

## Parking Policy under Strategic Interaction

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*Abstract:*

Parking policy is a tool municipalities may use to influence transportation. As transportation takes place in a system that stretches outside a given municipality's borders, the policies in different municipalities are related and must be decided upon taking this relation into account. This creates an element of strategic interaction when deciding on local transport policy including parking policy. Typically, the outcome is a policy that is inefficient in terms of parking fees and availability of parking space. By structurally categorizing the underlying mechanisms and formulating a tentative model, we provide insights to where and why inefficiencies will occur.

*Keywords:* Parking, spillover, resource flow, efficiency

## 1 INTRODUCTION

To a large extent, transport policy lies in the hands of the national government that typically decides on taxes and subsidies towards transportation as well as on large infrastructure projects. However, also local governments, e.g., in municipalities, have some policy tools at their disposal. In this paper, we focus on one of them; parking policy. Partly, parking is provided by private actors. Nevertheless, municipalities are important actors on the parking market through providing both on- or off-street parking themselves; through being responsible for zoning, thus having influence on where parking is possible; and through being able to decide on parking norms that specify how much parking is needed for new construction.

Our point of departure is that transportation takes place in a system that stretches outside a given municipality's borders. Thus, any transport policy decision taken in one municipality may have impact on other municipalities and vice versa. Consequently, the policies in different municipalities are related and must be decided upon taking this relation into account. This creates an element of strategic interaction when deciding on local transport policy including parking policy.

There is also an interrelationship between local transport policy and transport policy decided upon by regional or national governments. Furthermore, these higher level policies will influence the outcome of the strategic interaction between local governments. It is also the case that the interaction between policies is driven by different underlying mechanisms. Thus, the situation is rather complex.

In this paper, we develop a framework for categorizing different problems and issues related to parking policy from a strategic point of view. We start by constructing a matrix to provide an overview. The matrix we employ makes use of two dimensions:

1. The first dimension categorizes the effects of the choice of parking policy instruments in two groups depending on whether the individual municipalities are affected directly or indirectly by policies other public bodies conduct.
2. The second dimension categorizes effects along a hierarchical dimension. The idea captures that a municipality's decision is influenced by several other actors' decisions. These other actors may be other nearby municipalities (i.e., on the same hierarchical level) or national or regional government (i.e., on a higher level).

In the public economics literature it has long been discussed the reasons and consequences of strategic competition between regional policy makers. An early seminal paper is Oates (1972). Recently, the subject has received renewed attention in the literature (see Brueckner, (2003), and Genschel & Schwarz

(2011) for reviews). In this paper, it is strategic competition between municipalities that are most relevant. However, there may also be strategic competitive on other levels as between counties or neighborhoods. Strategic interaction concerning transport policy also occurs between countries, see e.g. Proost & Mandell (2014). However, that dimension seems less relevant for parking policy.

The remaining paper is structured as follows. In section 2, we briefly describe the concepts of resource flow and spillover models, respectively. In section 3, we provide a matrix to categorize the problem. A tentative model is presented in section 4. Drawing on the categorization and the model framework, we discuss a series of different cases in section 5. Section 6 concludes.

## 2 RESOURCE FLOW AND SPILLOVER MODELS

In principle, there are two types of forces that lead to policy competition between municipalities. The forces can be captured in two different types of economic models. They are usually referred to as "resource-flow" and "spillover" models, respectively. Although they are closely related, they are driven by different basic mechanisms.

In the spillover models, each individual municipality chooses the level of an instrument, such as a tax, in order to influence an outcome, e.g. the amount of emissions from traffic. What is important in these models is that the individual municipality is not only affected by the outcome in their own municipality, but also the outcome in other nearby municipalities. Emissions are a good illustration; a municipality may reduce the emissions within its own borders using some policy instrument, but the municipality is also affected by emissions in other municipalities. Similarly, other municipalities are affected by the emissions that occur in the municipality under study.

It is easy to intuitively understand the resulting outcome. Because each individual community only cares about the welfare of its own residents, the level of the instrument will differ compared to what would be required to maximize total welfare. In the example of emissions, total welfare is maximized given an instrument that sets the cost of further emissions (the marginal cost) equal to the utility - for everyone, not just residents in a given neighborhood - of further emissions (the marginal utility). If a portion of the benefit accrues to other than local residents, but local residents bear the cost, then the individual municipality will set the instruments at too low a level.

Thus, in the spillover models, municipality 1, M1, is directly affected by the instruments chosen in other municipalities and vice versa. In contrast, the resource flow model focuses on an indirect relationship. In these models, the municipality is affected by how much of a certain mobile resource - the typical example would be some kind of tax base - which is within the municipal

borders. By their choice of policy instrument, the individual municipalities may affect how the mobile resources choose to allocate themselves.

A simple example may be the choice of municipal income tax level. The municipality uses the revenue from income taxes to finance public goods. The optimal tax level is then represented by a trade-off between the willingness to pay for the public good and the cost of providing it. If the tax base is mobile, then a higher tax results in that individuals will reallocate. Some individuals choose to move to avoid the higher tax - they will instead contribute to the tax base of the municipality where they chose to reside. The result is thus similar to that of the spillover models; in optimum, municipality M1 will take the reallocation effects into account, and the result is too low – from a total welfare perspective - income taxes in all municipalities as a result of competition for the mobile tax base.

In other setups it may be the case that municipalities strive to force some activity, e.g., parking, to move to other municipalities through applying high taxes (or parking fees). The same mechanism as above will be at work, but the outcome may be inefficiently high taxes.

Both resource-flow and spillover problems may influence the interaction between the policy decided upon in municipalities and that decided upon at higher hierarchical levels, as the regional or national level. As an example, consider the fuel tax – decided upon by the national government. The fuel tax will influence the overall traffic volume and, thus, the need for municipal policy geared towards traffic. In most cases it would seem to be most realistic to have the national government decide first, and then the municipalities will adapt their policy to the national one. However, it is possible to imagine situations where the causality runs in the opposite direction. One such case may be the Stockholm congestion charge, which is decided upon by the national government. Arguably, the need for a congestion charge depends on how, in this case, Stockholm and surrounding municipalities have handled the traffic situation.

### 3 CATEGORIZING DIFFERENT CASES

Using the above two dimensions, we can create a matrix that will be helpful to categorize the various strategic interaction elements of importance for how municipalities choose to design their parking policies. The matrix is illustrated in Figure 1.

	Spillover effects	Resource flow effects
Municipality	<i>A1</i>	<i>B1</i>
Regional government	<i>A2</i>	<i>B2</i>
National government	<i>A3</i>	<i>B3</i>

Figure 1. Structure of a simple classification scheme

In the first row (A1 and B1), we find the pure spillover and resource-flow models. These concern the interaction between municipalities. Thus, the interaction occurs between two agents on the same hierarchical level.

The analogy with spillover and resource flow is helpful also in the other cases.

In the bottom two rows of Figure 1, we find cases where a municipality's parking policies are influenced by - and influences - policy on other related areas that are controlled by agents on a higher hierarchical level. Thus, A2 and B2 concern cases where there is an interaction between the municipality's parking policy and policy decisions taken by the regional government. In the Swedish case, the regional government is typically responsible for public transport related matters for instance. A3 and B3 relate to the interaction between municipality parking policy and relevant national level policies, such as for instance fuel taxes and congestion charges (both of which, in Sweden, are decided upon on a centralized national level).

The spillover problem follows from the municipality making decisions only on the basis of how it affects its own residents even though the decision has a direct impact on individuals outside the municipality. An obvious consequence of this is that, arguably, the decision should be taken at a higher hierarchical level. For example, it appears relevant to let decisions on fuel tax levels to be a responsibility for the national government. If it had been a municipal issue so we should expect that competition for tax base had depressed level of tax to an inefficiently low level.

There are in particular two reasons for why it is interesting to analyze the cases that fall within the categories A2 and A3 in Figure 1. Firstly, the regional or state policies (e.g., the choice of the quality of transport and fuel taxes) may have an impact on how the municipality chooses to design its parking policies. Secondly, there is a dimension that does not fit in Figure 1 in the form of that even though there are more than reasonable grounds to make decisions at a high hierarchical level, there may be other reasons to the contrary. One such reason involves asymmetric information. A decision maker who is close to the beneficiaries of a decision is likely to be in a better position to properly evaluate the consequences of the decision. Thus, there is a potential trade-off between taking a decision on a high hierarchical level, which takes into account all the individuals concerned but potentially based on incorrect information, and at a lower level, based on better knowledge about the local characteristics but not accounting for all individuals concerned.

Row 2 and 3 in Figure 1 may not include as clear cut resource flow cases. However, the fundamental driving force still exists in that there may be competition for a tax base involved. We can for example imagine a case where the state for fiscal reasons imposes a tax on transportation. In the same manner as above, this may affect the choice of municipal parking policy. A higher tax reduces the total amount of transportation and reasonably thereby the demand for parking - which in turn affects the need and design of parking policy. We will return to this in Section 5.

## 4 A TENTATIVE MODEL

We will not provide a formal model, but to fix ideas we sketch on the following simple setup. Consider two adjacent municipalities, M1 and M2. Each municipality has a given number of inhabitants that all have a preferred place of parking. For simplicity, we abstract away from scarcity of parking. Parking is associated with a parking fee that is set by each municipality and is uniform throughout that municipality. Let us denote these  $P_{M1}$  and  $P_{M2}$ . For an individual  $i$ , there is a travel cost,  $D$ , associated with moving from wherever the car is parked to the preferred place of parking. Figure 2 illustrates the setup

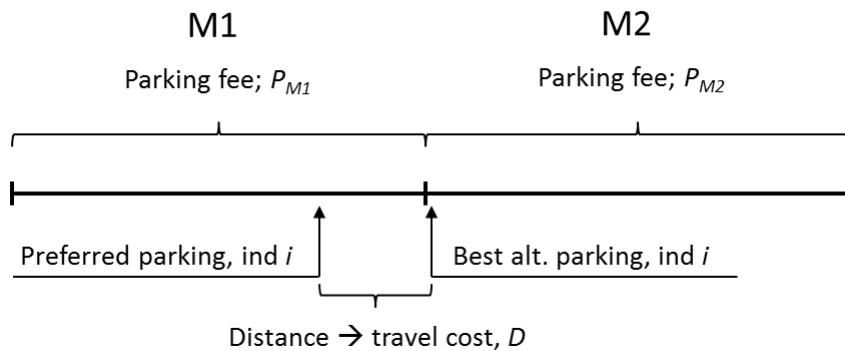


Figure 2. The basic setup

The travel cost increases in distance. Thus, if a given individual's preferred place of parking lies in municipality M1, there is no reason to park anywhere else within M1 than at the preferred place of parking. This would only result in a  $D > 0$ , and as there is no scarcity in parking it is always possible to park such that  $D = 0$ . However, if the parking fee in M2 is sufficiently less than in M1, it is worthwhile to park in M2 and incur a travel cost. This is the case if  $P_{M1} - P_{M2} > D$ .

As illustrated in figure 3, the setup results in a threshold. The threshold depends on the relative parking fees and the individuals' travel costs. Individuals whose preferred parking place lies far away from the other municipality, i.e., the travel cost incurred from parking there would be high, will be on the right side of the threshold in figure 3. For these individuals, parking in M1 and paying  $P_{M1}$  in parking fee is better than the alternative (parking in M2 and paying  $P_{M2} + D$ ).

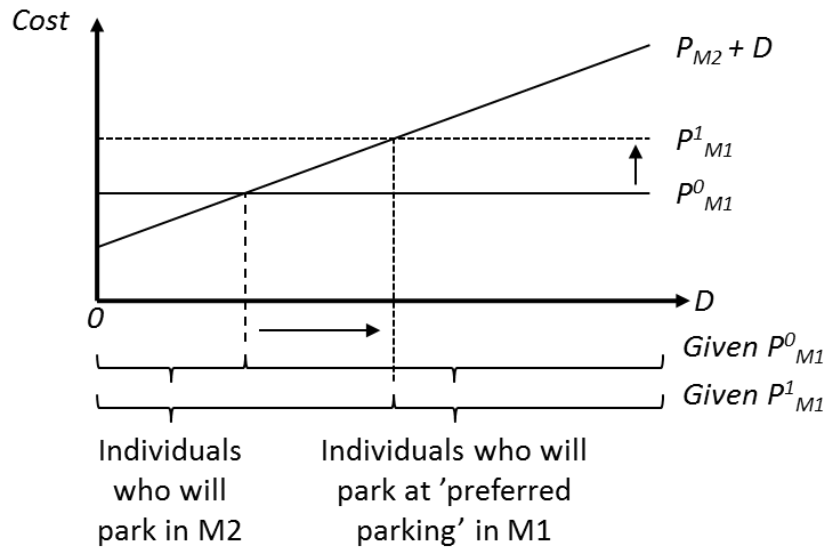


Figure 3. The conceptual idea behind an increase in municipality M1's parking fee shifting individuals to park in M2.

Furthermore, let us assume that each municipality faces a cost associated with parking,  $C_{M1}$  and  $C_{M2}$  respectively. If this cost is low, relative to the price of parking, a municipality would like to attract individuals with preferred places of parking in the other municipality. Thereby the municipality may increase its parking net revenues. That is, we have a form of resource flow effect. The municipality may do this by undercutting the other municipality's parking fee. Those individuals with preferred places of parking close to the border, and thus a low  $D$  associated with parking in the "wrong" municipality may then switch municipality – given that the incurred travel cost is less than the gain from having to pay a lower parking fee. In figure 3, this is captured by M1 increasing its parking fee from  $P^0_{M1}$  to  $P^1_{M1}$  and thereby shifting the threshold to the right and hence making a larger share of the individuals choose to park in M2.

If the two municipalities are identical (or at least similar), they will face the same incentives. The competition over parking revenues may then result in that both municipalities try to undercut each other, with a very low parking fee as the outcome.

Similarly, if the cost of providing parking is high, relative to the parking fee, we may end up in the opposite outcome. In this case, a municipality has incentives to push individuals with a preferred place of parking inside the municipality to park in the other municipality. This is achieved by charging a parking fee sufficiently high, relative to that in the neighboring municipality. The larger the difference in fee, the larger the  $D$  that motivates parking outside the municipality.

Again, both municipalities – given that they are identical (or similar enough) – face the same incentives. It is the difference in fees that matter. Thus, if M1 increases  $P_{M1}$  above  $P_{M2}$ , a share of those individuals who would like to park in M1 will find it profitable to park in M2 instead. However, the response from M2

is then to increase  $P_{M2}$  and thereby force some individuals to M1 instead. The outcome may be a situation where both municipalities charge inefficiently high parking fees, without succeeding in forcing any individuals to park in the other municipality.

Figure 4 provides a simple illustration of the game between the municipalities and the Nash equilibrium that may emerge.  $P^*_{M1}$  and  $P^*_{M2}$  denote the parking fees in the respective municipality that would maximize total welfare, i.e., equate the (social) marginal cost of parking with the (social) marginal benefit – taking both municipalities into consideration. The competition between municipalities described above is captured by the two solid upward sloping reaction functions. Each reaction function shows one municipality’s best response given the parking fee in the other municipality. The intersection between the reaction functions is thus the (Nash) equilibrium. As figure 4 is drawn, the competition forces both municipalities to implement parking fees larger than the optimal ones in equilibrium.

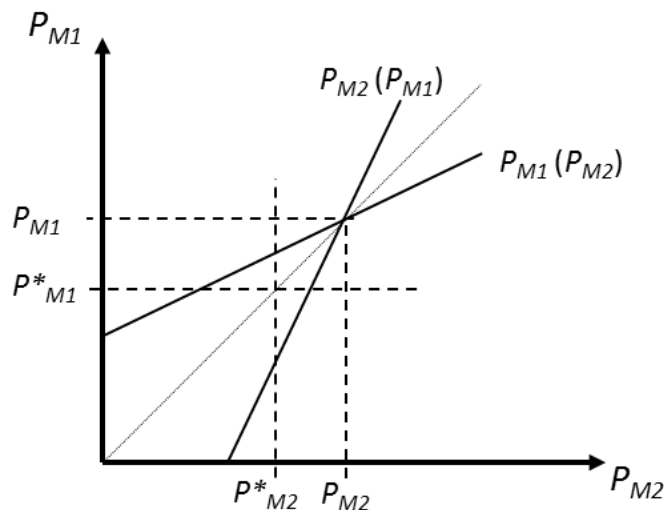


Figure 4. The resource flow competition between municipalities results in a Nash equilibrium with larger than optimal parking fees.

Both effects above are resource flow effects. If we introduce externalities associated with parking (or driving to the parking space), we also have spillover effects. Consider again the case with high costs associated with parking, such that a municipality, say M1, would like to push some individuals to park in M2 instead. This will result in costs in M2, but these are not considered by M1 when deciding on the parking fees,  $P_{M1}$ . Thus,  $P_{M1}$  will – in this case – be higher than it would be if all costs were considered. That is, a spillover effect.

Figure 5 illustrates a Nash equilibrium where each municipality only considers their own costs and benefits – illustrated by the solid reaction functions – as compared to an equilibrium where they consider all costs and benefits – dashed-dotted lines. The outcome is, as the figure is drawn, that both municipalities will charge inefficiently high parking fees.



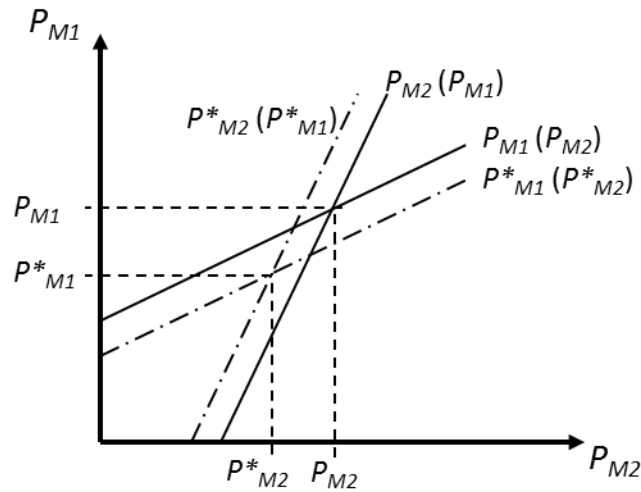


Figure 5. Municipalities only taking account for own costs and benefits in their respective reaction function results in a Nash equilibrium with higher than optimal parking fees.

Thus far, in our tentative model, we have considered stylized effects both of resource flow and spillover types created by horizontal competition, i.e. competition between municipalities that are on the same hierarchical level. Vertical effects are associated with how the municipalities' pricing policies for parking are influenced by policy on a higher hierarchical level. In most realistic cases, these vertical effects are associated with how policy influences travel costs,  $D$ .

Consider public transit. By improving public transit, travel costs for a certain distance may be reduced. As a consequence, the difference between  $P_{M1}$  and  $P_{M2}$  required to push a given number of individuals to park in a different municipality (than if the fees are identical) will be less. This follows from that the difference must outweigh the travel costs in order to switch. If the travel cost is reduced through improved public transit, so is the difference in parking fees that will induce individuals to switch to parking in another municipality. It should be noted that it is not obvious that this has any impact in equilibrium. If M1 and M2 are similar, they also face similar incentives and will respond to each other's pricing policies. This may cancel the effect of the improved public transit on parking fees. The situation is likely to be different if, for instance, the cost of providing parking differs between municipalities.

The concept is illustrated in figure 6. The starting point is identical to that in figure 3. By decreasing the travel cost per distance, e.g., through improved public transit, the function that describes the total cost (parking fee plus transportation cost) of parking in M2 becomes less steep. As a consequence, the threshold that determines the share of individuals that prefers to park in M1 is reduced.

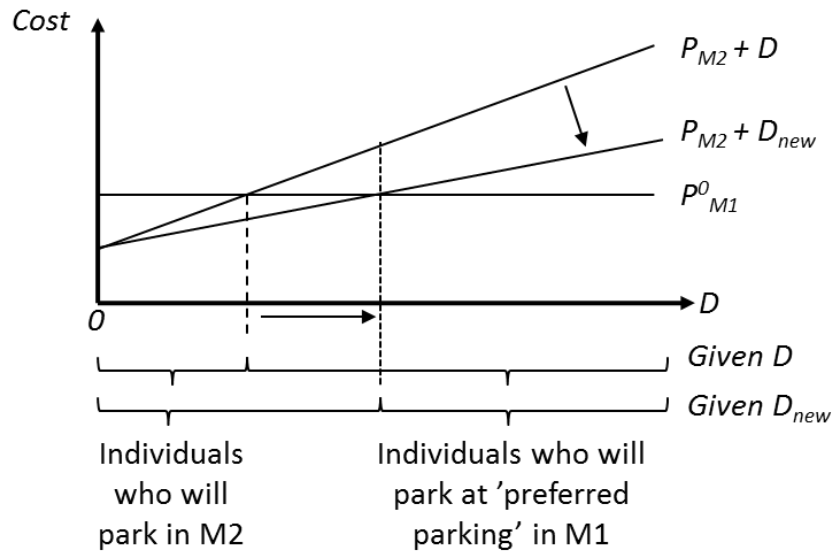


Figure 6. A decrease in travel cost per distance influences the individuals' parking choices.

Another example is fuel taxes. Setting these is typically the responsibility of the central government. If the fuel taxes are increased, this is likely to increase the travel costs. Just as above, this influences the difference in parking fees between municipalities required to push a given amount of individuals to park in the other municipality.

One dimension only indirectly captured in our model is public acceptance. Kallbekken et al (2013) finds that public acceptance is dependent on perceived effectiveness of the tax in diminishing pollution and congestion, expected distributional effects and expected impacts on personal finances. This is in line with most recent findings, see Dresner et al (2006), Eriksson et al (2008), Fujii et al (2004). The earlier view was that only self-interested motives are important for acceptance, see for example Stern et al (1993).

Getting public acceptance is a substantial challenge for parking policy instruments. Surveys in Sweden show that parking is by many considered to be a right. This is in contrast to the technical view on effective steering etc., see Hamilton et al (2013). Introducing prices on something that used to be free could be perceived as losing a right. Fuel taxes are perceived as much more effective than road pricing and parking charges in reducing both local air pollution and congestion (Kallbekken et al (2013)). Since the public debate in Sweden focuses on congestion charges and fuel tax, it is questionable whether parking fees are perceived as a corrective tax. The acceptance of parking measures goes up after implementation (Cost, 2005), which is in line with other policy measures.

## 5 ILLUSTRATING CASES AND THEIR CATEGORIZATION

In this section, we discuss a number of specific cases involving the design of a municipality's parking policies. The discussion is based on the method that we have developed above, and thus serves as an illustration of the applicability of the model. Through this we get an overview of the problems that might arise, how they can be managed and at what hierarchical level this should be done.

### 5.1 Municipality vs municipality – spillover effects

This case captures situations where municipality M1's policy becomes inefficient for failing to take into account that it creates an impact in municipality M2. That is, the policy in M1 infers an externality on the inhabitants in M2, that policy makers in M1 do not consider. This case thus corresponds to case A1 above.

An example of this is environmental zones, where only the own municipalities inhabitants benefit but all travelers are affected by the decreased accessibility. Such zones are not very common, but one example is the no-spike zone on Hornsgatan in Stockholm. The benefits in this particular case follow from a reduction in particle emissions and thus the benefits are highly local. The costs are to some extent borne by travelers from outside Stockholm. Even though this illustrates a situation where the spillover problem is present, this observation is clearly not sufficient to say that the policy is not motivated (to say that one needs information about total costs and benefits).

Turning to the case of parking, we may see both positive and negative spillover effects. This is because one municipality's parking policy may either increase or decrease traffic in neighboring municipalities. Thus, we may have that municipalities build too much parking because they do not regard the increased flow through other municipalities. Perhaps a more common case involves spillover effects that make municipalities build too few parking spaces: if the costs from parking exceed the possible income from fees, it might be profitable to reduce the number of parking spaces and thereby push parking to other municipalities and thus also the costs associated with this.

The most obvious example is park-and-ride, which in many places are under dimensioned. From the discussion above, this is hardly surprising. Park-and-ride mostly benefits people from other municipalities, and the fees are often not enough to cover the costs. Consequently, a given municipality faces weak incentives to provide park-and-ride facilities.

### 5.2 Municipality vs municipality – resource flow effects

This case corresponds to the case B1 above and is highly related to the former. Here, municipality M1's policy becomes inefficient from a welfare perspective due to competition over other municipalities' tax bases.

One situation would be where municipality M1 underprices parking to get income from municipality M2's inhabitants. This would thus mirror the classic tax competition situation seen for, e.g., local income or sales taxes. In these situations, both municipalities face incentives to undercut the other municipality's tax in order to attract tax payers. The typical outcome, as described above, is that both municipalities charge inefficiently low taxes. It seems to be the case that parking places in real life typically are underpriced. That the parking fees are inefficiently low is in line with the outcome one would expect in a resource flow setting. Having noted that, there may of course be other explanations than resource flow problems for why municipalities apply inefficiently low parking fees. In particular, as it seems common that the parking fees are so low that they do not cover the costs of providing parking, there is likely some additional reason present as the argument above hardly can motivate making a loss on parking.

One such additional explanation for low parking fees is that they benefit the residents in the municipality. This serves to make the municipality more attractive, and thus also fits into a resource flow framework. The problem for the municipality is that also residents in other municipalities may gain from the low fees. That this indeed seems to be a problem for the municipalities is the not too uncommon practice of providing discounts for the own municipality's inhabitants. For residential parking this is to a large extent a question of distribution of equity between the own municipality's inhabitants. This has questionable distributional, as it mainly favors the wealthy, and efficiency effects. Again, viewing this from a resource flow perspective, it thus serves as a way of attracting high income earners to reside in the municipality.

An illustrative example is found for park-and-ride, where some municipalities charge higher fees for other municipalities' inhabitants. This practice is quite common. Danderyd, a wealthy municipality just north of Stockholm, is a good example. There, several park-and-ride areas are reserved for Danderyd's residents only. Even if this policy makes good sense from the point of view of the politicians and voters in Danderyd, the total welfare effects of this practice would seem to be substantially negative.

From earlier literature, e.g., Mintz & Tulkens (1986), we know that the tax setting behavior of governments depends on the relative sizes of the countries. Smaller countries gain more by undercutting their neighbors than larger countries. The reason is that the small country may capture a large foreign tax base while the domestic inefficiency (due to an inefficiently low tax level) is relatively small. If we apply this insight on the case of municipalities' parking policy it means that large municipalities, as Stockholm and Gothenburg, are less likely to engage in competitive behavior resulting in inefficient parking fees, as they have less to gain and also has a large base of residents that would suffer from such behavior, as compared to smaller municipalities. However, due to this they also face strong incentives to price discriminate between their own and other inhabitants.

### 5.3 Municipality vs regional or county governments

In the center of this paper's attention is how the strategic interaction between municipalities affect their parking policy. However, as discussed above, there are also elements of strategic interaction between municipalities and policy makers higher up in the hierarchy – both on a regional and national level. Let us start by concentrating on the regional level, that is, cases A2 and B2 above. In Sweden, the most important task, from the perspective of this paper, for the regional government is to decide on issues involving public transport.

The availability and quality of public transport influences municipal parking policy in at least two ways. First, it influences the travel costs. Second, it influences the demand for parking.

If the regional government invests in better public transport such that travel costs are decreased, this will influence the choice of where to park. In the light of the discussion above, a larger share of car-riders may find it preferable to park somewhere else than at their final destination and use public transport for the last part of the trip. This means that there is more room for competition between municipalities. This, in turn, implies that the consequences of spillover and resource flow problems between municipalities discussed above may be further strengthened. That is, decisions taken on the regional level may influence the outcome of the strategic interaction between municipalities.

The second point, regarding that public transport investments affect parking demand, is more direct. For instance, new public transport may decrease parking demand in central municipalities, but increase it in more peripheral municipalities, e.g., through a larger need for park-and-ride facilities. The regional government's policy is thus interlinked with the municipalities'. A municipality typically has incentives to provide too few park-and-ride spaces. As a consequence, the use of public transport may be inefficiently low. This has been the case in a number of neighboring municipalities to Stockholm. The underlying reasons for providing too few park-and-ride facilities may be driven both by spillover problems and by resource flow problem. The former follows from that the municipality cares only about its own residents, and the park-and-ride facilities are typically used by travelers from outside the municipality. The latter may not be as obvious, but one can imagine a case where park-and-ride facilities are costly to provide (so they do not produce a surplus to the municipality) and neither do they serve to make the municipality better at attracting inhabitants. Thus, a "negative" resource flow argument.

There are also spillover problems that are directly related to the relationship between the municipalities and the regional government. For example, public transport will affect the transport volumes (both positively and negatively) in certain municipalities. It is not obvious that the regional government considers these externalities created by improving public transport. Even if it does, the spillover effects would seem to make it more difficult to align the interests of the regional government and the individual municipalities.

Similarly, there are resource flow problems between the policy on the municipal and regional level. Consider for instance a setting where the municipalities charge high prices for commuter parking. This reduces the demand for public transport, and thus influences the regional government's policy.

#### 5.4 Municipality vs the national government

Much as between the local municipal and regional policy, there are interactions between municipal parking policy and transport policy decided upon at the national level. That is, the cases A3 and B3 above. Here, we are particularly concerned with national policy regarding large investments in infrastructure, congestion charges, and transportation (mostly fuel) taxation.

First, there is a link between transportation costs and municipal parking policy. This is similar to what we discussed regarding public transport above. Basically, decisions taken on the national level, e.g., constructing a new highway or increasing the fuel tax, will influence the transportation costs and, just as above, this will affect the outcome of the strategic interaction between municipalities.

Second, national transport policies affect the demand for parking. Take a congestion charge as an example. Given a congestion charge implemented as a cordon around the central parts of the region; parking demand will likely be reduced inside the cordon. Outside the cordon, the demand for park and ride facilities is likely to increase.

Third, there is a more direct link between the municipal and national policy. Let us again take the introduction of congestion charges as an example. As the level of the parking fee is increased, the level of an optimally determined congestion charge falls. Similarly, by introducing a congestion charge, the level of an optimally determined parking fee is reduced. The relative "strength" of the two policy measures could be debated. Congestion charges has been given more attention, but Calthrop et al (2000) showed in a numerical simulation that second-best pricing of all parking spaces produces higher welfare gains than the use of a single ring cordon scheme.

From a resource flow perspective parking fees provide revenues to the municipality, while congestion charges provide revenues to the state. That is, there is a clear case of two agents that face incentives to capture the other agent's tax base. The income from the congestion charges in Sweden goes to the state and is decided upon by the state government. The de facto situation is more complicated since the revenues from the congestion charges in both Stockholm and Gothenburg are used to finance local infrastructure projects. But since the income from congestion charges to a large extent replaces other state funds, the states resource flow-incentives are quite clear.

As, in reality, congestion charges in Stockholm has been raised to fund infrastructure investments, the resource flow arguments dominates the corrective taxation arguments. But the level is still most likely lower than

welfare optimum. Congestion charges in Gothenburg were motivated by financing arguments from the beginning (the need for correcting congestion is also much smaller in Gothenburg).

Finally, an argument similar to the public transport discussion above (between the municipalities and the regional government) could be made. A municipality that only cares about their own community members, constructs too few park-and-ride facilities which weakens the positive impact of the congestion charge.

## 6 CONCLUSIONS

We have studied local governments' parking policy with emphasis on that decisions regarding these policies cannot be taken in isolation. Rather, there is an element of strategic interaction between local governments, as well as regional and national governments, that plays a role when designing the local parking policy.

The contribution of this paper is to structure and explain the problem. We argue that both resource flow and spillover effects play significant roles when it comes to parking policy. They serve to explain why local parking policy often seems to be less than efficient.

We have also discussed that the regional and national transport policy have a direct effect on local parking policies as well as an indirect effect through them affecting the outcome from the strategic interaction between local governments. We argue that measures that decreases transportation costs – infrastructure investments, improved public transit etc. – typically serve to further strengthen the competitive environment in which local parking policies are decided upon.

Using the framework discussed in this paper helps us to better understand the lack of park-and-ride facilities, why parking generally seems to be underpriced, and the common use of price discrimination where the local government favors its of habitants' parking.

Some problems are hard to deal with, the independent positions of the municipalities in Sweden makes it hard to change the hierarchal level of the decisions. Other problems have simpler solutions. One such solution is to forbid discrimination of other municipalities inhabitants when it comes to parking. The resource flow effect also provides an argument for lowering congestion charges from the state level to a regional level.

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