Motorized Two-Wheelers in Indian Cities: A Boon, A Bane, Or Both?
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Ongoing Research ~ Feedback and Collaborations
Context

- Motorized two-wheeler market expanding rapidly in urban areas of Asia
  - 80% of two-wheelers world-wide, 90% of sales
  - Indian market second only to China in size

- Two-wheelers help fill the gaps ~ inadequate and poor quality public transport systems, walking and cycling infrastructure in many Indian cities
- Car ownership rising, but two-wheelers leading mass motorization

- Highest mode shares in small to mid-size cities
- Trade-offs: Merits v/s Demerits
Objectives and Research Questions

- Where does India currently fit on the motorization curve and future implications?
- Do two-wheelers accelerate the overall growth of motorization – are they a step towards car ownership?
- What is the role of two-wheelers in urban transport?
- What are the key factors that influence motorized two-wheeler ownership, motivations of users?
- What is the demographic of two-wheeler users? What effect does income have on two-wheeler ownership?
- What are some of the issues and challenges for Indian cities with the rapid growth of two-wheelers?
- Do two-wheelers have a role in sustainable urban mobility in the Indian context? If so, what policy options are available to best manage them, based on international experience?
Motorization Rates

Source: Fabian, 2012
March 2012: **115.4 million** registered two-wheelers in India ~ 72% of all vehicles, compared to 13% of cars

Motorization Rate: 96 two-wheelers to 15 cars / 1000 persons

Source: Road Transport Year Book (2011-12)
Higher Motorization = More pollution, congestion, travel times, safety issues and loss in worker productivity

Co-relation between motorized mode shares of public transport and two-wheelers

Source: iTrans 2009
Two-wheelers: A Step Towards Cars?
Two-wheelers: A Step Towards Cars?

- Share of personalized modes have grown by leaps and bounds in recent decades, while transit numbers have generally dwindled.

- **2015**: Average Income - $1700 capita p.a.
  
  20 cars/1000 p, and 100-150 cars/1000 p in richer cities.

- Two-wheeler Sales: Car Sales ~ unlikely to change much.

- With higher two-wheeler ownership levels, car ownership levels tend to decrease.

- 11 of 12 Indian cities studied have higher two-wheeler motorization and lower car motorization than average middle-income Asian cities.

- Two-wheeler ownership ~ monthly household income, often not correlated.
Case Study: Pune

Profile

- 8th largest city in India and fast growing
- Population (2011): 3 million, students > 0.5 million
- Large student and working population ~ 62% under the age of 30, median age 24 years
- 6th largest metropolitan economy in India, 2nd highest per capita income

- Since 1960’s population grew 4x, vehicles 87x
- 2002-2012: highest CAGR of motor vehicles 13.2% p.a.; over 2.3 million
- 2010-2013: 20% decrease in public transport ridership

Source: RTO, Pune
Case Study: Pune

- Historically ‘Cycle City of India’, now a city of two-wheelers

- 2005: More than 53% of households, 30% of population owned a two-wheeler

- 2011: two-wheelers 77% of registered vehicles, compared to 19% cars
Two-Wheeler Users Survey

- Objectives:
  Understand reasons for two-wheeler use, demographics of users and usage patterns, economic factors and propensity to switch to other modes.

- Intercept survey of 1000 two-wheeler users in 2012 ~ 72% males, 28% females; household members ~ 51% males, 49% females

- 10 stakeholder interviews: govt. officials, politicians, activists, corporates

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<th></th>
<th>Average</th>
<th>Max</th>
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<tbody>
<tr>
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<tr>
<td>Number of adults</td>
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<tr>
<td>Number of children</td>
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<td>Monthly household income</td>
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<td>More than Rs.100,000 (12%)</td>
<td>Less than Rs 10,000 (5%)</td>
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<td>Number of cars</td>
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<tr>
<td>Number of bicycles</td>
<td>0.4</td>
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Reasons for Two-Wheeler Use

- Safer than other modes of transport: Males 1.4%, Females 0.1%
- Easier to park: Males 2.5%, Females 2.1%
- Higher status/cool: Males 0.7%, Females 0.6%
- Longer commute: Males 0.6%, Females 0.6%
- Public transport not available/inconvenient: Males 1.8%, Females 2.1%
- Low cost: Males 2.8%, Females 2.9%
- Faster than other modes: Males 5.7%, Females 7.4%
- Convenience and flexibility: Males 14.8%, Females 14.2%
- Enjoy riding: Males 15.3%, Females 14.2%
- More comfortable: Males 55.2%, Females 59.9%
• Convenience and affordability + lack of good public transport
Willingness to Shift

Switch to Public Transportation
- Won't use PT (20%)
- Reliable/Regular (16%)
- Less crowded (13%)
- More frequent (10%)
- Clean/neat (10%)
- Better buses (9%)
- Safer for women (6%)
- Conductor/driver behavior (4%)
- Reserved seats (5%)
- Air-conditioned (3%)
- Door-to-door-service (1%)
- Information system (1%)
- Metro/tram (1%)

Switch to Cycling
- Won't cycle (44%)
- Small distance (16%)
- Recreation/exercise (15%)
- Cycle track (9%)
- Compulsory/law (5%)
- Greater cycle use (4%)
- Very high petrol price (4%)
- Can't ride cycle (1%)
- Old age (1%)

Switch to Walking
- Small distance (50%)
- Exercise (25%)
- Won't walk (13%)
- Better footpaths (8%)
- Last option (4%)

Fuel Price Threshold
- Rs 80-150/litre
- Rs 160-300/litre
- Rs 310-500/litre
- Rs 510-10,000/litre
- Never
- Can't Say
Demographics of Two-Wheeler Users

- Primary mode for all household members:
  - Two-wheelers: 55%
  - Cars: 19%
  - Public Transport: 15%
- Majority of two-wheeler and car drivers male; but notable number of female two-wheeler drivers between ages 18-50
- Increasing role of women in two-wheeler ownership
- Majority of two-wheeler/car passengers and public transport users were female
Demographics of Two-Wheeler Users

- After age 50, the number of men and women driving two-wheelers dropped drastically; shifting to cars or public transport — safety concerns, lower comfort, improved purchasing power being possible reasons

- For half of those whose household owned a car, the two-wheeler was their primary mode of transport, while others relied on the car.

- Average age to begin riding a two-wheeler: 20 (men), 21.5 (women)
Usage Patterns

- 78% used the two-wheeler more than 10 times a week
- 27% of riders used the two-wheeler with another mode of transport
  ~ 43% with bus, 33% with autorickshaws, 20% with walking
Economic Factors

- Monthly household income of majority (33%) users between Rs 25,000-50,000; an equal third below and above.

- Ownership seen to increase with household incomes.

- Wider income distribution among users than typically perceived.
Economic Factors

- Relatively low capital, operational and maintenance costs. Users reported spending:
  - Rs 40,000-60,000 for new vehicles; Rs 20,000-40,000 or less for second-hand vehicles
  - 86% of users spent less than Rs 2000 a month on fuel + maintenance

- 1/3rd of surveyed riders also owned a car in household; average monthly household income Rs 65,650
- 80% of those not owning a car interested in purchasing one in the future ~ primary impetus higher income (76%), marriage and children
- 1/3rd of respondents with children, also owned a car
Challenges

- Growth in two-wheeler use ~ decline of non-motorized and public transport mode shares

- Two-wheeler use can engender continued preference for private motorized mobility ~ lead to car ownership as income levels rise

- Rising income levels and car ownership do not necessarily lead to a decline in the role or mode share of two-wheelers ~ similar trends forseen by stakeholders interviewed in Pune
  - cars still unaffordable by the masses
  - continued use of two-wheelers ~ congestion, parking problems, cost-effectiveness, etc
  - some regular car users may even shift to two-wheelers
Challenges

• Private motorized vehicles ~ numerous external costs
  • Parking
  • Congestion
  • Traffic Management
  • Road Safety
  • Air and Noise Pollution
Challenges: parking problems

- Growing traffic congestion and parking issues ~ prompting authorities to study trends, frame policy and find solutions

- Parking fees repealed in Pune ~ undue hardship on users, mostly from lower income bracket; survey results and studies present a different picture

- Over 50% respondents felt that parking should be free
- 54% said parking was not a problem ~ presumably due to few restrictions and no cost
Challenges: congestion and restrictions

- Pune Municipal Corporation’s Traffic Department (2009):
  - levy higher parking and congestion charges in city’s core areas
  - ban on two-wheelers entering some parts

- Ambiguity regarding the congestion impacts of two-wheelers; infact bicycles and two-wheelers are a relatively efficient use of road space

- Rather than outright bans, consider appropriate management strategies
Safety a significant concern with two-wheelers ~ vulnerable in mixed traffic, add to unsafe driving conditions.

Pune (2010-11): 50% of all traffic accident deaths were two-wheeler riders; only 1% wearing helmet.

20% of surveyed riders reported being in an accident; average number of accidents 1.2.

Wearing helmet: 43% regularly, 24% occasionally, 33% never.

64% favor compulsory helmet laws.
Lessons from the Experience of Taipei, Taiwan

Source: Chang, 2012
Lessons from the Experience of Taipei, Taiwan

- Two-stage left turn at major intersections
- Waiting zone in front of other traffic
- Separate two-wheeler lanes on major roads, not allowed on expressways

Source: Chang, 2012

Source: Lung, Chang and Hong (1986)
Lessons from the Experience of Taipei, Taiwan

• Trial Helmet Law (1994) ~ helmet use went from 21% to 79% and motorized vehicle-related fatalities reduced by 56%.
• National Helmet Law (1997)

• Two-wheeler fatality rate in Taipei is 54% compared to 80% across Taiwan (MOTC 2011) ~ speed limit, and lane regulation, traffic management, public education and enforcement.

• Road design and traffic engineering along BRT corridor ~ 85% reduction in two-wheeler accidents

• Two-strokes stopped since 2004; introduction of electric two-wheelers in certain areas

Source: Chang, 2013
Lessons from the Experience of Taipei, Taiwan

- Parking management ~ dedicated curbside parking and parking fees

- Still, two-wheeler users pay about 40% of real costs
- Gradually charge full cost of use, while simultaneously improving public transport systems

Source: Chang, 2013
Policy Implications and Options of Indian Cities

Managing Two-Wheeler Numbers/Use:

- Inadequate, poor quality PT systems and NMT infrastructure: don’t meet needs
- Cars still unaffordable by the masses: but aspire to own
- Two-wheelers affordable and convenient: unmatched benefits
- RAPID GROWTH AND HUGE VOLUME

- Need a good, fully-equipped public transport system, before restricting or discouraging two-wheelers
- If public transport systems are improved, some or many would shift from private vehicles
- Vehicle-free days in campuses, restriction along BRT
Policy Implications and Options of Indian Cities

- Private sector initiatives to encourage sustainable mobility:
  - reserve parking space for car-poolers and bicyclists
  - charge parking fees for private vehicles, where special facilities are provided
  - stop incentives to acquire personal vehicles, incentivize travel by non-motorized or public transport and company buses
  - actively support initiatives like Bus or Cycle Days
  - provide technical/financial support and work with local authorities to address and solve traffic/transport issues in city
**Policy Implications and Options of Indian Cities**

**Charging Real Costs of Use:**
- Higher taxes
- Higher fuel prices
- Parking fees
- Congestion charges

- Necessity, not luxury ~ unfair
- Why restrict facilities, restrict ownership
- Politically difficult to implement
- May not prove to be enough disincentive

**PUSH STRATEGIES**
- Price mechanisms
- Demand management

**PULL STRATEGIES**
- Improving PT services
- Improving NMT infrastructure
- Appropriate policies, investment, subsidies

- Integrating two-wheelers with mass transit systems
Safety Issues:

- License age reduced from 18 to 16 yrs ~ youngsters driving illegally
- Strongly for helmet law; compulsory on highways, voluntary within cities

- Helmet use → Reduced severity of head injury and fatality
- Indian MV Act has mandatory helmet legislation ~ not notified by many states, or partial in nature eg: for men and not women

- Effectiveness ~ helmet quality, public education, enforcement
- Proper pricing of fines
Policy Implications and Options of Indian Cities

Policy and Planning Action Areas:

• Improving and integrating with public transport systems
• Demand management and pricing mechanisms, incentives to influence user behavior
• Improved infrastructure design and management ~ roads, traffic, parking
• Two-wheeler-specific traffic regulations ~ speed, lanes, etc
• Implementation of helmet law
• Public education and enforcement
• Improved vehicle design/technology ~ safety, environmental perspective

MAXIMISE ADVANTAGES MINIMISE COSTS
Thank You!

QUESTIONS?

Find the Full Working Paper Here:
http://embarqindia.org/Motorized_Two_Wheelers_in_Indian_Cities_A_Case_Study_of_the_City_of_Pune
http://www.embarq.org/research/publication/motorized-two-wheelers-indian-cities

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