. This highlights the potential loss of consumer welfare involved: regulators have typically done poorly at estimating the number of taxis required to meet consumer demand effectively and it is not obvious that better decisions would be taken in the ridesourcing context.

As noted, legislation imposing a cap was ultimately adopted in New York City in August 2018 [NYCC Law 144-B/2018]. In addition to requiring the Taxi and Limousine Commission (TLC) not to issue any new licences during a 12-month period, it provides permanent powers for the TLC to regulate the number of for hire vehicle licences issued. The TLC stated in January 2019 that extending the freeze beyond its initial 12-month duration is one of a "wide variety of policy options" being evaluated.[32] However, the New York City Council voted in August 2019 to extend the cap for a further year (Markets Insider 2019), while Schaller (2019) states that the intention is to make the freeze permanent.

The TLC has also been empowered to set *vehicle utilisation standards*, a tool which would apparently also act indirectly to limit ridesourcing vehicle numbers. A third, related factor in this regard is the operation of the driver income rule which, as noted above, creates incentives for ridesourcing companies to increase utilisation rates[33], and hence limit fleet size, due to the design of the minimum payment formula. Thus, NYC has, in effect, implemented a suite of measures with the intent and/or the effect of limiting the size of the ridesourcing fleet and, hence, its impact on congestion and pollution.

Parrott and Reich reported that the average utilisation rate in the ridesourcing sector in New York City in the second half of 2017 was 58% and that Via has the highest rate among the four entities currently affected by the legislation, with 69%. NYTLC officials have indicated that they believe it would be feasible to achieve a sector-wide utilisation rate at or above Via's 69% following the implementation of the measures identified above. This would imply an increase of 11% in the current industry average utilisation rate and, consequently, an average reduction of 15.9% in the number of ridesourcing vehicles on the streets.[34] By comparison, Parrott and Reich's three base scenarios, used in modelling the probable impact of the Driver Income Rule, adopt an assumption of only a 4% increase in utilisation rates. A 4% increase in utilisation rates, from the current average level of 58%, would imply a reduction of only 6.4% in the number of ridesourcing vehicles in use.

Alternative estimates of the size of the potential benefits were published by Schaller (2017). Schaller modelled the potential impacts of restrictions on access to central Manhattan for taxis and ridesourcing vehicles, based on a reduction in average time between trips to a target of six minutes, as recorded in 2013, when cabs were heavily utilised. This scenario was estimated to reduce taxi and ridesourcing vehicle numbers in the CBD by 12% and to reduce total (all vehicle) mileage in the CBD by 7%. A further scenario, based on taxis adopting the use of apps to reduce average times between trips to four minutes resulted in estimated reduction in total vehicle mileage of 11%.

The above suggests that the potential impact of vehicle utilisation standards and the operation of the driver income rule on congestion in New York City may be limited. The continuation of the freeze on licence issue could clearly have a more substantial effect, but at a significant cost in terms of lost consumer welfare.

This highlights the likely limitations of the sector-specific approach as a second-best means of addressing congestion and suggests the merits of focussing on improving the acceptability of one or more fleet-wide approaches. It may also highlight the general risk that fleet caps that are intended to be temporary may, in fact, become more durable. That is, if limiting ridesourcing fleet numbers (directly or indirectly) becomes accepted as a key anti-congestion measure and congestion levels are little changed, there will tend to be a public and political expectation that the controls will be retained, and perhaps strengthened. The broader context, in terms of taxi regulation, is one of a tendency for temporary caps to become effectively permanent. A current example is that of the one year freeze on (previously deregulated) taxi numbers introduced in Dublin in 2009, which remains in place almost a decade later and has led to a 25% fall in the size of the taxi fleet. The significantly higher rates of turnover in the ridesourcing industry suggest that the continued application of a cap would lead to more rapid declines in fleet numbers.

Utilisation rates in the NYC ridesourcing sector continued to increase prior to the introduction of the fleet cap, rising from 58% in the second half of 2017, as reported by Parrott and Reich, to 62.8% in the first half of 2018. The average rose further, to 64.4% during the second half of 2018, although there was no clear uptrend following the introduction of the freeze on licence issues in August. This may reflect the fact that, despite the freeze, NYTLC data show that the number of active ridesourcing vehicles operating increased over the first four months of the operation of the freeze on licence issue, from 78 545 in August 2018 to 85 146 in December 2018.

Ridesourcing utilisation rates are already to be significantly higher than those of taxis, in New York City as in other US cities. Cramer and Krueger (2016) found average UberX utilisation rates in a selection of cities to be 30% higher than taxis when measured by time and 50% higher when measured by miles, attributing the difference to a combination of the greater matching efficiency of ridesourcing apps, network size effects, inefficient taxi regulations and the efficiency impact of dynamic pricing. NYTLC data show that for the earliest period for which comparative data are available (June 2017) average ridesourcing utilisation was 8.7% higher than that of yellow taxis (63.0% vs 54.3%)[35], while the gap in utilisation rates appears to have grown subsequently, to 11.5% in the first half of 2018 (62.8% vs 51.3%) and 12.9% in the second half (64.4% vs 51.5%). By December 2018, the gap was 14.5% (66.7% vs 53.2%)(Schneider 2019).

This progressive increase in ridehailing utilisation appears to have been largely unrelated to the legislative action taken by the NYC government.[36] It also runs counter to the conclusions of Hall et al (2017), who found that utilisation rates in major Uber markets tend to be stable over time as market expansion occurs. The fact that utilisation has already reached 66.7% suggests that the scope for further increases may be limited. The consistently increasing gap in efficiency (i.e. utilisation rate) between ridesourcing and taxis also implies that, to the extent that the legislative changes cause any switching of demand from ridesourcing to taxis (i.e. increases the utilisation rate of the taxi fleet), the net impact on congestion levels would be a negative one.[37]

While the current NYC freeze on licence issue is temporary, the TLC has, as noted, been given the power to regulate the number of for hire licences issued on a permanent basis. Thus, legislative power to extend the freeze, potentially indefinitely, now exists. The TLC’s exercise of a similar power to regulate taxi licence numbers has seen virtually no new taxi licences issued since licensing was introduced in 1937.[38]

More generally, the widespread failure of taxi regulators to “manage” taxi fleet restrictions effectively and the large consumer costs that resulted necessarily suggests that providing similar powers in relation to ridesourcing entails significant welfare risks. These must be weighed against the potential benefits, in terms of congestion, pollution and other policy objectives. They should also be weighed against other policy tools, such as generalised congestion charges, that have the potential to address these issues at much lower cost.

Capping taxi fleets

The issue of fleet numbers is also relevant to the issue of equal treatment of the two sectors by the regulatory system. While ridesourcing numbers have, to date, rarely been restricted, the supply of taxi medallions continues to be fixed in many cities. This inevitably means that the taxi sector is constrained in defending its market share against ridesourcing entrants, with potential entrants to the industry continuing to face lower entry barriers in the ridesourcing sector.

By retaining caps on taxi medallion numbers, governments have limited the size of the loss of medallion values suffered by incumbents due to the entrance of ridesourcing. However, this approach has also constrained the ability of the taxi industry to evolve and adapt in the face of this competition. An alternative approach, adopted across much of Australia, is to adopt alternative policy tools to ameliorate the losses of incumbent medallion owners in order to facilitate the opening of entry to the taxi sector. In Melbourne, Sydney and Perth, payments were made to medallion-owners immediately prior to the removal of limits on medallion numbers. These were focused particularly on small-scale owners and broadly intended to address hardship, rather than provide “compensation” for the loss of medallion values per se.[39] A similar approach was adopted at the time of the removal of restrictions on taxi numbers in Ireland, from 1999.

The impact of this approach can be seen in Melbourne, where a key regulator reported in late 2018 that the number of taxi licences on issue had almost doubled in the year to 2018 (Essential Services Commission, 2018). This strong interest in obtaining taxi licences among entrants to the industry has been demonstrated in an environment in which four ridesourcing companies are now established and more than 52 000 FHVs serve a city of around 5 million people.[40] Hence, opening entry to the taxi sector appears to have substantially improved its ability to compete with ridesourcing and perhaps demonstrated the continuing importance of the traditional street hail and rank markets. Deregulation of fares for booked taxi services has also helped enable taxis and ridesourcing to compete more fairly. The funding of the payments to medallion owners is discussed below in the section on sector-specific taxes and levies.

Sector-specific congestion charging

That ridesourcing-specific congestion charges – or alternatives such as fleet caps – constitute second best policies for addressing congestion (and/or pollution) is typically acknowledged by their proponents. In the New York City case, the moratorium on FHV licence issue was adopted following the discontinuation of State government proposals to adopt a general congestion charge in early 2018. Similarly, Biderman (2018) acknowledges the theoretical superiority of a fleet-wide approach to congestion charging in the Sao Paolo context, but highlights a number of practical difficulties. In assessing whether a second best policy should be adopted, two key considerations are a) whether a first-best policy is a feasible alternative and, if it is not, b) whether the second best policy is a reasonably effective and efficient substitute (i.e. whether it passes a benefit/cost test, as well as equity assessment).

The feasibility of adopting the first-best policy of fleet-wide congestion charging will clearly vary widely in different circumstances. To date, the number of cities that have successfully adopted such policies is low, being largely restricted to London, Milan, Singapore and Stockholm. A few cities (e.g. Beijing and Seattle) are currently considering adopting this policy (the latter with strong support from Uber and Lyft), while others including Edinburgh, Manchester (in the mid-2000s) and New York State[41] have previously abandoned proposals. The case for congestion charging is clearly likely to be easier to mount in larger cities facing more severe congestion problems. However, the increasing policy focus on urban policy issues, including “liveability”, in many countries suggests that the space for adopting these policies may be enlarging. Moreover, the political context, and hence the feasibility of congestion charging may change rapidly, as demonstrated by the fact that, having voted against a congestion charge in early 2018, the New York State legislature subsequently approved one in April 2019 (The Guardian, 2019).

The specific design of policies addressing congestion is likely to have a large impact on their reception by populations and, hence, the prospect of their adoption at the political level. Parking levies targeted at inner urban areas can create similar incentives to congestion charges, but are often more politically acceptable. Such levies have been adopted in several Australian cities (Melbourne, Sydney, Perth), in Montreal (Canada) and in Nottingham (United Kingdom).[42] While such levies are likely to have little impact on the ridesourcing sector (in contrast to a traditional congestion charge)[43], their application to the majority of the vehicle fleet implies that they will be substantially more effective than congestion charges applied only to ridesourcing services.

Another option for improving the political acceptability of congestion charges is a revenue-neutral substitution between existing, fixed road charges (such as vehicle registration) and a broadly applied system of road user charging, which would be differentiated according to demand levels. That is, rather than applying usage charges to only a small subset of the most congested roads, it would be applied generally. Thus, all road users would be subject to charging, rather than only the sub-set that uses the most congested inner-urban road space. Both the general application of the charges and their offset by the removal of existing charges would be expected to increase their acceptability, while still retaining the incentive benefits of road user charging. An increasing range of technological options is available to facilitate this approach, including GPS-based systems currently being employed by some insurance companies as the basis for more differentiated premium offerings.

More generally, advocates typically underline the need to adopt congestion charging as part of a wider suite of policies. For example, the Advisory Panel which proposed a congestion charge in NYC recommended that it form the part of the third stage of a set of policies that would begin with improvements to public transport, better enforcement of traffic laws and addressing bus congestion (Fix NYC Advisory Panel, 2018).

In sum, addressing congestion issues by specifically targeting the ridesourcing sector will necessarily be substantially less effective than a fleet-wide approach and also raises equity issues. Thus, a careful assessment of various first-best policy options to address congestion and pollution issues at the fleet-wide level to identify politically feasible approaches should be undertaken before consideration of partial approaches.

While there is strong support among economists for general congestion charges, it does not follow that sector-specific congestion charges necessarily constitute an effective and equitable intervention. That said, proponents of such policies argue several factors can collectively constitute a sound justification for such an approach. In particular:

- In contrast to private vehicles, ridesourcing vehicles do not pay parking fees when operating in congested central city areas. With such parking fees increasingly being adopted as a tool of policy to encourage modal shift – i.e. effectively functioning as a de facto congestion charge –a ridesourcing specific congestion charge can be seen as an alternative means of achieving the same policy objective.
- The pattern of movement of ridesourcing vehicles, including their near constant movement (both while carrying paying passengers and, in many cases, cruising between jobs) and their tendency to block traffic during pick-up and set-down activity.
- In some dense inner-urban environments, in which congestion and pollution concerns are greatest, ridesourcing vehicles and taxis can collectively constitute a large proportion of the vehicle fleet.

Assessment of the policy merits of a FHV-specific charge involves consideration of the potential impact of a charge on congestion, the economics of the ridesourcing sector and consumer welfare.

While ridesourcing vehicles typically account for only a small proportion of the vehicle fleet, some evidence indicates that its impact on congestion may be proportionately much greater. For example, San Francisco County Transportation Authority (2018) includes a ‘counter-factual’ scenario, which models current traffic flows in the absence of ridesourcing services and concludes that around 25% of total congestion, measured as Vehicle Hours of Delay (VHD) is the result of ridesourcing activity. This represents a substantially greater proportion than ridesourcing’s contribution to total vehicle miles driven, which is calculated at around 5%, and reflects the fact that a high proportion of ridesourcing services are provided at congested times and places (i.e. peak hours in the inner urban area).

A dynamic element should be considered in this context. While ridesourcing has been found to be a major contributor to increased congestion in San Francisco in recent years, and may be a similarly significant factor in other large, dense cities, the six-year period covered by the San Francisco study coincides with the growth of ridesourcing from a start-up business to a mature industry. That is, further substantial growth in ridesourcing vehicle numbers would seem unlikely as, by implication, would be any further major contribution to congestion. If this is correct, the overall impact of the ridesourcing sector can be characterised as being to bring forward the growth in congestion in San Francisco by about three years. That is, the report argues that congestion would have grown by only around half the rate over the past six years, in its “counter-factual” scenario, which models congestion growth in the absence of the ridesourcing sector.

Put alternatively, even if a congestion charge were applied to the ridesourcing sector at a level that would effectively completely exclude it from the market, the impact would be a one-off 25% reduction in congestion levels, which would be expected to be reversed within about three years, due to the combined effect of other, non-ridesourcing related factors. This highlights the limited likely impact of policies designed simply to limit the growth of the ridesourcing fleet.[44] Moreover, the size of the impact modelled in San Francisco may be significantly larger than would be the case in most other cities, due to the starting point of substantial distortion of transport demand due to an unusually constrained taxi industry.

While the ridesourcing industry may have made a significant contribution to congestion growth over a short period, its transition to a mature industry[45] suggests that this large marginal impact will not continue, while its contribution to total congestion appears to be relatively limited. By implication, congestion charging for ridesourcing alone or other sector-specific initiatives is likely to have limited impact in reducing congestion and pollution in most contexts[46], while yielding potentially significant costs via economic distortions. Such policies also raises equity concerns by imposing congestion charges on relatively infrequent users of ridesourcing services while exempting people who commute daily to city centres in private vehicles and are likely to be high-income earners.

In sum, if roadway space is relatively scarce and negative externalities result, the use of the resource should ideally be subject to a generally applicable tax which, if set at the correct level, will reduce the externality to its optimal level, while those who value the ability to drive in the congested area most highly will pay the tax and others will change their travel patterns. A sector-specific tax (or cap on numbers) is unable to achieve these outcomes and potentially creates significant distortions in modal choice, as well as reducing the efficiency gains from ridesourcing and raising equity concerns.

Taxis vs ridesourcing

If a congestion charge that is limited to the PHV sector is considered to be an appropriate second-best policy, the principle of non-discriminatory regulation suggests that it should be applied on a consistent basis across all FHVs – i.e. taxis, ridesourcing and other private hire vehicles. This recognises that the distinctions between these sub-sectors are largely regulatory in nature, while both taxis and ridesourcing vehicles have substantial market share, in terms of v-km travelled.

This approach has not been taken consistently. In New York City, the per-trip surcharge recommended by the Fix NYC Advisory Panel in early 2018 has been applied the whole FHV sector. Conversely, while London's fleet-wide congestion charge will applied to ridesourcing vehicles and "mini-cabs" for the first time in April 2019, traditional taxis (i.e. black cabs) remain exempt. The congestion charge adopted in Sao Paolo has also been applied only to ridesourcing vehicles. While it has been argued that the fact that taxis pay significant licence fees in some jurisdictions constitutes reasonable grounds for excluding them from a sector-specific congestion charge, a flat annual fee fails to provide the same market signals as a congestion charge.

Other, sector-specific taxes or levies

In addition to sector-specific congestion charges, an increasing number of jurisdictions have imposed other sector-specific taxes or levies on the ridehailing sector as means of addressing one or more of the costs identified as being imposed by the accommodation of ridesourcing in the regulatory system. These have varied widely in both scale and purpose. However, two key reasons for adopting sector-specific levies are to:

- Address the negative social and economic impacts of the disruption of the taxi industry caused by ridesourcing.
- Address strains on the viability of transit systems which are in some cases said to be exacerbated by ridesourcing's impact in reducing ridership.

In Australia, two or three years after the entry of ridesourcing to major cities the value of taxi licences (medallions) had been reduced by around two-thirds. In deciding to formally accommodate ridesourcing in the regulatory system, State governments also determined to level the playing field for the taxi sector by making taxi licences available to all qualified applicants at administrative cost. This necessarily eliminated the remaining value of existing licences at a stroke and was accompanied by a decision to make payments to incumbent licence-holders. These payments represented a fraction of the former value of the licences and were presented as transitional assistance designed to avoid hardship, rather than as compensation for regulatory 'takings'.[47] However, the cost of these schemes was sufficiently high that at least four of the eight State and Territory governments (including Victoria and New South Wales) applied relatively large (USD 1 per ride) levies to both ridehailing and taxi sectors in order to fund them. While it is expected that the levies will take several years to recoup these costs, these levies have been presented as temporary measures.

Suska (2016) argues that such initiatives can be both efficient and equitable: if they pave the way for more rapid accommodation of ridesourcing in the regulatory system by reducing lobbying against reform by incumbents and making reform politically more feasible, the benefits of regulatory change are achieved more quickly, while ridesourcing users and drivers, as the main beneficiaries, pay the cost of bringing forward reform. Certainly, this was consistent with the narrative presented by most of the State governments to explain their approach.

The levies adopted in various cities in the Americas have differed both in that they have generally been presented as permanent, rather than temporary, and in that they have generally not been hypothecated toward the provision of assistance to taxi industry incumbents. Most are levied as a flat fee per ride, although some are levied as a percentage of the trip price. In several cases, at least part of the revenue from these levies has been hypothecated to fund the urban transit system. This is in some cases explained by reference to research suggesting that the development of ridesharing is a significant explanation for the declines in transit ridership observed in many US cities in recent years. In other cases, some or all fee revenue has been directed toward funding accessible transport options. Examples of levies in place at present include:

- Massachusetts, which legislated in 2016 to apply a USD 0.20 per ride levy to ridesourcing services, with USD 0.05 to be used to assist the taxi industry, USD 0.05 to be earmarked for a state transport fund and USD 0.10 to be given to city governments (Reuters, 2016).
- Mexico City, which imposed a tax of 1.5% of the fare in 2015, with the proceeds being directed to a City Transport Fund, some of which is earmarked to support the taxi industry (Reuters 2015).
- Washington DC, which increased its existing levy to 4.75% in 2018, with the majority of the levy being used to supply 10% of the city's funding of the Metro (Washington Post, 2018).
- New York City, which has an 8.875% levy, split between the general funds of the State and city governments, plus a USD 2.75 Manhattan congestion surcharge, which is directed to the Metropolitan Transit Authority.
- Fortaleza in Brazil, which has a 2% levy, with revenue directed to measures to reduce private vehicle usage, such as the development of bus and bike lanes (World Resources Institute, 2018).
- Chicago, where a USD 0.52 per ride levy was initially directed to the city's general fund, but was hypothecated to funding the city's public transport system in 2017, as well as being increased to USD 0.67 and, from 2019, USD 0.72 (Citylab, 2017). The change was adopted in the wake of the publication of research arguing that ridesourcing was both reducing public transit ridership and increasing congestion.
- Philadelphia, where two-thirds of the revenue from a 1.4% levy is directed to the School District and one third to the Philadelphia Parking Authority (Philadelphia magazine, 2017).
- Calgary (Canada), which introduced a CAD 0.20 per ride fee in January 2019, which is hypothecated toward improving the accessible taxi programme (City of Calgary, 2019).

Most of these levies are smaller than the Australian examples above, although the current Chicago fee of USD 0.72c is approximately equal to AUD 1.00, while the NYC 8.875% is likely higher and the inclusion of the USD 2.75 congestion surcharge in Manhattan makes this clearly the largest of the charges identified.

The negative impact of ridesourcing on urban congestion, and sometimes on pollution, is frequently cited in explaining these taxes. However, pragmatic reasons also appear to be significant; that is, municipal governments facing severe constraints on revenue raising, plus significant infrastructure spending backlogs, have found ridesourcing to be a politically acceptable way to raise significant new revenue. Hypothecation to urban transit (or to schools, as in Philadelphia) appears to be a means of further enhancing the political acceptability of such taxes. In the Chicago case, the city has argued that its programme of investment in public transit is only possible because of the increased and newly hypothecated ridesourcing fee (City of Chicago, 2019). It has also argued that ridesourcing companies should be taxed more highly to compensate the city for the loss of other tax revenues claimed to have occurred due to modal shifts caused by ridesourcing's market entry. These include loss in tax revenues from "other public vehicles", reduced parking garage tax revenues, vehicle lessor tax and reduced public transit fare revenues (Chicago Sun-Times, 2017).

This list of fees includes a number (notably parking garage tax) that are likely linked to negative externality effects. As noted above, there is clear evidence of the contribution of ridesourcing to increases in urban congestion in at least some cities. This implies the potential for congestion-related taxes to yield improved efficiency outcomes. However, an optimal policy implies applying congestion charging to the whole private vehicle fleet. If a sector-specific charge is adopted as a second-best policy, structuring the charge in a way that focuses it on congestion impacts (e.g. by applying it only to rides that enter congested areas, at times likely to be congested) should be preferred to a flat charge. Such approaches do not appear to have been adopted to date, with the partial exception of Sao Paolo, which has adopted a highly differentiated charging system with numerous parameters, some of which relate to congestion.

In the absence of such tailored charging systems, it is questionable whether ridesourcing-specific taxes of the type identified above will have significant positive efficiency impacts. That said, it is arguable that such taxes are no less distorting than many other revenue sources relied upon by municipal governments. Taxes hypothecated toward adjustment assistance for taxi industry incumbents may yield positive impacts if they enable reform action to be brought forward. However, this is unlikely to be the case in jurisdictions in which ridesourcing is already well-established.

Current sector-specific taxes on ridesourcing are relatively small in most jurisdictions, but show a clear tendency to increase over time. Governments should recognise the risk of distorting demand through the imposition of large sector-specific taxes on ridesourcing. Where taxes are believed to be justified by negative externalities such as congestion, they should be targeted toward the correction of the externality as far as possible, rather than being applied broadly or indiscriminately. The app-based nature of ridesourcing would seem to make such designs feasible.

Other competition issues

A notable feature of the ridesourcing sector is that, almost a decade after its initial appearance, the major operators continue to report significant operating losses, with their continued existence and growth being underpinned by successive injections of venture capital. Despite initial public offerings (IPOs) being prepared at high valuations, some observers have questioned whether the sector will ever be profitable. This, in turn, raises the issue of whether the current business model – and pricing – will prove sustainable in the longer-term.

While this is not a policy issue per se, it is arguable that the taxi industry faces unfair competition due to the operation of this dynamic, in which the operations of ridesourcing competitors are subsidised in the medium-term by capital injections. To the extent that ridesourcing companies seek to drive taxi industry competitors from the market by maintaining prices at levels that are below cost on a sustained basis, this could be seen as constituting predatory pricing. That said, a number of court actions alleging predatory pricing have, to date, been unsuccessful (CUTS International, 2017), while an action commenced against Uber by a San Francisco taxi company in late 2016 remains unresolved at the time of writing.[48] Moreover, the fact that these actions have been litigated in the courts in a number of jurisdictions indicates that the general competition law is capable of dealing with questions arising in this particular context.

Moreover, the ridesourcing sector does not appear to be unique in adopting a business model that emphasises growth in market share and expansion into new sectors over profitability and in which owners seek returns through the ultimate sale of the business, rather than a stream of profits. Darbera (2017) refers to “the venture capital economy”, and describes the emergence of this phenomenon as one of the three major changes that have allowed ridesourcing to disrupt the taxi industry, alongside the smartphone and the network economy. The dynamic is described as follows:

> *"It is now possible to raise funds to develop one's company with the objective to sell it to another bigger company without any notion of short-term profitability; whereas traditional taxi companies cannot afford to lose money for two or three years in a row, if so, they would disappear."*

Darbera describes the model as being based on the establishment of an internationally recognised brand, and argues that the corollary of this is that, in order to be able to compete successfully, traditional taxi companies must adopt the same business model, building a brand-name for an international consortium of taxi companies using a common app.

In sum, while the ability of ridesourcing companies to sustain loss-making operations in the medium term clearly adds to the competitive challenge faced by the taxi industry, the issues involved appear to fall within the scope of general competition law in most OECD countries. Moreover, given the adoption of similar business models in other sectors of the economy, to the extent that competitive protections are seen as inadequate, review of the general competition law would appear to be the most appropriate response.

Bikeshare

The bikesharing concept has its origins in the docked schemes established in many cities with the involvement of, and provision of substantial subsidies by, municipal or regional government. Lyon's Velo'V (2005), Paris' Velib (2007) and Barcelona's Bicing (2007) schemes are perhaps the earliest modern examples. However, while this model has spread relatively rapidly, the bikeshare market has increasingly been disrupted by app-based dockless variants. These offer greater flexibility, since rides do not need to be commenced or ended at one of a limited number of docks. The lack of fixed infrastructure also significantly reduces the costs of this model. More recently, the dockless market offer has expanded to include both electric bikes and e-scooters.

Regulatory objectives

Dockless bikeshare schemes have been operated by private entities without direct public subsidy.[49] Some early systems were largely funded by venture capital. Mobike alone had raised USD 900 million by mid-2017 (Reuters 2017). They compete with pre-existing docked services in many cities. The public subsidisation of docked bikeshare means that governments control their operation via contractual arrangements. This is not the case with unsubsidised dockless schemes. The flexibility and lower cost base which constitute key advantages of the dockless model give rise to externality issues: fleet numbers are typically much larger, while the parking of the bicycles is not constrained by the docking infrastructure. Parking in inappropriate places affects urban amenity and can block pedestrian access including at road crossings and at station entrances. The rapid introduction of numbers of bikes that exceed any likely short-term demand has exacerbated the problem in some cases. These factors, plus concerns in relation to consumer protection where subscription fees are charged, and in relation to safety, have resulted in many city governments intervening to regulate dockless bikeshare, using a variety of approaches.

The case for regulating the sector, as usually articulated (e.g. ITDP, 2018), rests on addressing negative externalities, consumer protection and road safety. The entry of some dockless bikeshare companies that decided against consultation with local government authorities created large negative externalities in some markets, for example Mobike in Mexico City, at least in the short term. The key concerns have been with obstruction of pedestrians and other users and visual pollution of public space. The size of these issues appears to vary with factors such as city density, but have often been seen as substantial. As an extreme example, they were considered to be sufficiently serious in Amsterdam as to require a temporary ban on all dockless bikeshare (implemented in mid-2017) due to concerns that bikeshare bikes were crowding out private users from limited bike parking spaces.[50] The entry strategies of some operators have exacerbated the problem, in that they have sought to achieve market dominance by swamping target cities with vast numbers of bikes in a short space of time. Several cities have responded by removing and destroying large numbers of bikes.

A variant of this externality argument suggests that city governments provide public infrastructure which is fundamental to the operation of bikeshare businesses, in the form of pavements and other public space on which bikes are parked when not in use and in terms of cycleways, roads and related infrastructure on which they are used. Thus, it is argued, regulatory fees should be set at a level that not only recovers the direct costs of regulation, but also provides a contribution to the cost of this infrastructure.

The consumer protection issue relates to the potential loss of deposits paid when operators exit a market. In several cases, providers have exited rapidly and provided no means for consumers to claim the return of their deposits. In some cases, little-understood contractual provisions have enabled operators to convert deposits to subscription payments unilaterally. Thus, operators have claimed the right to retain deposits, without users' "informed consent".

The existence of specific safety issues in relation to dockless bikes appears to be largely speculative: quantitative data on accident rates in the sector are scarce given the short time systems have been in operation, but bikeshare is generally considered to be safer than personal bike riding (Yanocha, 2018). However, it is speculated that some dockless bikes, said to be lighter and potentially of lower quality, could be more prone to malfunctions and crashes, while the potentially wider geographical spread of dockless bikes implies a higher proportion of riding on roads without bike lanes. ITDP (2018) argues that providers should supply detailed safety information to users (covering helmet wearing, giving way to pedestrians and conducting pre-ride bike inspections), as well as ensuring that bikes comply with ISO safety standards. Most operators now do this.

In a dynamic sense, it is well-documented that cycling safety is positively correlated with usage levels (e.g. Jacobsen, 2003). Hence, to the extent that bike-sharing increases usage over time, it would be expected to have a positive safety impact for all users.

Regulatory initiatives

A substantial number of cities in the United States have already moved to regulate the sector, while regulation is also under development in many European cities.[51] Other, less formal, arrangements include a Code of Practice adopted in London in 2017 and a Memorandum of Understanding adopted in Paris in mid-2018. Also in the United Kingdom, ComoUK, a private entity, offers an accreditation scheme to bikeshare operators, which is intended to provide assurance to local authorities as to the standards that will be followed.

Dockless shared bikes are now generally equipped with GPS. This makes geo-fencing possible, whereby users can be penalised for not parking bikes in designated spaces (or given positive incentives for doing so), and can also enable municipal governments to monitor the location of bikes, require operators to move those that are incorrectly parked and levy penalties for poor performance. It can also underpin regulatory requirements in relation to the geographical coverage of the bikeshare scheme. Geo-fencing is under consideration as a regulatory requirement in some jurisdictions, however, early experience in Singapore, which mandated geo-fencing as of the end of 2018, suggests that technical problems relating to the precision of geo-location are posing barriers to compliance, causing the withdrawal of some operators from the market.[52] Some experience also raises doubts as to its practical effectiveness in reducing externalities, with charges for leaving bikes outside geo-fenced areas proving too low to yield high levels of compliance in a recent New York City pilot. As a result of these experiences, requirements that bikes be locked to appropriate street furniture have been promoted as an alternative (Yanocha, 2018). However, this option entails significantly higher costs, since additional infrastructure must be installed, while also arguably reducing the flexibility of these schemes by at least partly undermining the *dockless* nature of the bikes.

In some cities (e.g. London and Tokyo), local borough councils have regulatory responsibility for bikeshare systems because of their impact on use of street space. However, while apparently intended to enable local conditions and preferences to be reflected in the regulatory scheme, negative outcomes have quickly been identified in terms of the effective constraints fragmentation imposes on trips that cross the boundaries of regulatory responsibility. Small areas for operation reduce the utility of the system and constrain user numbers. And the smaller the licenced area the more onerous and ineffective are requirements to repatriate bikes parked outside the area.

Some regulatory interventions have imposed significant direct costs on the operators. For example, in Los Angeles, a relatively modest USD 5 000 fee for licence applications is supplemented by a much more substantial annual fee of USD 32.50 per bicycle (Yanocha, 2018). Other costs may also be incurred to clear bicycles that are causing obstructions, pay penalties and so on. Seattle approved regulations imposing an annual fee of USD 250 000 per operator in July 2018, together with a fleet size cap of 5 000. The fee is thus equivalent to a minimum of USD 50 per bike per annum (Seattle Times, 2018). Similar approaches to e-scooters appear to have been adopted in a range of US cities, with fees ranging from USD 25 to USD 130 being charged where regulation exists and Raleigh, North Carolina recently adopting a USD 300 per scooter annual fee.[53] Mexico City adopted a two-part charge in 2019 with a modest licence fee but an extremely large charge per scooter. The city auctioned quotas of bikes and scooters to operate in more or less contiguous designated areas. It calculated a floor price of USD 53 per bicycle based on the parking space consumed and other costs to the community, discounted by the benefits of the modal shift induced. The auction yielded annual fees per bike for the three successful bidders ranging from USD 68 to USD 137, while the result was even more extreme for e-scooters, with fees ranging from USD 379 to USD 736 – amounts which exceed the annual regulatory fees paid by taxis.[54] Such fees significantly change the economics of the model, in a context in which the operator’s cost per bike is typically well under USD 100, compared with estimates ranging from USD 1 800 – USD 2 500[55] to USD 3-5 000 for docked schemes (BBC, 2018). High regulatory costs are likely to limit supply, reducing socio-economic welfare, or prove unsustainable with the exit of some of the operators facing the highest charges.

The recent adoption of these regulatory interventions implies that it is not yet possible to fully assess their practical impact. However, regulatory policy principles require that regulatory interventions should be subject to comparative benefit/cost analysis. In the bikeshare context, the key considerations are whether:

- whether the nature and extent of the policy problem is sufficient to justify regulatory intervention (with its associated costs)
- whether other, less intrusive policy responses may adequately address the identified problems at lower costs
- whether the imposition of regulation could have disproportionate indirect costs on the viability of bikeshare, given the rapid evolution of the model and its business model
- whether such impacts would be undesirable from the perspective of broader public policy objectives.

Nature and extent of the problem

The externality issues noted above have been widely discussed. However, it is possible that they could, at least to some extent, prove to be transient in nature in the absence of regulatory intervention. Some have argued that poor bike parking practice and wilful misuse arise from an initial lack of public acceptance of bikeshare, due to the failure of proponents to engage with, and obtain permission from, city authorities before entry. To the extent this is so, attitudes to bikeshare schemes, and hence behaviour, could become more positive over time as the benefits of the model became more widely understood. Non-regulatory interventions, based on more co-operative relations between bikeshare providers and local government, could potentially contribute, while imposing fewer costs and risks. Many dockless bike and e-bikeshare operators have invested in extensive discussions with city planning authorities before deployment to develop strategies for relocating bikes and providing incentives for users to park bikes responsibly.

The argument that regulatory fees should include a contribution to the costs of public infrastructure is difficult to sustain in the context of the quite limited use, in general terms, of specific user charges to recover infrastructure costs. For example, road user charging is largely confined to the heavy vehicle sector. Moreover, major bike-specific infrastructure expenditures have to a large extent pre-dated bikeshare and have been predicated on a general government view in favour of increasing cycling's modal share in general. It appears difficult to argue that most cyclists should receive significant public subsidies, while a subset that ride a certain type of hired bicycle should be taxed. The unprofitable nature, to date, of dockless bikeshare schemes perhaps underlines this point. However, at least one provider of e-scooter services has adopted the practice of concluding agreements with all cities in which it operates under which it contributes a percentage of revenue to fund infrastructure development, with a view to enabling any externalities associated with its services to be minimised.

The size of the consumer protection issue also appears to be limited, given the small size of the deposits (typically less than USD 100) required of users. Governments are generally reluctant to adopt regulatory interventions in order to protect consumers from small financial losses, given the costs of such interventions. Moreover, the industry, notably including recent e-scooter competitors, appears to have largely moved away from a deposit-based model toward a pure "pay as you go" one, as experience has shown that the deposit requirement has often acted as an impediment to high rates of take-up by consumers. Earlier perceptions that the ability to use, or lend, deposit funds may have been a key element of the business model for dockless bikeshare appear to have been unfounded.

As suggested above, the existence of a safety issue specific to dockless bikeshare has not been well-established, either quantitatively or in principle. Available information suggests dockless bikeshare in general is a relatively safe form of cycling, while the suggested reasons for believing dockless variants may be less safe are not immediately compelling. More broadly, little attention has been given to explaining why specific safety interventions are needed in this context, whereas cycling in general is largely free of regulatory constraints, other than the need to comply with standard road rules. The recent move of the dockless sector toward e-bikes, notably in the United States (NACTO, 2019), could raise new safety issues in terms of vehicle speed and braking performance, although most appear to be speed limited to around 25 km/h, a speed similar to that of conventional bicycles.

In sum, the case for regulation arguably seems to rest largely on the negative externalities observed, while there is a question as to whether this is a significant issue in all city contexts and as to the likely durability of the issue. For example, Seattle’s recent evaluation of its pilot permitting system for bikeshare, involving three providers, found that while 30% of bikes were not compliant with parking guidelines, only 4% were impeding access.

Potential non-regulatory interventions to address issues

An alternative approach adopted in a small number of cities is to let a concession to operate a dockless bikeshare scheme to one or more selected operators. In this model, the concession is let on the basis of an agreement between the city government and bikeshare operator addressing key performance objectives. Such an agreement may or may not be accompanied by provision of a public subsidy. This approach is broadly contractual, rather than regulatory, in nature and potentially more readily able to be renegotiated either because public objectives are not being met or in response to business imperatives.

One example of this model is that adopted by the Gold Coast, in Australia, in early 2018. In this case, the concession has been provided to a single operator (MoBike), chosen via a competitive bidding process. The single operator model was seen as maximising government’s ability to manage the performance of the sector. Conversely, concern has been raised that this model is anti-competitive in nature and may lead to less favourable consumer outcomes. A single provider model also necessarily means that should the provider withdraw from the market services would be unavailable in the short term, pending a new concession being let.

Ensuring that the length of the concession is carefully considered and that the conditions are present for effective competition for the market at the time it expires are key considerations in minimising concerns regarding the anti-competitive impact of this model. Existing docked schemes typically operate on the basis of eight- to ten-year contracts, while shorter concession periods (e.g. three – five years) may be feasible for dockless bikeshare, given the significantly lower fixed infrastructure costs incurred.[56] However, even where concession terms have been carefully considered, the potential costs of limiting competition, particularly in relation to innovation, should be carefully weighed against the possible benefits of encouraging a more collaborative approach to the provision of the service. No principles or decision framework appear to exist to date to guide the assessment of the likely merits of concessions, competition among a limited number of providers and open competition as options for market organisation for bikeshare in different city contexts.

At least one city, Santa Monica in California, has adopted a multiple-operator version of the concession. A total of four operators were authorised to provide shared bike and/or e-scooter services in late 2018, with an overall fleet-size cap allocated among the four providers (City of Santa Monica 2018).

Given the recent commencement of these models, it is too early to assess their performance or identify potential lessons.

A further option that is also broadly contractual in nature is that of providing subsidies to operators who agree to comply with certain standards.

Potential indirect cost impacts

While transparency is limited, dockless bikeshare operators appear to have similarities to ridesourcing, in terms of the financial model underpinning them. In particular, they appear to be funded by substantial venture capital while few, if any, are currently profitable and several operators (e.g. Gobeekbike, Obike, BluGogo, Ofo) have experienced bankruptcy. More broadly, operators in a number of areas within the app-based shared mobility sector at the Roundtable argued that their market offers and business models were rapidly evolving as they sought to identify what offerings would receive a positive consumer response and potentially prove sustainable. A key trend observed in the United States in 2018 is the rapid growth in e-scooters' share of the total micro-mobility market and a simultaneous move toward e-bikes within the dockless bikeshare sector, with two-thirds of dockless bikeshare rides being taken on e-bikes during 2018 (NACTO, 2019).

Given this context, there is a clear risk that imposing substantial regulatory costs on the sector could have negative impacts on its development, while imposing detailed and prescriptive standards could distort or prevent innovation, thus endangering longer-term sustainability. Given the potential of dockless bikeshare to address mobility issues, particularly in relation to first/last mile transportation, this argues for both light-handed regulatory approaches and for the merits of governments absorbing indirect costs during the initial deployment of share bikes to be considered, to enable the scope of the market to be determined."

Broader public policy considerations

Governments have chosen to underwrite docked bikeshare schemes as they believe they can contribute to the achievement of a range of public policy objectives, particularly increasing the range of mobility options, encouraging modal shift away from private vehicles (particularly by providing first and last mile options) and improving public health by encouraging active mobility. However, as suggested above, the effective cost per bicycle of this model is often high, with the result that the size of the public subsidies provided in order to underwrite these schemes often being substantial, while market penetration levels have frequently remained fairly low. City-specific factors seem to be significant. For example, even after several years, Melbourne's scheme is subsidised by the equivalent of around AUD 35–40 per ride. However, the context is one of a low-density city and strict enforcement of compulsory helmet laws. By contrast, while Reuters reports that subsidies cover 60–70% of the cost of Paris' Velib scheme, despite it being well-established (Reuters 2017b) the effective subsidy per ride is substantially lower. Koning and Koop (2014) includes data implying an average subsidy of around EUR 2, reflecting the much greater intensity of use of the bikes, which may be ridden four or more times per day, while more recent estimates suggest still lower subsidies and higher utilisation rates.[57] In some cases, such as the scheme run by Citibike in New York City, implicit subsidies are provided by private entities via branding/sponsorship or advertising arrangements.

Dockless schemes must, in the first instance, be considered to be similarly effective in achieving the identified public policy objectives, as they provide essentially the same service. Indeed, because they are more flexible, from the user perspective, they arguably deliver greater value.[58] Their lower cost base also allows for a wider geographical distribution. Even in the presence of a docked scheme, competing dockless bikeshare options are likely to provide additional public benefits. Despite these factors, these schemes remain unsubsidised, and operators appear in general not to have sought subsidies.

Some transport authorities have seen dockless bikeshare schemes as potentially providing significant urban policy benefits. In particular, these include the potential to exit expensive subsidy arrangements while maintaining bikeshare services and the possibility of effectively addressing the problems docked schemes have sometimes faced in meeting demand from regular users at peak times. However, others have seen competition from dockless schemes as undermining the economics of existing schemes and have sought to block their entry. Even where dockless bikeshare is seen as a potentially lower cost means of service provision the fact that service providers lack an established track record has yielded a cautious approach from governments. This, combined with a frequent lack of transparency and willingness to engage with government on the part of dockless bikeshare providers, have generally seen governments reserve judgment, maintaining existing docked schemes in the initial period after the entry of dockless schemes. These judgments seem to have been vindicated in at least some cases, with new entrants in many cases withdrawing from the market, or scaling back services within a relatively short period after initial entry. These observations, combined with the financial failure of some dockless bikeshare operators (e.g. BlueGoGo, Obike, GobeeBike) have raised more general doubts as to the sustainability of the dockless bikeshare model as a stand-alone business.

However, to the extent that the dockless bikeshare is seen as viable – or at least potentially so – its apparent ability to contribute to the achievement of public policy goals which governments have chosen to subsidise heavily suggests that more positive policy responses should be given consideration. Emerging data suggest that dockless schemes serve different purposes and different demographics than docked schemes. Docked bikes are more likely to be used for regular commutes, while dockless bikes service a wider range of needs (e.g. NACTO, 2019). Dockless bikeshare users tend to be less affluent and to live in areas that are not well-served by docked schemes.[59] Thus, dockless bikeshare seems to be, at least in part, complementary to existing docked schemes. The size of the potential benefits is suggested by the experience of Beijing, which saw the modal share of cycling more than double (from 5% to 11.6%) following the entry of dockless bikeshare companies. A high proportion of these trips are reported to have been reported to be first/last mile trips

The apparent ability of dockless bikeshare to significantly expand the reach of this transport mode, as a result of its significantly lower cost base, suggest there may be a case for extending bikeshare subsidies to these providers, in at least some circumstances. Such an option would enable governments to address the concerns underlying current regulation through contractual mechanisms – i.e. making provision of subsidies conditional on identified performance outcomes. This would potentially constitute a more flexible, lower-cost approach. Moreover, if public subsidies proved to be a key factor in the sustainability of the business model, as may be the case, the incentive effects involved would be strong.

The potential for bikeshare schemes to expand the reach of transit systems is also cited as an argument in favour of the provision of subsidies. However, recent research appears to provide an equivocal view on this point. Graehler, Mucci and Erhardt (2018) find that the introduction of bikeshare in a city is associated with increased light and heavy rail ridership, but a 1.8% decrease in bus ridership.

From an economic perspective, if dockless bikeshare yields both public benefits and costs, a government response which simply imposes regulatory costs without recognising the benefits provided is distorting in nature, in that it implies that too little service provision will result. While this appears counter-intuitive in a context in which some cities are concerned at an over-abundance of bikes, the numerous incidences of rapid exit of bikeshare providers suggests that this may not be a long-term issue. That is, the imposition of significant regulatory costs may hasten, or be the catalyst, for exit and function as a significant disincentive for new entry.

Put alternatively, a situation in which one supplier of bikeshare services is subsidised while others are effectively taxed, via the imposition of regulatory fees, is unlikely to be either economically efficient or equitable. Given that there are public benefits and costs associated with dockless bikeshare, there are policy grounds for both subsidising and regulating/taxing the industry. As suggested above, one solution is for governments to enter into contractual arrangements with providers, which provide subsidies on a conditional basis. An alternative approach is to regulate the industry but depart from the general assumption that industries should bear the costs of their regulation via the imposition of regulatory fees. That is, government would provide an implicit subsidy by bearing the administration and enforcement costs of the regulatory scheme imposed. This option would be reasonably efficient from a policy perspective if the benefits and costs of dockless bikeshare were considered to be relatively similar in size.

The specific urban context needs to be considered when reviewing whether dockless bikeshare should be regulated, subject to concession arrangements or allowed to operate freely and also whether implicit or explicit subsidies should be employed. This context includes citizens' behavioural responses to the schemes, the number of entrants and approach to entry taken by them and the broader mobility context, including government policies in this regard.

In the longer term, the continued successful development of the shared-mobility market is likely to give rise to other demands on public expenditure. For example, increasing concerns regarding modal conflict between e-scooters and both pedestrians and motor vehicles suggest that these vehicles are best suited to operating on dedicated bicycle lanes. A user survey recently published by Bird Scooters (2019) found that, when asked what infrastructure improvements users wished to see, the most common answer (61% of respondents) was more protected bicycle lanes, while 57% nominated smoother pavement and 42% wider bicycle lanes. It also included data demonstrating that scooter injury rates were significantly lower in cities with higher "bike friendliness" scores – i.e. those with better developed bicycle infrastructure.

The rise of both dockless bikes and e-scooters may lead to government objectives of increasing the modal share of active transport being achieved more rapidly than anticipated. This will create strong pressure for both more investment in the necessary infrastructure and supporting policies in relation to speed limits and street furniture.[60]

Other app-based services

The attributes of flexibility and adaptability in any government intervention are likely to be particularly important given the rapid diversification occurring in the app-based shared mobility market, notably via the spread of shared e-bicycles, electric mini-scooters and electric motor-scooters.[61] It is, as yet, unclear to what extent these electrically powered (or assisted) options will supplant or supplement standard bicycles in the shared-mobility context.[62] However, their popularity has grown extremely rapidly in many markets, so that, little more than a year after the launch of the first service providers (Bird, Lime) they already have substantial market share in many cities. Recently published US data (NACTO, 2019) show that the total number of trips taken via all forms of micro-mobility more than doubled, from 35 million in 2017 to 84 million in 2018, and that the adoption of e-scooters was largely responsible for this growth. Within a year of their introduction to the market, e-scooters accounted for 38.5 million rides, or 46% of the total. E-bikes accounted for a further 6.5 million rides, so that electrically assisted vehicles now account for almost 54% of the total micro-mobility market.

NACTO also highlights the transformation of the dockless bikeshare market in the United States in 2018, stating that

> *"dockless pedal (non-electric) bikes, which quickly proliferated across the United States in 2017, have largely disappeared from North American cities, with just 3 million trips in a handful of cities in 2018".*

Within the dockless sector, e-bikes now account for two-thirds of the total of 9 million rides completed.

The greater range and more limited physical demands of e-bikes and scooters suggest that they have much potential to increase the overall size of the shared-mobility market by appealing to those who would be unwilling or unable to use 'conventional' shared bicycles or to use them for longer journeys. The fact that they have driven massive growth in the sector in the United States in 2018, as documented by NACTO (2019) underlines this point: growth of 140% in total micro-mobility trips in 2018 vastly outstripped the rates of 27% and 25% experienced in the two previous years.

Existing regulations in many jurisdictions do not accommodate all of these mobility options, indicating that the approach taken by governments as to whether to enable their use will be an important consideration. E-scooter operators appear to have adopted a similar approach to market entry to that of ridesourcing. While a number of cities have responded with varying kinds of enforcement actions designed to prevent or tightly constrain their operations (Telegraph, 2018), there appear to be widespread moves in the United States to adopt legislation that accommodates their operation. NACTO (2019) reports that, at the beginning of 2019, 44 Bills dealing with e-scooters were being considered in 26 states.

This context further underlines the difficulties of seeking to regulate emerging markets, as the key regulatory considerations in relation to e-scooters, for example, appear to be quite different from those relevant to dockless bikeshare. For example:

- The lesser stability of scooters, due to smaller wheels and steeper steering geometry, has led to suggestions that safety concerns are larger than with bikeshare, while possible "modal conflict" may add to this dynamic.
- These options appear to be offered on a pay-as-you-go basis, with no subscription payment/deposit being required; suggesting that consumer protection issues are likely moot.
- The higher cost of these vehicles suggest that they are unlikely to be supplied in such large numbers as standard bicycles, implying that negative externalities due to obstruction of pedestrians, deliberate misuse and the like may be a much smaller concern.

The rapid introduction of e-scooters means there is much uncertainty regarding these issues. For example, while many regulatory authorities have raised safety concerns, the emerging data on scooters' actual safety performance suggests that it is comparable with that of bikeshare. A report on the recent scooter trial in Portland, Oregon found low accident and injury rates. The report concluded that "We did not find a disproportionate risk that would discourage the city from allowing a scooter ride-share pilot" (Portland Bureau of Transportation, 2018). Data published by Bird Scooters (2019) finds that its users reported 37.2 injuries per million miles travelled, whereas US national data show 58.9 emergency department admissions per million miles among cyclists. Bird concludes that while there are limits to the comparability of the data, overall the injury levels for scooters and cyclists are apparently similar. The report also includes comparative data on emergency department admissions for cyclists and scooter riders in Westwood, Santa Monica and Portland and concludes that, taken together, these suggest parity in safety levels.

The case for subsidising bikeshare, discussed above, can be made in similar terms in relation to e-scooters. Indeed, the potential to be used by a wider range of people, together with the fact that they have rapidly attained a large market share, at least in the United States, suggests that they may be better candidates for subsidised provision of first/last mile journeys by sustainable means. The ITDP, for example, has suggested that cities could subsidise e-scooter journeys that start or end at transit stops (ITDP, 2018b).

Ridesharing, micro-transit and demand-responsive transit

A developing field within app-based mobility services is that of shared mobility services – i.e. the provision of mobility services to more than one, unrelated consumer in the same vehicle at the same time. This includes ridesharing (i.e. the shared use of ridesourcing vehicles) and demand responsive transit (i.e. bus-like services that are adaptable to consumer demand in relation to scheduling, route and/or other service elements). It also includes micro-transit, which similarly uses mini-buses and app-based booking, but operates on fixed routes. Given the importance of addressing rising urban congestion by reducing the private use of vehicles, developments in shared mobility services are potentially highly significant. While having limited market share to date, app-based technology provides significant opportunities to expand the range of shared mobility options, increase their attractiveness and, hence, their overall role.

Ridesharing is being promoted by major ridesourcing companies as enabling consumers to obtain most of the convenience benefits of ridesourcing at a significantly reduced price, while also holding out the prospect of reducing the incremental impact of ridesourcing on urban congestion. To date, take-up appears to be low in most jurisdictions, although some cities have experienced strong growth. In New York City the proportion of ridesourcing trips that are shared now varies from 14% to 36%, depending on the time of day (Taxi and Limousine Commission, 2018b), and has been estimated to have risen from an overall average of 17% in late 2017 to 23% in in early 2018 (Parrott and Reich, 2018). However, some research (e.g. Schaller Consulting, 2018) suggests that ride-sharing may have little, if any, impact in reducing the congestion impact of ridesourcing, particularly if a high proportion of ride-share trips are diverted from transit.

The fields of micro-transit and Demand Responsive Transit (DRT) may have greater potential to address urban congestion and pollution issues by providing higher quality transit services at prices that represent a premium to standard transit, but a significant discount to ridesourcing. Such offers could encourage modal shift from both private cars and ridesourcing, thus increase average load factors. However, they may also divert significant numbers of users from traditional transit by offering a higher quality of service, thus contributing to congestion. The overall impact of these services on pollution and congestion remains unclear. Moreover, while this mode is at a very early stage of development, some high-profile failures raise doubts as to the potential scope of the model. For example, Chariot ceased operation at the end of January 2019, after almost five years, despite being owned by the Ford Motor Company's Mobility Services arm.

A recent example of DRT is the Jetty service in Mexico City, which enables riders to reserve a seat on a mini-bus in advance, and uses the data derived from the app-based booking system to adjust routes, vehicle size and schedules in response to consumer demand patterns (Flores Dewey, 2018). The difficulty of assessing overall congestion impacts can be seen in the early experience of Jetty. Its data suggest that around 50% of its demand is diverted from private car use and ridesourcing, which has obvious positive impacts on congestion. However, much of the remaining demand is drawn from traditional Jitney services. Since Jetty's service sees all passengers having reserved seats, and thus has much lower average ridership levels than traditional jitney services, this has a negative congestion impact which would partly offset the positive impact of the reduction in private vehicle trips. Conversely, because jitneys often generate congestion impacts of their own by blocking traffic lanes while aggressively chasing passengers, substitution to Jetty could also have positive congestion impacts in this respect. Importantly, the substantial consumer benefits of Jetty, in terms of improved service quality and safety standards must also be weighed.

From a regulatory perspective, ride-sharing services appear to pose few substantively different issues to those of ridesourcing generally, although the issue of applying congestion charging to this mode has already arisen.[63] Moreover, given that these services are, at present, largely offered as a complementary or additional service by established ridesourcing companies, there would seem to be practical difficulties in attempting to distinguish these services in a regulatory context. That said, where ride-sharing services constitute a significant part of overall service provision, the argument for adopting congestion-based charging arrangements by regulation would seem to be weakened.

Van-sharing services such as Jetty are at an early stage of development and have received inconsistent regulatory responses. In the specific context of Jetty, the operation of the service is regulated under a ridesourcing permit. However, this appears to have been the result of the need to fit a new type of service within an existing regulatory scheme that was ill-adapted to it, rather than a conscious decision that this constitutes the most appropriate form of regulation. It can equally be regarded as a "flexible bus service", and would potentially be more appropriately regulated as such. Existing regulatory definitions and thresholds, such as distinctions between PHVs and buses based on the seating capacity of the vehicle, rather than the nature of the service being provided, may need to be revisited in order to ensure the regulatory structure is well-adapted to emerging market offers.

A key element of the dynamic in relation to the entry and regulation of Jetty appears to have been that of regulatory capture. That is, the rapid adoption of a regulation prohibiting ride-sharing just prior to the launch of the service appeared to have been the result of strong lobbying by incumbent Jitney operators seeking to prevent the operation of a competing service.

The broader policy perspective also includes the question of whether DRT services should be considered as part of the public transport infrastructure. This conceptual issue is relevant both from the perspective of determining what regulatory standards should apply and in determining whether they are appropriately recipients of public subsidies.

In the specific context in which Jetty operates, publicly funded public transport services carry a smaller number of passengers than the private, semi-regulated jitney services with which Jetty competes. Thus the issue of potential public subsidisation has not arisen. However, as noted, the service operators regard the service as a flexible variant of a bus service. Such services are publicly subsidised in most cities and emerging DRT services can be expected to act as a relatively close substitute in most contexts.

The prospect of extending public subsidies would seem to give rise to a number of policy issues. In particular:

- Given that the adaptability of schedules, timetables and vehicle types is a key element of the service, how would minimum service standards be specified in the context of a contract under which subsidies would be offered?
- Is it appropriate on equity grounds to extend subsidies to DRT given its market positioning as a premium product, vis-à-vis standard bus services?
- Given the uncertain impact of DRT in relation to modal substitution and, consequently, its implications for urban congestion and pollution, is subsidisation appropriate in relation to public policy objectives in these areas?

More broadly, the significant improvements in both customer service and labour standards which the Jetty model has delivered necessarily calls into question the regulatory impediments placed in the way of this innovative service offering and suggests government should adopt a more facilitative response. While the long-term role of vanpooling remains unclear, some experts have argued that multi-passenger shared mobility is potentially the most important recent innovation for achieving sustainable urban transport (Sperling, 2018).

Mobility as a Service

A key development in relation to app-based mobility is that of the bundling of service offers involving different modes. One element of this move is the purchase of bike-sharing companies by leading ridesourcing firms, including Uber and Lyft, who are increasingly offering access to ridesourcing, shared bikes and scooters through a single platform. This arguably represents a step toward the Mobility as a Service (MaaS) concept, which involves providing multi-modal mobility solutions that break the link between mobility and ownership of vehicles.

The MaaS concept implies the integration of public and private transport modes and typically entails a range of subscription-based service offerings, whereby consumers choose between options containing different price and availability bundles. In contrast to the developing multi-modal offerings of ridesourcing companies, in this model the MaaS provider appears to be an aggregator or intermediary between the consumer and a range of mobility service providers. That said, a pioneer in this field, (MaaS Global, 2018) argues that its offering through the Whim app is based on it acting as a reseller of services that it has bought at a wholesale level (MaaS Global (2018).

The emerging MaaS concept raises a number of potential issues for regulators. First the appropriate boundaries of regulatory schemes. That is, if the product being offered is a 'bundle' of mobility services, to what extent is it feasible or appropriate to design regulatory structures around particular vehicle types/travel modes? The fact that some regulatory imperatives may be directly vehicle-related (notably safety-related standards), while others (e.g. consumer protection issues) relate to the design of the business model through which the service is offered suggests the possible need for matrix approaches to regulatory design and raises the question of how to ensure integration and consistency between different elements of the regulatory architecture. Another issue is whether regulation should require public transport operators to sell tickets in bulk to MaaS resellers. This issue may be particularly complex where public transport operations are carried out under contract by private entities.

Second, the likelihood of intermediaries playing a strong role in the mobility market potentially raises issues about where responsibility for compliance with some regulatory standards should be allocated. Issues such as whether the MaaS provider is a simple aggregator or a re-seller may be significant in determining how to respond to these questions.

Third, the convergence of mobility offerings toward a MaaS type model brings the question of accessibility into sharper relief. The issue of the lack of access to mobility services for people without access to smartphones and credit or debit cards has already been highlighted in the context of the development of regulatory principles for ridesourcing services and their disruptive impact on the taxi industry. To the extent that MaaS becomes the model through which the bulk of shared mobility services is offered, the scale and scope of this issue is increased. In the medium-term, continuing rapid increases in the penetration of smartphones and the availability of debit card options are likely largely to address this issue. Nonetheless, it is a potentially significant issue for regulators and policy-makers to address in the near future.

Finally, there is a role for MaaS to act as the mechanism that enables app-based shared mobility options to effectively address the last-mile challenge of getting people from major, higher frequency public transport stops to their home or a final destination. Many of the concerns in relation to app-based mobility services relate to congestion in the core of urban area, whether density of ride share vehicle on the roads or electric scooters on footpaths. These impacts can be reduced if the potential of app-based mobility services to feed people to and from public transit services is harnessed effectively. The integration of app-based mobility services and public transport represents a significant opportunity that has yet to be realised. Policies, regulations or commercial relationships that encourage MaaS providers to focus on first/last mile solutions could help to address this issue.

As the ITF has previously argued, the governance arrangements adopted with respect to these modes can be expected to have a significant impact on outcomes in this regard. The task of achieving effective integration is complicated by responsibility regulating public transport and taxis and ridesourcing often being allocated to different agencies. Conversely:

> *"Governance models that unify regulatory oversight and planning functions, define quality outcomes and performance objectives, and set contractual relationships to deliver these across a wide range of mobility operators may accelerate the integration of these into a co-ordinated ecosystem."* (ITF, 2017).

A particular issue is that the relevant regulatory responsibilities can be distributed across different levels of government. The above example, in which ridesourcing in New York City is regulated at the municipal level, but congestion charging must be legislated at State government level serves as an example of the policy making challenges that can arise as a result of this division of responsibilities and highlights the extent of the co-ordination challenge.

Initiatives that bring these regulatory responsibilities together, as far as possible, can not only enhance policy and regulatory co-ordination, but also address underlying incentive issues. Co-ordination based around recognition of the need to integrate broader public policy objectives can help overcome resistance to change based on concerns regarding competition with incumbents, whether in the public transport context or in areas such as the taxi industry (ITF, 2017: 39-40).

Conclusions

The context for shared mobility and the policy challenges can differ widely between different areas within the same city. For example, city centres can face substantial congestion issues, even while suburban areas struggle with poor service standards due to limited availability of vehicles. Similarly, the distribution of shared bikes can be highly uneven across the urban area. This creates significant complexities in addressing the policy issues posed, which must be taken into account in choosing between regulatory policy options.

Uncertainty also exists in relation to the impacts of various shared-mobility services on modal distribution in cities. While research yields a range of different conclusions, significant evidence exists that ridesourcing may be contributing to congestion, by drawing passengers away from public and active transport modes. However, there is also evidence of its ability to act as a complement to public transport, by providing first/last mile services which make transit usage feasible for a wider range of journeys. Moreover, congestion concerns must be balanced against the various service quality benefits identified as deriving from ridesourcing. The fact that the causes of urban congestion are much broader than ridesourcing must be weighed when designing policy responses.

The development of app-based mobility services has significant implications for a wide range of public policy objectives. A key challenge for regulatory design and implementation is, therefore, to ensure that these objectives are recognised and taken into account and that both synergies and trade-offs between them are understood and addressed. As a practical matter, this also implies that regulatory objectives should not be unduly ambitious. That is, sector-specific (or mode-specific) regulation is likely to be poorly adapted to advancing some wider policy goals, such as addressing congestion and pollution, and attempts to address additional policy goals in this context will often risk compromising the ability of regulation to achieve core objectives by undermining its consistency, coherence and clarity.

A careful approach is needed to the regulation of new, rapidly evolving sectors, where technologies, service offers and business models are subject to change as providers seek to understand and respond to consumer needs and demands. This context necessarily implies risks that regulatory design will reflect misunderstandings of the evolving industry dynamics and the relationships between public and private objectives. Unduly intrusive regulation runs substantial risks of distorting, or preventing the development of innovative new service offers, in situations in which their economics remain precarious.

Regulation should reflect an essentially permissive and facilitative approach to innovation, which accepts market disruption. This does not imply inaction where there is a need to ensure safety or protect consumers against the risk of other, significant harms. However, it implies that equal treatment of incumbents and new entrants is an important principle.

Minimising regulatory barriers is particularly important where new modes and business models, with uncertain viability, are concerned. In many cases, small trial schemes, with limited regulation can provide important practical experience, as well as demonstration effects that can encourage broader positive changes in modal choice. Governments should consider bearing the initial regulatory costs (e.g. of monitoring and enforcement functions) in such circumstances, rather than seeking to recover them from new businesses, as a means of encouraging innovation.

Where regulation is adopted in these contexts, the need for subsequent evaluation and regulatory review is particularly acute. Adopting scheduled review clauses in regulatory statutes is a potentially effective way of ensuring that timely review occurs, that regulatory missteps are corrected and that regulation evolves along with these rapidly developing industries. At the same time, it is important to allow sufficient time to elapse to be able to make a reasonable assessment of the impact of the regulatory regime before making changes. A key risk is that continued lobbying from former incumbents that have suffered economic losses due to disruption will lead to new regulatory regimes that accommodate innovative service provision being undermined in the short term, before new market equilibria have been reached and the impacts of the regulation can be accurately assessed. The ex ante scheduling of subsequent reviews should therefore take careful account of this risk.

To minimise these risks, attention must be paid to ensure that regulatory review processes and methodologies are robust and transparent. In contexts such as the taxi industry, which have long been characterised by regulatory capture in a majority of jurisdictions (OECD, 2007), a useful process element may be to ensure a high level of involvement by regulatory experts from outside the industry, such as the competition authority or the body responsible for the oversight of regulatory policy. This may be particularly important when threshold decisions as to whether and how existing regulations should recognise and accommodate disruptors are being made.

Regulatory development, implementation, review and reform activity should be based on the following principles:

- Regulatory approaches within a sector should be consistent in their treatment of incumbents and new entrants, but adapted as necessary to the specific characteristics of particular modes or sub-markets.
- Regulation should reflect an essentially permissive and facilitative approach to innovation – including market disruption – and be based on addressing clearly identified market failures. This does not imply inaction where there is a need to ensure safety and protect consumers against risks of significant harms.
- Regulation should be neutral as regards technology and business models.
- Regulation should, as far as possible, be adaptable in the face of innovation.
- Regulation should seek to promote the inclusion of all social groups, including those with limited mobility.
- Regulation should be developed using robust processes that are resistant to capture.
- Regulation should be subject to regular monitoring and review.

Notes

1 See OECD (2018), pp 8-9.
2 See OECD (2012), p 4.
3 See Deighton-Smith (2018), p 13.
4 By contrast, while AirBnB and its competitors have captured a large share of the short-term accommodation market, the disruptive impact on hotels and other traditional providers has been far less pronounced. A key difference is the absence of monopoly rents underpinned by regulatory restrictions in the accommodation sector.
5 In San Francisco, where ridesourcing originated, limousine and minicab services were previously being hailed by hotel bellboys for passers-by, contrary to the regulations, in response to the severe shortage of taxis.
6 Conceptual questions about the nature of app-based services have been a factor here, as in the European context, where current and recent cases at the European Court of Justice turn on the question of whether ridesourcing companies provide a transport service or a technology service.
7 The Act on Transport Services seeks to facilitate the "digitalisation" of transport by bringing together the regulation of various transport modes. It has also enabled ridesourcing operators to re-enter the market and facilitated competition from the taxi sector on an even playing field by eliminating much of the previous body of restrictive taxi regulation. https://www.lvm.fi/en/act-on-transport-services
8 Conversely, some jurisdictions have sought to introduce a basic form of price regulation to the ridesourcing sector by legislating limits on surge pricing multiples. For example, a Bill adopting such regulation passed the Hawaii legislature in 2018, but was subsequently vetoed by the Governor. Given that consumers are informed of the fare and must agree to it before surge pricing is applied, regulators appear in general to have been reluctant to intervene to regulate prices.
9 https://www.geotab.com/blog/uber-driver-tracking/ ; https://eng.uber.com/telematics/ ; https://www.ttnews.com/articles/opinion-uber-restricts-driver-hours-should-others-follow-suit
10 i.e. Brooklyn, Queens, the Bronx, Staten Island. See: https://www.recode.net/2018/3/15/17126058/uber-lyft-taxis-new-york-city-rides
11 https://www.statista.com/statistics/408427/smartphone-penetration-in-france-by-age-group/ US data show that In the US, while overall smartphone ownership is 77%, it rises to 83% in urban areas. Moreover, while 67% of people in the lowest income band (<USD 30 000 p.a.) own smartphones, only 46% of those aged 65+ own them. See: http://www.pewinternet.org/fact-sheet/mobile/,
12 https://www.latimes.com/business/technology/la-fi-tn-uber-seniors-20170627-story.html
13 Taxi operators frequently point to the higher cost of serving passengers with disabilities, notably due to the additional time required to load and unload wheelchairs and note that this tends not to be reflected in higher regulated prices.
14 This argued that the city was in breach of the non-discrimination requirements of the Americans with Disabilities Act, because only 230 of the city's 13,000 taxis were then accessible.
15 For example, the cost of an accessible London taxi is GBP 42 795 (EUR 48 000), compared with around EUR 21 000 for a Toyota Camry Hybrid, which is used in many taxi fleets and for ridesourcing. See: https://www.levc.com/corporate/news/the-london-taxi-company-confirms-pricing-for-its-cleanest-tx4-ever-/
16 Individual or mini-fleet medallions only. A USD 14 000 capital payment is made after the accessible vehicle is put into service, while annual payments of USD 4 000 can be made for four years to cover additional operating costs.
17 By allowing taxi medallion owners to sell and/or lease the medallions and employ others to drive the taxi to which it was affixed, it was expected that the limited supply of medallions would be exploited with maximum efficiency. However, the "scarcity" of medallions was itself solely a product of regulators' decisions. Prior to this, taxi driving had been a solely owner-operator endeavour.
18 Data suggest that a large and increasing proportion of ridesourcing drivers in some US cities (notably NYC) work full-time in the industry. For example, Parrott and Reich (2018) find that average hours worked by ridesourcing drivers in NYC have increased significantly in recent years, although only 42% worked at least 35 hours per week in 2017. It is not yet clear whether this will prove to be a broader trend, either within the US or internationally. Parrott and Reich (2018) cite Hall and Krueger's findings that the demographic characteristics of Uber drivers closely resemble the overall workforce in most large US cities and that "a desire for a flexible and supplemental work arrangement using their otherwise idle cars explained why drivers sought work on an app-based platform".
19 For example, Uber recently paid a substantial fine to the US Federal Trade Commission as a result of having been found to have engaged in such practices. https://www.ftc.gov/news-events/press-releases/2017/01/uber-agrees-pay-20-million-settle-ftc-charges-it-recruited
20 The 25 the percentile average wage was found to be USD 13.31 per hour. Note that the NYC minimum wage will rise to USD 15 per hour from end-2019. https://www.labor.ny.gov/workerprotection/laborstandards/workprot/minwage.shtm
21 i.e. After payment of social security contributions and other charges paid by employers of wage-earning employees.
22 The driver income rule is based on specifying a minimum per trip payment, which the TNC must make to the driver. This includes both time and distance elements, with each being divided by the "utilisation rate" – i.e. the average proportion of the time the TNC's drivers are available for hire that they are actually carrying passengers. Thus, the minimum per-trip payment is higher for TNCs with lower utilisation rates. This is intended to provide TNCs with incentives to limit the number of drivers working, thus increasing utilisation rates. The formula has been calculated with the intention that it will yield an after-expenses wage equivalent of USD 17.22 per hour.
23 Base scenarios incorporate an assumed 4% increase in the current 58% average utilisation rate and a 12 second increase in average waiting times.

24 While estimates suggest relatively inelastic consumer demand in the sector, there will necessarily be some degree of demand reduction. Using the estimate of Cohen et al. (2016) that demand elasticity is between - 0.4 and - 0.6, fare increases of 3 – 5%, as per Parrott and Reich's Scenarios 2 and 3, would yield 1.2 – 3% reductions in demand.

25 Several jurisdictions have sought to regulate medallion lease prices in order to protect lessee driver incomes, including Chicago, San Francisco and Melbourne, Australia.

26 Parrott and Reich (2018) note that "…we can imagine a series of policy alternatives that would help the medallion drivers…". However, the authors have subsequently indicated that the options envisaged were largely focused on improving the fortunes of medallion owners, rather than lessee drivers. Specifically, they included provision of financial assistance to taxi owner-drivers in medallion debt, adopting a cap on ridesourcing numbers, or a surcharge on ride-hailing vehicles in the Manhattan Core to protect market share for taxi drivers, or promoting an app for medallion taxis and potentially giving the taxi app priority over ridesourcing apps in the Manhattan Core. The first of these proposals has been adopted in several Australian cities, as well as in Dublin in 1999, and has been the vehicle for removing quantitative supply restrictions on the taxi industry. It can therefore indirectly benefit non-medallion owning taxi drivers by opening a more affordable path to independent employment in the taxi industry, as well as helping to create a more level playing field between taxis and ridesourcing. The second and third proposal, on the other hand, clearly discriminate against ridesourcing. Options for directly addressing the income of non-medallion owning drivers would inevitably differ according to the nature of their contract with the medallion owner. However, where taxis are leased on a "price per shift" basis, they would include regulating that the maximum amount payable to the medallion-owner could not exceed the difference between the farebox revenue and the minimum wage for the length of the shift.

27 Dynamex Operations West Pty Ltd vs Superior Court. https://scocal.stanford.edu/opinion/dynamex-operations-west-inc-v-superior-court-34584

28 Data is taken from NYTLC. Trips per day totaled 954,023 in December 2017, compared with 550,254 in January 2015.

29 This include the higher average occupancy of ridesourcing vis-à-vis taxis (Rayle et al 2014), research indicating that the availability of car sharing options reduced car ownership, wider modal-shift impacts of using ridesourcing, the impact of surge pricing in moving trips to less congested times and higher capacity utilisation in ridesourcing than taxis (citing Cramer and Kruger 2016, who find that "the efficiency of Uber is much higher than traditional taxis" due to higher utilisation rates).

30 This initiative was the subject of an unsuccessful legal challenge brought by the taxi industry, which delayed its implementation until 1 February 2019.

31 See: A Local Law to amend the administrative code of the city of New York, in relation to conducting a study of the impact vehicles for hire have on the city of New York, and authorising the commission to establish and revise vehicle utilization standards for high-volume for-hire services and to regulate the issuance of new licenses to for-hire vehicles. [144-B/2018] https://legistar.council.nyc.gov/LegislationDetail.aspx?ID=3331789&GUID=6647E630-2992-461F-B3E3-F5103DED0653&Options=ID%7cText%7c&Search=144

32 Private communication with Dawn Miller, NYC TLC. 11 January 2019.

33 The utilisation rate is measured in the following discussion as the proportion of the time that a vehicle is available for hire that it is carrying one or more passengers. Thus, if a vehicle spends 40 minutes per hour on average carrying passengers, the utilisation rate is 66.7%. The utilisation rate can also be calculated in distance terms – i.e. as the proportion of the total distance driven that the vehicle is carrying passengers.

34 That is, at a 69% occupancy rate there would be approximately 1 449 vehicles on the street for each 1 000 passengers being carried, compared with 1 724 vehicles at a 58% occupancy rate. This is a fall of 275 vehicles, or 15.9% of the 1 724 that would be required at the current average occupancy rate.

35 Utilisation rates calculated by multiplying average trips per hour by average trip length to obtain occupied minutes per hour. December 2018 data was the most recent available at the time of writing.

36 Uber and Lyft did not stop accepting new drivers until April 2019, while comments attributed this move primarily to the Driver Income Rule, rather than the freeze on licence issue. https://www.politico.com/states/new-york/city-hall/story/2019/04/29/uber-and-lyft-have-stopped-accepting-new-drivers-in-new-york-city-993270

37 That said, this data relates to NYC as a whole. Schaller (2017) publishes data for Manhattan that suggests a slightly higher utilization rate for taxis than ridesourcing vehicles.

38 Following the passage of the Haas Act of 1937, medallion numbers were effectively frozen at approximately 12 000. Some 2 000 medallions were auctioned in 1996, this being the first sale of licences since the Haas Act. Medallion numbers remained at around 14 000 in 2014, before ridesourcing achieved major market share while, according to the TLC, "There are currently about 13 000 licensed taxicabs" http://www.nyc.gov/html/tlc/html/industry/current_licensees.shtml .

39 For example, in Melbourne, medallion owners were paid USD 100 000 for the first medallion, and USD 50 000 for a second, third or fourth medallion. No additional payments were made where a single owner held more than four medallions. Medallion values had fallen from a peak of over A USD 500 000 to around USD 170 000 prior to the fund being announced.

40 Didi, Ola, Taxify and Uber operate in Melbourne. FHV and taxi licence numbers at: https://cpv.vic.gov.au/about-us/industry-statistics

41 New York City Council favoured a fleet-wide congestion charge, but could only adopt one if State legislation was passed authorising it. The State legislation did not adopt the legislation.

42 Parking charges have also been used in combination with congestion charges in some cities, where they form part of a comprehensive set of tools to manage traffic.

43 Among existing congestion charges, those of London, Milan and Stockholm exclude taxis and ridesourcing vehicles, with only Singapore including them. Such an exemption is as difficult to justify theoretically as a sector-specific congestion charge targeting ridesourcing. However, were these exemptions removed, the specific designs of these charges differ in ways that imply they would affect ridesourcing quite differently. While London levies a single daily charge on vehicles that enter the central city between certain hours, Stockholm charges vehicles each time they enter and exit the central zone. Thus, a ridesourceing vehicle undertaking multiple trips that crossed the zone boundaries during a single day would pay the charge only once under a London-style charging system but several times under a Stockholm-type system. Conversely, trips that

had both their origin and destination within the system would not incur a charge. Thus, the adoption of a charge designed along the Stockholm lines would potentially have significant incentive effects, in terms of ridesourcing vehicles' willingness to undertake different types of trips. These examples suggest the need for the design of general congestion charges to be carefully considered to take account of the impact of the proposed system on the ridesourcing sector. Whereas the impacts of the London and Stockholm models may differ little in practical terms for most private vehicles, the above indicates that the Stockholm model would be better tailored to the needs of a city with a large ridesourcing sector.

44 The fact that much of the increase in PHV fleet size observed in most cities represents the correction of earlier regulatory distortions is relevant in this context. Conversely, ridesourcing vehicles cover significant numbers of miles without passengers and may, as a result, have lower overall load factors than the average for the vehicle fleet.

45 Ridesourcing seems to be entering a mature phase in cities in which it has been established for several years and has operated in a relatively unrestricted manner. This can be inferred from a number of indicators, including the size of ridesourcing's share of the FHV market in many cities and rapidly slowing rates of increase in trip numbers. For example, in New York City, year on year trip growth rates fell from 176% in early 2016 to 27% by the end of 2018.

46 Uber has adopted "green fleet" policies in respect of major cities – e.g. a target of making all its vehicles electric in the London area by 2025. In this context, the contribution of policies targeting ridesourcing to reducing overall pollution levels may be extremely small.

47 Taxi medallion owners in various jurisdictions have previously launched legal challenges to governments that have removed or diminished restrictions on entry to the industry, arguing that this constitutes a taking of private property and must therefore be accompanied by payment of compensation at a fair market value. These legal actions have, in all known cases been unsuccessful. A long-running example was that of Ireland, where actions taken following the 2000 deregulation of entry to the industry were only finally resolved in 2015. See: https://www.irishtimes.com/news/crime-and-law/courts/high-court/taxi-drivers-lose-high-court-case-over-deregulation-of-industry-1.2394523

48 https://www.courtlistener.com/docket/4496065/desoto-cab-company-inc-v-uber-technologies-inc/

49 It has been argued that dockless bikeshare schemes make use of public open space – i.e. footpaths – to park bicycles, whereas other businesses such as cafes are often charged a fee to use the equivalent space. This can be seen as constituting an implicit subsidy.

50 As noted, Amsterdam is an extreme example, in that Dutch private bicycle ownership rates are much higher than those found in most countries. Note that such "crowding out" could be beneficial, if usage rates for shared bikes were sufficiently high. However, the Amsterdam case appears to have been one in which largely unused shared bikes were crowding out privately owned commuter bikes.

51 For a summary of the bike-sharing situation in European cities, see: http://ebma-brussels.eu/bike-sharing-in-europe/

52 Private communication with Dana Yanocha, ITDP, 15 January 2019.

53 www.cbs17.com/news/local-news/wake-county-news/raleigh-leaders-hike-electric-scooter-fees-to-300-each-for-companies-involved/1577078049

54 Karina Licea (Dezba bikeshare). Reflections on the regulation of micro-mobility systems in Mexico City. Presentation at the Interamerican Development Bank Expert Workshop on Decarbonising Transport in Latin American Cities. Mexico City, 8 – 10 July 2019.

55 Finding from a review by Cerema, cited by Laurence Mercat.

56 Laurent Mercat, President, Smoove, Private communication.

57 Laurence Mercat, President, Smoove estimates subsidies may not be above EUR 1 per ride, while bikes may be used up to seven or eight times per day. Private communication.

58 Conversely, it is arguable that there is a degree of warranty that a bike will be available from a docking station, whereas there is no specific location at which a dockless bike is sure to be found. This may be one factor behing the very large size of the dockless fleets on introduction in many cities.

59 See, for example, https://medium.com/populus-ai/measuring-equity-dockless-27c40af259f8

60 Data from the recent e-scooter trial in Portland, Oregon (US) indicate that e-scooter riders are less likely to ride on either the footpath or the road where bicycle lanes are provided, particularly where these are separated from vehicle traffic. However, they are also more likely to choose the road over the footpath where speed limits are lower. See Portland Bureau of Transportation (2018).

61 "Mini-scooters" here refers to those used by companies such as Lime and Bird, which use an enlarged version of the child's scooter format "trottinettes electriques", whereas "electric motor-scooters" refers to electric versions of traditional motor scooters (e.g. Vespas), which are specifically intended to be used on public roads. In practice, the distinction between e-scooter types is more complex, however. For example, in the Netherlands, Snorscooter are limited to 25 km/h and can be used on bicycle lanes, while bromscooter, which are not speed limited in the same way are required to stay on the road. In appearance, however, both typically resemble the Vespa-type scooter. From early 2019, Amsterdam will ban Snorscooter from bicycle lanes.

62 This report of an e-scooter trial in Portland, Oregon found that use of the docked bikeshare scheme increased in tandem with the scooter trial.

63 In a future AV context, the interaction of passengers unknown to each other without a driver in charge of the vehicle and its occupants may pose distinct regulatory issues.

References

Babar, Y. and G. Burtch (2017), “Examining the Impact of Ridehailing Services on Public Transit Use”, *SSRN Electronic Journal*, pp. 1 – 54.

Barrios, J., Y. Hochberg, and L. Li (2018), “The cost of convenience: ride-sharing and traffic fatalities”, *Stigler Centre Working Paper*, No. 27, University of Chicago.

BBC (2018), “How cheap dockless scooters are flooding the world”, Padraig Belton, 15 May 2018. https://www.bbc.com/news/business-44066083 Access 12 August 2019

Biderman, C. (2018), “Mitigating Congestion and Environmental Impacts from Ride-Sharing Services: The Case of TNC Regulation in São Paulo, Brazil”, Presentation at the ITF Roundtable on Regulating App-Based Mobility Services, Beijing, 1-2 November 2018.

Bird Scooters (2019), *A look at e-scooter safety: Examining risks, reviewing priorities and prioritising prevention,* April 2019. https://www.bird.co/wp-content/uploads/2019/04/Bird-Safety-Report-April-2019-3.pdf Access 12 August 2019

Boston Globe (2017), “Thousands of current Uber, Lyft drivers fail new background checks”,. www.bostonglobe.com/business/2017/04/05/uber-lyft-ride-hailing-drivers-fail-new-background-checks/aX3pQy6Q0pJvbtKZKw9fON/story.html (accessed 08 August 2019).

Brown, AE. (2018), “Ridehail revolution: ridehail travel and equity in Los Angeles”, Ph.D thesis, UCLA, www.escholarship.org/uc/item/4r22m57k (accessed 08 August 2019).

Business and Human Rights Resource Centre (2018), “Uber loses appeal against ruling that its drivers are workers with minimum wage rights”. https://www.business-humanrights.org/en/uk-uber-loses-appeal-in-employment-rights-case-company-says-it-will-challenge-the-decision

CEBR (2014), “The future economic and environmental costs of gridlock in 2030”, Centre for Economics and Business Research, https://www.ibtta.org/sites/default/files/documents/MAF/Costs-of-Congestion-INRIX-Cebr-Report%20(3).pdf .

Chicago Sun-Times (2017), “Emanual claims ride-hailing industry costing taxpayers USD 40 million”, www.chicago.suntimes.com/business/emanuel-claims-ride-hailing-industry-costing-taxpayer-40m/ (accessed 08 August 2019).

Chicago Tribune (2018), “Too much of a good thing? Aldermen consider capping the number of ride-share vehicles” https://www.chicagotribune.com/business/ct-biz-ride-share-cap-20180816-story.html (accessed 08 August 2019).

City of Calgary (2019). “Licence fee payment options for transportation network companies”. https://www.calgary.ca/CSPS/ABS/Pages/Livery-Transport-Services/Licence-Fee-Payment-Options.aspx Access 14 June 2019.

City of Chicago (2019), *Mayor Emanuel and CTA Announce Entire Rail System Now 100 Percent Equipped with HighDefinition Cameras*, Office of the Mayor, Press Release, 4 April 2019, www.chicago.gov/city/en/depts/mayor/press_room/press_releases/2019/april/CTAEntireSystemCameras.html.

City of New York (2019). “Mayor de Blasio Announces Extending FHV Caps to Protect Hardworking Drivers, Increase Their Pay & Reduce Cruising by Empty Cars in Manhattan”. 12 June 2019. https://www1.nyc.gov/office-of-the-mayor/news/301-19/mayor-de-blasio-extending-fhv-caps-protect-hardworking-drivers-increase-their-pay-#/0,

City of New York (2016), *For hire vehicle transportation study,* Office of the Mayor, www1.nyc.gov/assets/operations/downloads/pdf/For-Hire-Vehicle-Transportation-Study.pdf Access 12 August 2019.

City of Santa Monica (2018). “Final administrative decision: Shared mobility device pilot program operator selection and device allocation pursuant to Santa Monica Municipal Code Chapter 3.21., 30 August 2018.
https://www.smgov.net/uploadedFiles/Departments/PCD/Transportation/Shared%20Mobility%20Device%20Pilot%20Program.pdf

Citylab (2017), *How Should Chicago Spend Its Uber Tax?,* www.citylab.com/transportation/2017/11/how-should-chicago-spend-its-uber-tax/546233/ (accessed 08 August 2019).

Clewlow, R. and G. Mishra (2017), *Disruptive Transportation: The Adoption, Utilization, and Impacts of Ride-Hailing in the United States,* UC Davis Institute for Transportation Studies Research Report UCD-ITS-RR-17-07.

Cohen, P. et al. (2016), “Using Big Data to Estimate Consumer Surplus: The Case of Uber”, *National Bureau of Economic Research Working Paper,* No. 22627. https://www.nber.org/papers/w22627 Access 12 August 2019.

Conway, M., D. Salon and D. King (2018), “Trends in Taxi Use and the Advent of Ridehailing, 1995–2017: Evidence from the US National Household Travel Survey”, *Urban Science,* Vol. 2/3, p. 79.

www.mdpi.com/2413-8851/2/3/79/pdf

Cramer, J. and A. Krueger (2016), “Disruptive change in the taxi business: the case of Uber”, *American Economic Review: Papers and Proceedings*, Vol 106/5, pp. 177-182., https://www.nber.org/papers/w22083 Access 12 August 2019.

CUTS International (2017), *Analysis of competition cases against Uber across the globe,* Parveer S Ghuman, www.cuts-ccier.org/pdf/Analysis_of_Competition_Cases_Against_Uber_Across_the_Globe.pdf (accessed 08 August 2019).

Darbera, R. (2017), *Business models for the taxi of the future,* Research Report, International Road Union. https://hal.archives-ouvertes.fr/hal-01631663/document (accessed 08 August 2019).

Deighton-Smith, R. (2018), "The Economics of Regulating Ride-Hailing and Dockless Bike Share",International Transport Forum Discussion Papers, No. 2018/24, OECD Publishing, Paris, https://doi.org/10.1787/2baf35bd-en.

Deloitte (2017), *Global mobile consumer trends: 2nd edition,* https://www2.deloitte.com/content/dam/Deloitte/us/Documents/technology-media-telecommunications/us-global-mobile-consumer-survey-second-edition.pdf (accessed 08 August 2019).

Doppelt, L. and A. Kern (2018), *Need a ride? Uber can take you (away from public transportation),* https://repository.library.georgetown.edu/handle/10822/1050860 (accessed 08 August 2019).

The Economist (2018a), "The social costs of ride-hailing may be larger than previously thought", www.economist.com/finance-and-economics/2018/11/03/the-social-costs-of-ride-hailing-may-be-larger-than-previously-thought (accessed 08 August 2019).

The Economist (2018b), "New York halts new licences for ride-hailing cars", www.economist.com/united-states/2018/08/11/new-york-halts-new-licences-for-ride-hailing-cars (accessed 08 August 2019).

Essential Services Commission (2018). "Unbooked commercial passenger vehicle fare review 2018. Final decision," Government of Victoria (Australia), 13 September 2018. https://www.esc.vic.gov.au/sites/default/files/documents/Unbooked%20Commercial%20Passenger%20Vehicles%20Fare%20Review%202018%20-%20Final%20Decision.pdf

European Union (2017), *European urban mobility: policy context,* https://ec.europa.eu/transport/sites/transport/files/2017-sustainable-urban-mobility-policy-context.pdf

Financial Times (2018), *Uber loses key Court of Appeal ruling on worker rights,* New York City, www.ft.com/content/7cdcf52c-03a5-11e9-9d01-cd4d49afbbe3.

Financial Times (2019), *Uber sues New York City over for hire car licence cap,* New York City, www.ft.com/content/db15a28e-3162-11e9-8744-e7016697f225.

Fix NYC Advisory Panel (2018), *Fix NYC Advisory Panel Report January 2018*, www.hntb.com/HNTB/media/HNTBMediaLibrary/Home/Fix-NYC-Panel-Report.pdf.

Flores, O. (2018), "How Mexico City is transforming a jitney system into a world class bus rapid transit system", Case Study, Tut-Pol 8, https://static1.squarespace.com/static/5804efd7cd0f68e576ecd423/t/5807c49b37c5818a3e4be9ad/1476904093177/Mexico+City+Case+2016.pdf

Flores, O. (2018), "Launching and Operating a Transit Start-Up", Presentation at the ITF Roundtable on Regulating App-Based Mobility Services, Beijing, 1-2 November 2018, https://www.itf-oecd.org/launching-and-operating-transit-start

Flores and Rayle (2016), "How Ridesourcing went from 'Rogue' to Mainstream in San Francisco", http://research.gsd.harvard.edu/tut/files/2016/06/San-Francisco-Case-2016.pdf

Graehler, M., R. Mucci and G. Erhardt (2018), *Understanding the recent transit ridership decline in major US cities: Service cuts or emerging modes*, Paper prepared for the 98th Annual Meeting of the Transportation Research Board, http://usa.streetsblog.org/wp-content/uploads/sites/5/2019/01/19-04931-Transit-Trends.pdf

The Guardian (2018), "Sadiq Khan wants to cap number of Uber drivers in London", London, www.theguardian.com/technology/2018/aug/15/sadiq-khan-wants-to-restrict-number-of-uber-drivers-in-london

The Guardian (2019), "New York Becomes First City in US to Approve Congestion Pricing", London, www.theguardian.com/us-news/2019/apr/01/new-york-congestion-pricing-manhattan

Hall, J. et al. (2017), *Labor Market Equilibration: Evidence from Uber*, http://john-joseph-horton.com/papers/uber_price.pdf

Hall, J., C. Palsson and J. Price (2018), "Is Uber a substitute or complement for public transit?", *Journal of Urban Economics*, 108, pp. 36 – 50.

Henao and Marshall (2018), "The impact of ride-hailing on vehicle miles traveled", *Transportation,* pp. 1-22. https://link.springer.com/article/10.1007/s11116-018-9923-2 Access 12 August 2019

ITDP (2018a), *Dockless Bikeshare: What We Know So Far*, Institution for Transportation Development and Policy, www.itdp.org/2018/01/04/dockless-bikeshare-know-so-far/

ITDP (2018b), "E-scooters could be a last mile solution for everyone". 14 December 2018, https://www.itdp.org/2018/12/14/e-scooters-last-mile-solution/ Access 12 August 2019.

ITF (2017), "Shaping the Relationship Between Public Transport and Innovative Mobility", International Transport Forum Policy Papers, No. 34, OECD Publishing, Paris, https://doi.org/10.1787/7a1f7b89-en.

Jacobsen, PL. (2003), "Safety in numbers: More walkers and bicyclists, safer walking and bicycling", *Injury Prevention*; Vol. 9, pp. 205 -209.

Japan Times (2018), "Uber joins hands with Fuji Taxi, sealing first Japan deal under new, pro-regulator approach", www.japantimes.co.jp/news/2018/09/06/business/corporate-business/uber-seals-first-japan-taxi-deal-new-pro-regulator-approach/#.XKdXjPkzYuU .

Koning, M. and P. Koop (2014) "Are bicycles good for Paris?" https://sorbonne.pierrekopp.com/downloads/2014-01-27-Are%20bycicles%20good%20for%20Paris.pdf

Lam, C. and M. Liu (2019), "Toward inclusive mobility: ridesharing mitigates geographical disparity in transportation", SSRN, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2997190.

Lee, K. et al. (2018), "Are Ride-hailing Platforms Sustainable? Impact of Uber on Public Transportation and Traffic Congestion", *SSRN*, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3244207.

Li, S., H. Tavafoghi, K. Poolla, and P. Varaiya (2019), "Regulating TNCs: Should Uber and Lyft set their own rules? ", *Elsevier*, https://arxiv.org/pdf/1902.01076.pdf.

Li, S., Y. Hong, and Z. Zhang (2019), "Do Ride-Sharing Services Affect Congestion? An Empirical Study of Uber Entry", https://pdfs.semanticscholar.org/cd1b/61691d055780b6ea30f25e7fce957553c9ce.pdf

Licea, K. (2019), "Reflections on the regulation of micro-mobility systems in Mexico City". Presentation to the Interamerican Development Bank Expert Workshop on Decarbonising Transport in Latin American Cities, Mexico City, 8 – 10 July 2019

MaaS Global (2018). "The business model of mobility as a service". Sampo Hietanen, 11 June 2018. https://maas.global/blog-the-business-model-of-mobility-as-a-service-maas/ Access 12 August 2018

MacEachen E, Reid Musson E, Bartel E, *et al (*2018)*, "*284 Safety management systems: peer-to-peer ratings in the sharing economy"**.** *Occup Environ Med* 2018;75:A516 https://oem.bmj.com/content/75/Suppl_2/A516.2

Markets Insider (2019), "Uber and Lyft are lashing out at New York City regulators over "malarkey" vehicle caps", Theron Mohamed, https://markets.businessinsider.com/news/stocks/uber-lyft-attack-new-york-city-regulators-malarkey-vehicle-caps-2019-8-1028434123

Martin-Buck, FM. (2016), "Driving Safety: An Empirical Analysis of Ridesharing's Impact on Drunk Driving and Alcohol-Related Crime", www.semanticscholar.org/paper/Driving-Safety-%3A-An-Empirical-Analysis-of-%E2%80%99-s-on-Martin-Buck/3f1eb273fcee888441147105882dd12ca811fd35.

Massachusetts Bay Transit Authority (2018), *On-demand para-transit pilot program,* www.mbta.com/accessibility/the-ride/on-demand-pilot.

Mishel, L. (2018), *Uber and the labour market,* Economic Policy Institute, www.epi.org/publication/uber-and-the-labor-market-uber-drivers-compensation-wages-and-the-scale-of-uber-and-the-gig-economy/.

Moore, AT. and T. Balaker (2006), "Do Economists Reach a Conclusion on Taxi Regulation?", *Econ journal Watch*, Vol. 3/2, pp. 109-132, www.researchgate.net/publication/5012753_Do_Economists_Reach_a_Conclusion_on_Taxi_Deregulation

NACTO (2019), "Shared micromobility in the US: 2018", National Association of City Transportation Officials, https://nacto.org/wp-content/uploads/2019/04/NACTO_Shared-Micromobility-in-2018_Web.pdf

New York Lawyers for the Public Interest (2018), "Left Behind: New York's For Hire Industry Continues to Exclude People with Disabilities", www.nylpi.org/wp-content/uploads/2018/05/Left-Behind-Report.pdf (accessed on 08 August 2019).

New York Taxi and Limousine Commission (2019). ´FHV Accessibility: Trip Percentage Rule FAQ", https://www1.nyc.gov/assets/tlc/downloads/pdf/faq_fhv_accessibility_rule_information.pdf

New York Taxi and Limousine Commission (2018a), "Driver income rules", https://www1.nyc.gov/assets/tlc/downloads/pdf/driver_income_rules_12_04_2018.pdf (Access 12 August 2019).

New York Taxi and Limousine Commission (2018b), "2018 Fact Book", New York City Council, https://www1.nyc.gov/assets/tlc/downloads/pdf/2018_tlc_factbook.pdf (Accessed 12 August 2019).

The New Yorker (2015), "Uber isn't causing New York City's traffic slowdown" Prof. Ben Wellington, www.newyorker.com/tech/annals-of-technology/uber-isnt-causing-new-york-citys-traffic-slowdown,

The New York Times (2018), "Uber gains civil rights allies against New York City's proposed freeze: "It's a racial issue"", www.nytimes.com/2018/07/29/nyregion/uber-cap-civil-rights.html.

Nie, Y. (2017), "How can the taxi industry survive the tide of ridesourcing? Evidence from Shenzhen, China", *Transportation Research Part C: Emerging Technologies*, Volume 79, pp. 242-256.

OECD (2018), "Taxi, ride-sourcing and ride-sharing services: Background note by the Secretariat", OECD Working Party No. 2 on competition and reulation, https://one.oecd.org/document/DAF/COMP/WP2(2018)1/en/pdf.

OECD (2012), *Recommendation of the Council on Regulatory Policy and Governance*, OECD Publishing, Paris, https://doi.org/10.1787/9789264209022-en

OECD (2007), "Taxi services: competition and regulation", *OECD Policy Roundtables*, https://www.oecd.org/daf/competition/41472612.pdf.

Pacific Business News (2018), "Honolulu mayor vetos bill to limit ride-hailing surge pricing for Uber, Lyft". https://www.bizjournals.com/pacific/news/2018/06/19/honolulu-mayor-vetos-bill-to-limit-ride-hailing.html. Access 9 August 2019.

Parrott, JA. and M. Reich (2018), *An Earnings Standard for New York City's App-based Drivers: Economic Analysis and Policy Assessment,* The New School, Center for New York City Affairs, Report prepared for the New York City Taxi and Limousine Commission.

Pew Research Center (2016), "On demand: Ridehailing apps", Aaron Smith, 19 May 2016. http://www.pewinternet.org/2016/05/19/on-demand-ride-hailing-apps/

Philadelphia magazine (2017). "Uber and Lyft give Philly schools a boost for the first time". Fabiola Cineas, 17 February 2017. https://www.phillymag.com/business/2017/02/17/uber-lyft-philly-school-district-tax-revenue/

Portland Bureau of Transportation (2018), "2018 E-scooter findings report" https://www.portlandoregon.gov/transportation/article/709719.

Portland Tribune (2018), *More ride services, more congestion?,* https://pamplinmedia.com/pt/9-news/399043-293259-more-ride-services-more-congestion

Rayle, L. et al. (2016), *"Just a better taxi? A survey-based comparison of taxis, transit, and ridesourcing services in San Francisco"*, *Transport Policy*, Vol. 45, pp. 168–178.

Reuters (2017), "Chinese start-up Mobike gains $600 million in biggest financing round to date". Cate Cadell, 21 April 2017, https://www.reuters.com/article/us-mobike-funding/chinese-start-up-mobike-gains-600-million-in-biggest-financing-round-to-date-idUSKBN197056 (Accessed 12 August 2019).

Reuters (2017b) "New Paris Velib scheme to end bicycle parking misery", Geert de Clercq, 10 May 2017. https://www.reuters.com/article/us-paris-bicycles-velib-idUSKBN1862NB

Reuters (2016). "Massachusetts to tax ride-hailing apps, give the money to taxis. David Ingram, 19 August 2016. https://www.reuters.com/article/us-massachusetts-uber-idUSKCN10U1ST Access 14 June 2019.

Reuters (2015), Mexico City to regulate Uber with license fees, ride lev, Mad de Haldevang, https://www.reuters.com/article/us-mexico-uber/exclusive-mexico-city-to-regulate-uber-with-license-fees-ride-levy-draft-idUSKCN0PI17420150708

San Francisco County Transportation Authority (2017), "TNCs today: Final Report", https://www.sfcta.org/sites/default/files/2019-02/TNCs_Today_112917_0.pdf (Accessed 12 August 2019)

San Francisco County Transportation Authority (2018). "TNCs and Congestion", Draft Report, https://www.sfcta.org/sites/default/files/content/Planning/TNCs/TNCs_Congestion_Report_181015_Final.pdf

Schaller, B. (2019), "Driven to desperate measures: the city's approach to Uber and Lyft isn't right yet", New York Daily News, 14 June 2019

Schaller Consulting (2017), "Empty seats, full streets: Fixing Manhattan's traffic problem", Brooklyn NY, http://schallerconsult.com/rideservices/emptyseats.pdf

Schaller Consulting (2018), "The new Automobility: Lyft, Uber and the Future of American Cities", Brooklyn NY, http://www.schallerconsult.com/rideservices/automobility.htm

Schneider, TW (2019). Taxi and ridehailing usage in New York City, Website: https://toddwschneider.com/dashboards/nyc-taxi-ridehailing-uber-lyft-data/. (Accessed 16 May 2019).

Seattle Times (2018), "Seattle city council approves new bike share rules, prompting Ofo to leave Seattle", https://www.seattletimes.com/seattle-news/transportation/seattle-city-council-approves-new-bike-share-rules-supports-expanding-downtown-bike-lanes/

Sightline Institute (2014). "Murray compromise lifts Seattle rideshare caps", Jennifer Langston, https://www.sightline.org/2014/06/16/murray-compromise-lifts-seattle-rideshare-caps/

Sperling (2018), *Three revolutions: Steering automated, electric and shared vehicles to a better world,* Island Press.

Suska, DL. (2016), "Regulatory takings and ridesharing: "just compensation" for medallion owners?", *NYU Journal of Legislation and Public Policy*, Vol. 19/1, pp. 183-213.

Telegraph (UK) (2018), "Electric scooters face backlash from cities across the US after mayhem on the streets", https://www.telegraph.co.uk/news/2018/08/11/electric-scooters-face-backlash-cities-across-us-mayhem-streets/

Tirachini and Gomez-Lobo (2019), "Does ride-hailing increase or decrease vehicle kilometers traveled (VKT)? A simulation approach for Santiago de Chile", *International Journal of Sustainable Transportation*, DOI: 10.1080/15568318.2018.1539146

Washington Post (2018). "Why DC is targeting the ride-hail industry". Faiz Siddiqui, 31 March 2018. https://www.washingtonpost.com/local/trafficandcommuting/why-dc-is-targeting-the-ride-hail-industry/2018/03/31/ef01fca8-3473-11e8-94fa-32d48460b955_story.html?noredirect=on Access 12 August 2019.

World Resources Institute (2018). "Cities are taxing ride-hailing services like Uber and Lyft. Is this a good thing? Ben Welle, Guillermo Petzhold & Francisco Minella Pasqual, 8 August 2018. https://www.wri.org/blog/2018/08/cities-are-taxing-ride-hailing-services-uber-and-lyft-good-thing Access 14 June 2018.

Yanocha, D. (2018), "Optimising dockless bikeshare and other private new mobility services". Paper presented at the International Transport Forum Roundtable "Regulating App-based Mobility Services", Beijing 1 – 2 November 2018.

Annex: List of participants

WANG Xianjin (Chair)	Vice-President, China's Academy of Transportation Sciences (CATS)
PERKINS Stephen (Co-Chair)	Head of Research and Policy Analysis, International Transport Forum (ITF)
'T HOEN Arjen	Deputy director and core theme manager, Ministry of Infrastructure and Water Management, KiM
BIDERMAN Ciro	Associate professor at the Center for the Study of Politics and Economics of the Public Sector, Getulio Vargas Foundation
BROOKS Ben	Public Policy Lead, Regulatory Advocacy, UBER
CHHABRA Ashwini	Global Head of Central Policy, Bird scooters
CLARK Matthew	Specialist in Intelligent Mobility; Steer Consulting
DEIGHTON-SMITH Rex	Project Manager, ITF
FISHMAN Elliot	Director, Institute for Sensible Transport, Department of Transport Innovation
FLORES Onesimo	Founder of Jetty.mx, Jetty
FUJISAKI Koichi	Vice President, Policy Research Institute for Land, Infrastructure, Transport and Tourism
GUST Marion	Ministry of Transport, France
GOTO Akifumi	Counsellor, Japanese Embassy, Beijing
HELLÅKER Jan	Program Director, Drive Sweden
JIA Hao	Volunteer, Comprehensive Transportation Research Center (CTRC), China Academy of Transportation Sciences (CATS)
JIANG Cailiang	Researcher, Vice-Director, CTRC, CATS
LI Guanyu	Director of the Bureau of Foreign Affairs, Ministry of Transport, China
LI Hongchang	Vice Dean Economics, Beijing Jiatong University
LI Yanhong	Senior engineer, CATS
LICEA Karina	Urban development and mobility consultant, Mexico
LIU Leilei	Participant , Ministry of Transport
LIU Si	Associate researcher, CATS
MAI Yuanyuan	Senior Engineer, CTRC, CATS
MERCAT Laurent	Founder and President, Smoove
MIGUEL-BEJOS José	Director of Grupo Prodi (Development and Infrastructure)
MILLER Dawn	Chief of Staff and Chief Technology Officer at the NYC Taxi and Limousine Commission
MURPHY Colin	Director of Research and Consulting, Shared-use Mobility Center
MUSCAT Jesmond	Deputy Chief Officer, Integrated Transport Strategy Directorate Ministry for Transport, Infrastructure & Capital Projects, Transport Malta
NAKAMURA Fumihiko	Executive Director, Vice President, Yokohama National University
NG Annabella	Head of Government Affairs, Singapore at Grab
OZAWA Katsutoshi	Director of Business Operation Department, Docomo Bikeshare
QI Jian	Assistant, Economic Department, Japanese Embassy, Beijing
REJA Binyam	Practice Manager, Transport World Bank Group
SAMSONOVA Tatiana	Policy Analyst, ITF
SCHALLER Bruce	Principal of Schaller Consulting

STOKER Adam	Research Associate and Project Manager, Transportation Sustainability Research Center, Berkley
SUTTON David	Chief Officer, Integrated Transport Strategy Directorate, Ministry for Transport, Infrastructure & Capital Projects, Transport Malta
TAKEUCHI Ryusuke	Senior Researcher, Policy Research Institute for Land, Infrastructure, Transport and Tourism
TAN Yi	Participant , Beijing Shouqi Easy Go Technology Co.Ltd.
TIAN Xian	Participant, Beijing Mobike Technology Co. Ltd.
WANG Jing	Volunteer, CTRC, CATS
WANG Xianguang	Associate researcher, CATS
WEBB Adrian	Consultant, previously Transport for Victoria, Australia
WU Ping	Associate researcher, CTRC, CATS
XIAO Quingyu	Volunteer, CTRC, CATS
YAN Chao	Volunteer, CTRC, CATS
YANG Dong	Senior engineer, CATS
YANOCHA Dana	Senior Research Associate, Institute for Transportation and Development Policy (ITDP)
ZHAO Ruoxi	Engineer, CTRC, CATS
ZHUANG Zhouyang	Volunteer, CTRC, CATS

International Transport Forum

Regulating App-Based Services

This report examines how new app-based mobility services can be effectively regulated. High-quality regulations are essential to ensure that ridesourcing, dockless bikeshare, e-scooters and other innovative forms of urban mobility deliver their full benefits for society. They are also crucial to guarantee safety, address environmental concerns and ensure consumer protection. But inappropriate regulation will deny citizens welfare benefits and stifle development of services that may contribute to a more sustainable transport system.

Resources from the Roundtable on Regulating App-Based Mobility Services are available at:
www.itf-oecd.org/regulating-app-based-mobility-services-roundtable

International Transport Forum
2 rue André Pascal
F-75775 Paris Cedex 16
+33 (0)1 73 31 25 00
contact@itf-oecd.org
www.itf-oecd.org

OECD

Published: 11/2018 | Photo credit: snkw147