

# How can economy theories empower cycling infrastructure planners?

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## Abstract

Cycling has been promoted as a healthy, economical, and environmentally friendly mode of travel; however, its use has been hampered by a lack of safe infrastructure. This study revisits the political economy theorems of Adam Smith, Joseph Stiglitz, and Ronald Coase, to better guide government investment decisions on cycling infrastructure and to illustrate the trade-offs between the investment in cycling and automotive infrastructure. When improving infrastructure, there is no perfect policy, so a clear statement should be made to give the public a better understanding. This paper highlights that every road user should consider the difficulties of all other users on the road. Policy makers should consider cyclists' difficulties and try to find an investment solution that maximizes both cyclists' and car drivers' benefits. Putting cycle paths on the side of roads constrains the value of both bicycles and cars; separate cycling paths should be considered. Political economy theorems include moral, wellbeing, and social costs that can help policy makers make the best investments in cycling infrastructure.

## 1. Introduction

Government agencies have been perceived as major players in supporting cycling, cycling infrastructure provision, investment, and assessment, but a lack of high-quality cycling infrastructure is the biggest impediment to cycling growth (Cox and Koglin, 2020, Pucher et al., 2010). How governments make trade-offs on investment choices between roads and cycle paths seems to be a dilemma (van Waes et al., 2021) that has not been well resolved in the political realm. Previous research has discussed health and environmental benefits but has not demonstrated the complexity of infrastructure investment concepts. The measurements and processes by which decisions were made regarding car and bicycle travel options are vague.

This paper explains the constraints between bicycle and car usage and development and then describes the necessity of cycling infrastructure investment. It then reviews existing economic decision theorems by Adam Smith, Joseph Stiglitz, and Ronald Coase on morals, public infrastructure, and social costs in relation to car and bicycle use.

## 2. Infrastructure investment

Investment in cycling routes has always been a dilemma for policy makers (van Waes et al., 2021). It is perceived as a competing choice between cars and bicycles, where cycling has a smaller proportion of usage. In Australia, there is a 1.56% commuting modal share of bicycles (Infrastructure Australia, 2009), and this figure has shown a decreasing trend, with a low of 1.1% in recent years (ABS, 2017).

Cycling investment is often less favored in budgeting, as governments need to consult taxpayers (residents, represented by elected officials) to plan and strategize solutions. Sometimes elected representatives hold a strong view on the specific resident’s group, which may lead to biased decisions (Koglin and Rye, 2014).

### 3. Economic decision theorems

Given the slow pace of change regarding cycling infrastructure, this section introduces economic theorems as alternatives to possibly biased methods in policy and investment decisions.

#### 3.1 Moral sentiments and wealth

Adam Smith, the father of modern economics, wrote *The Theory of Moral Sentiments* in 1759, which stressed moral sentiments on decision-makers’ behavior. To achieve moral sentiments, Adam Smith suggests we should have immediate experience of how others feel and we have to put ourselves in other people’s shoes. Policy planners should have all experiences in road use, especially as a cyclist. Then they would imagine changes with sympathy and understand better vulnerable parties such as cyclists competing for road use with car drivers. These can be applied to the use and planning of transport infrastructure investment, through more understanding, less violence, and more compromise (more detailed quotes and author’s comments in Table 1).

**Table 1. Analysis of Adam Smith’s *The Theory of Moral Sentiments* (1861)**

<b>The Theory of Moral Sentiments (direct quotation)</b>	<b>Interpretations to investment in cycling infrastructure</b>
As we have no <b>immediate experience</b> of what other men feel, we can form no idea of the manner in which they are affected, but by conceiving what we ourselves should feel in the like situation. (p. 3)	People who make policy or influence investment decisions should have some <b>experience in riding a bicycle on bike lanes, particularly bike paths adjacent to roads.</b>
Neither can that faculty help us to this any other way, than by representing to us what would be our own, if we were in his case. (p. 4).	Policy makers and elected representatives who influence policy should <b>put themselves in the shoes of people</b> who cannot or do not want to drive a car and who want to travel by bicycle.
We run not only to congratulate the successful, but to condole with the afflicted; and the pleasure which we find in the conversation of one, whom in all the passions of his heart we can entirely <b>sympathize with</b> , seems to do more than compensate the painfulness of that sorrow with which the view of his situation affects us. On the contrary, it is always disagreeable to feel that we cannot sympathize with him; and, instead of being pleased with this exemption from sympathetic pain, it hurts us to find that we cannot share his uneasiness. (p. 13)	The car is usually fastest on the road, but there are also some fast cyclists. Users who have dominance on the road should think about the other users' difficulties.
In all such cases, that there may be some correspondence of sentiments between the spectator and the person principally concerned, the spectator must, first of all, endeavour as much as he can to put himself in the situation of the other, and to bring home to himself every little circumstance of distress which can possibly occur to the sufferer. (p. 22)	Policy makers, car users, and cyclists need to consider the <b>needs of other users on public roads.</b>
Mankind, though naturally sympathetic, never conceive, for what has befallen another, that degree of passion which naturally animates the person principally concerned. <b>That imaginary change of situation</b> , upon which their sympathy is founded, is but momentary thought of their own safety, the thought that they themselves are not really the sufferers, continually intrudes itself upon them; and though it does not hinder them from conceiving a passion somewhat analogous to what is felt by the sufferer, hinders them from conceiving any thing that approaches to the same degree of violence. (p. 22–23)	There should be more sympathy to road users who are disadvantaged, and who is considered to be disadvantaged depends on <b>specific situations</b> . There should be no violence.

<p>... very frequently make use of two different standards. The first is the idea of complete propriety and perfection, which, in those difficult situations, no human conduct ever did, or ever can, come up to; and in comparison with which the actions of <b>all men must for ever appear blameable and imperfect</b>. The second is the idea of that degree of proximity or distance from this complete perfection, which the actions of the greater part of men commonly arrive at. "Whatever goes beyond this degree, how far so ever it may be removed from absolute perfection, seems to deserve applause; and whatever falls short of it, to deserve blame. (p. 30)</p>	<p>There will not be a perfect solution for everyone, but investment in bicycle infrastructure should be set up with the aim of perfection. The steps should be clear and should be judged fairly, rather than only complained about.</p>
<p><b>When a critic examines the work</b> of any of the great masters in poetry or painting, he may sometimes examine it by an idea of perfection, in his own mind, which neither that nor any other human work will ever come up to; and as long as he compares it with this standard, he can see nothing in it but faults and imperfections. (p. 30)</p>	<p><b>Do not set a standard for perfection for public transport infrastructure and complain about whatever is offered.</b> There should be some appreciation and understanding of the difficulties.</p>

Adam Smith’s *The Wealth of the Nation*, published in 1776, discusses the fairness in allocating a suitable proportion of resources that meet every party’s requirement and the general welfare of society. He believed that building new infrastructure actively contributes to a nation’s wealth and that any decision should consider the consequences ‘upon the general welfare of the society’ (p.9) in the theories of political economy. No matter the proportion of consumers, conveniences and necessities should be provided for all. Policy makers should equally provide cycling infrastructure as a suitable proportion in infrastructure investments, regardless in bicycle has been very popularized in 19 Century, we will need to consider the voice of the public of those who wish to cycle but hampered by the road provision and riding safety (a more detailed quote and author’s comments can be seen in Table 2).

**Table 2. Analysis of Adam Smith’s ‘the Wealth of Nations’ (1776)**

The Wealth of Nations (direct quotations)	Interpretations to investment in cycling infrastructure (author’s input)
<p>According, therefore, as this produce, or what is purchased with it, bears a greater or smaller proportion to the number of those who are to consume it, the nation will be better or worse supplied with <b>all the necessaries and conveniences for which it has occasion</b>. But this proportion must in every nation be regulated by two different circumstances: first, by the skill, dexterity, and judgment with which its labour is generally applied; and, secondly, by the proportion between the number of those who are employed in useful labour, and that of those who are not so employed. (p. 7)</p>	<p>We need to provide proportional representation for the two opposing parties of cyclists and car drivers, to provide everyone with a <b>chance for a voice</b>.</p>
<p>Nations tolerably well advanced as to skill, dexterity, and judgment, in the application of labour, have followed very different plans in the general conduct or direction of it; and those plans have not all been equally favourable to the greatness of its produce ... Though those different plans were, perhaps, first introduced by the private interests and prejudices of particular orders of men, without any regard to, or foresight of, <b>their consequences upon the general welfare of the society</b>; yet they have given occasion to very different theories of political economy; of which some magnify the importance of that industry which is carried on in towns, others of that which is carried on in the country. (p. 9)</p>	<p>Investment plans will not work if they only consider private interest and prejudices. <b>They should be designed to favor the general welfare of society.</b></p>

### 3.2 Incentives and institutions

Joseph Stiglitz (1998) published an important paper on political economy called *The Private Uses of Public Interests: Incentives and Institutions*. He followed Adam Smith’s theorem of self-interested decisions of each person leading to maximum well-being of the nation as

whole. Stiglitz further suggested that the government should have policy interventions to help individuals become better off.

Stiglitz explained that the government has limitations that cause failure in decision-making, discussed in Meng et al. (2020). The government implements trade-offs among different groups, resulting in some groups gaining more (drivers) and other, smaller, groups suffering more (cyclists). Trade-off decisions should be based on empirical studies at the local level, to understand preferences and make proportional changes. If governments fail to consider sociology and anthropology, their poor decisions lead to market failures. In addition, investment in infrastructure should be a dynamic process: this year's decision shapes options and coalitions in the future. We cannot have static policies in place because they are imperfect and require continuous improvements.

### **3.3 Social costs**

Ronald Coase (1960) discussed the reciprocal of nature of some problems as 'we avoid harm to B but inflict harm on A', and stressed that we have to solve problems to achieve benefits in total and at the margin. He suggested that solutions to problems should consider modifying users' rights to increase the value of a product (Coase, 1960), as a court would not want to define the 'bad' person, but instead will need to justify who has the legal right to be on which road. Coase's arguments have led to legal rights-related choice preferences on infrastructure investment, which help us understand transport infrastructure legislation for cyclists and motorists with related safety legislation, prevention of conflict, and evaluations. Applying this philosophy to road uses for drivers and cyclists, we should identify a road's value, know users' rights, predict potential incidents between users, define regulation for conjunctive users, and make it easy to justify legal disputes. Coase also illustrated that the market should assess alternative social interactive regulations (sometimes called social structure or social arrangements) and, in broader terms, the total effect.

Coase also suggested that tax should not be used to reduce the value of a product but should only be introduced to reduce the amount of damage (Coase, 1960). Revenue from car registration fees and cycling infrastructure (such as lockable bicycle storage) should be used to establish separate cycling paths off-road or dedicated cycling roads, which would solve the issue that sharing the road constrains both cars and bicycles. We should also look for a relevant solution that is between 'do nothing' and 'the ideal world' and discuss whether a new solution is better or worse than the original one and what improvements are needed next time.

Regarding marginal damage, as car travel increases, a change in the existing investment system is needed to improve cycling infrastructure, which inevitably leads to a greater cost. Various cost analyses regarding the benefits of driving and cycling have been discussed in recent years, for example see Litman (2020).

## **4. Economic theorems for cycling infrastructure guidelines**

### **4.1 Practical experience in modal use and sympathy in urban planning**

Based on the economic theorems derived from Adam Smith and Joseph Stiglitz (1998), urban infrastructure planners should have practical experience in various of modes of travel as well as sympathy for other road users. They must consider the broader social environment and understand the nature of alternative choices.

As an example of this, we previously conducted an empirical study of how people would like to travel to railway stations in the Adelaide Northern Rail Corridor. The study used a discrete choice model to analyze the proportion of people who would like to use trains and discuss the access mode via active transit, such as cycling and walking. The paper used the discrete choice economic model to illustrate that approximately 30% of people (young to middle-aged) would like to cycle or walk to the railway station, if the right cycling infrastructure were provided and if it were safe to use (Meng et al., 2016).

## 4.2 Policy intervention for balanced welfare

Urban mobility needs policy intervention. Joseph Stiglitz suggests that incentives should consider sociology and anthropology; without them, a policy will not help individuals be better off and will therefore become a failure. Many studies have used this approach.

Cycling is a driver for sustainable growth agendas and is the solution for social and environmental concerns (Spinney, 2020). Spinney states that the ability to cycle safely and conveniently has become an index to rank a city and that it benefits everyone in the city. Koglin (2015) uses Copenhagen and Stockholm as examples to discuss the differences in modal split and bicycle infrastructure between the two cities. He found that Copenhagen has a better infrastructure and prioritizes the politics of cycling. In contrast, Stockholm has focused more on public transport and motorized traffic, and cycling is excluded from the planning process. As a result, Copenhagen has less car traffic and a more sustainable transport system than Stockholm. In addition, cycling in Copenhagen is perceived as community habit or a common good, which provide cyclists with more protected access (Freudental-Pedersen, 2015).

## 5. Conclusion

These theorems can further inform cycling infrastructure decision-making guidelines as follows:

- Policy decision-making should target the right proportion of infrastructure investment for a mixed application of bicycle lanes (a mix of separate cycling paths on road, separated cycling paths off road and dedicated cycling roads) to cope with car use and consider the overall public welfare. Policies should always be adjusted to aim for enhancement and perfection.
- Investment should aim to ensure that both cyclists and car users have equal rights on the road and encourage harmony.
- Applying social costs to cycling investment, such as supplying a dedicated cycling road, could help to maximise utilisation values for both parties, as having separated cycling paths on the road, confines the using value of both bikes and cars. Supplying a dedicated cycling road could help to maximise utilisation values for both parties.

## References

ABS 2017, *More than two in three drive to work, Census reveals*, Canberra.

Coase, RH 1960, 'The problem of social cost', *Classic papers in natural resource economics*, Springer, pp. 87-137.

- Cox, P & Koglin, T 2020, *The Politics of Cycling Infrastructure: Spaces and (in) equality*, Policy Press.
- Freudental-Pedersen, M 2015, 'Whose commons are mobilities spaces?: The case of Copenhagen cyclists', *ACME: An International Journal for Critical Geographies*, vol. 14, no. 2, p. 598.
- Infrastructure Australia 2009, *Cycling Infrastructure for Australian Cities*, Koglin, T & Rye, T 2014, 'The marginalisation of bicycling in Modernist urban transport planning', *Journal of Transport & Health*, vol. 1, no. 4, pp. 214-22.
- Koglin, T 2015, 'Vélobility and the politics of transport planning', *GeoJournal*, vol. 80, no. 4, pp. 569-86.
- Litman, T 2020, *Evaluating active transport benefits and costs*, Victoria Transport Policy Institute
- Meng, L, Taylor, MAP & Scrafton, D 2016, 'Combining Latent Class Models and GIS Models for Integrated Transport and Land Use Planning – A Case Study Application', *Urban Policy and Research*, pp. 1-25.
- Meng, L, Somenahalli, S & Berry, S 2020, 'Policy implementation of multi-modal (shared) mobility: review of a supply-demand value proposition canvas', *Transport Reviews*, pp. 1-15.
- Pucher, J, Buehler, R, Bassett, DR & Dannenberg, AL 2010, 'Walking and cycling to health: a comparative analysis of city, state, and international data', *American journal of public health*, vol. 100, no. 10, pp. 1986-92.
- Spinney, J 2020, *Understanding Urban Cycling: Exploring the Relationship Between Mobility, Sustainability and Capital*, Routledge
- Stiglitz, J 1998, 'The private uses of public interests: Incentives and institutions', *Journal of Economic Perspectives*, vol. 12, no. 2, pp. 3-22.
- van Waes, A, Nikolaeva, A & Raven, R 2021, 'Challenges and dilemmas in strategic urban experimentation An analysis of four cycling innovation living labs', *Technological Forecasting and Social Change*, vol. 172, p. 121004.