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# Transportation Research Part A

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## Pricing workplace parking via cash-out: Effects on modal choice and implications for transport policy



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### ABSTRACT

Employers often provide employees with either subsidized or free parking at work. This distorts relative prices of alternative commuting modes and produces inefficiencies in the transport market. To mitigate this price distortion, parking cash-out has been suggested as an effective and efficient policy to reduce single occupancy car commuting trips. By rewarding the abandonment of car parking use rather than penalizing continued parking, parking cash-out makes commuters sensitive to the opportunity cost of workplace parking while, at the same time, circumventing the opposition usually associated with the imposition of transport user fees. However, practical experiences are rare and only few studies investigate the effectiveness and efficiency of this policy option. This paper empirically tests the effects of parking cash-out on modal choice by performing a two-stage mode choice experiment among commuters in Germany. The first stage collects revealed commuting behavior data. The second stage proposes cash-out scenarios and observes stated mode choice behavior. The joint treatment of regular travel costs and cash outs allows comparing the traditional car travel demand cost elasticity and the parking cash-out elasticity. Results indicate that regardless of model specifications, parking cash-out has a negative and significant effect on the private car choice probability. This bears important implications for future transport policies.

### 1. Introduction

Cars not only cause adverse effects when in motion (e.g. local and global air pollution are produced by fossil fuel combustion), but also when parked (see [Shoup, 2005a](#)) due to the vast amount of land used for parking purposes.<sup>1</sup> This is often ignored which seems surprising since a car is parked about 95% of the day ([Shoup, 2005a](#)). A large fraction of that parking time – let's say around one-half assuming a worker spends on average 9–10 h (including breaks, lunchtime, etc.) per day at the workplace – can be traced back to employer parking (i.e. a firm's provision of parking space for its employees).

Employers usually provide employees with either free or low cost parking ([van Ommeren and Wentink, 2012](#); [Small and Verhoef, 2007](#)). Two main reasons may explain employers' incentive to provide employees with low cost or even free parking.

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<sup>1</sup> According to [Inci \(2015\)](#) the total amount of land taken up by parking in the US is at least as large as the total land area of Massachusetts, while in Europe it is at least one-half of Belgium.

First, from a worker's perspective employer-paid parking represents a fringe benefit which, in contrast to wages, is not taxed. This allows firms to pay workers lower wages without making them worse off, provided that they derive sufficient utility from parking at the workplace.<sup>2</sup> Put differently, if a company would price parking space, it would possibly have to accompany this measure with higher wages in order to remain an attractive employer. However, since wages are taxed, part of the employee's compensation for costly parking is taken away by the government.<sup>3</sup>

Second, local governments impose minimum parking requirements on buildings, thereby provoking an excess supply of parking space,<sup>4</sup> and, consequently, reducing the willingness to pay for it.

However, firms' provision of free/low cost parking space causes serious distortions. Clearly, cheap or free parking reduces the relative costs of car usage and makes commuting by car less expensive than it should be. Travel mode choice is thus biased in favor of individual passenger travel, which exacerbates negative road externalities such as excess congestion, pollution, accident and noise (for overviews see Parry et al., 2007; Anas and Lindsey, 2011; or Santos et al., 2010). Furthermore, lower market prices due to excess supply in case of minimum parking requirements regulation as well as the fringe benefit character of employer-paid parking imply that employees do not face the full resource cost of their parking space at the workplace. This increases the equilibrium demand quantities of parking lots above their efficient levels causing a deadweight loss for the firm and, in the end, an economy-wide welfare loss.<sup>5</sup>

To make commuters aware of the real (resource) cost of employer-provided parking space, pricing of commuting parking has been suggested as a potentially effective policy. This should reduce the distortions associated with cheap/free parking and, consequently, the share of commuters driving alone by car (while increasing the number of carpoolers or transit users, respectively), thus improving overall economic efficiency (e.g. Arnott and Inci, 2006, 2010; Arnott and Rowse, 2009; Brueckner and Franco, 2018; Calthrop et al., 2000; Feeney, 1989; Gillen, 1977; Glazer and Niskanen, 1992; Marsden, 2006; van Ommeren and Russo, 2014; Verhoef et al., 1995; Willson, 1992; Willson and Shoup, 1990; see also the review by Inci, 2015).

Unfortunately, levying direct charges for parking at work is still extremely rare. On the one hand, the incentives for employer-paid parking mentioned above seem to be sufficiently strong, preventing a wide policy implementation in practice.<sup>6</sup> On the other hand, given the current situation with free workplace parking, forcing employers (by law) to withdraw this subsidy would likely provoke a strong opposition from both employees and employers.

To overcome the dominance of employer-provided and employer-paid parking, Shoup and Willson (1992) and Shoup (2005b) suggested using a 'parking cash-out' option. Under this policy, employers who grant parking subsidies by providing free parking are required to offer the cash equivalent of the respective parking service value. Put differently, employers have to cash out the amount of money the firm could save when no longer providing the parking space. Rewarding the abandonment of using the parking right rather than penalizing continued parking has several advantages. The most important is probably making commuters sensitive to the opportunity cost of workplace parking while, at the same time, sidestepping the opposition usually associated with transport user fees.

However, practical cash-out experiences are rare. A prominent exemption is the study of Shoup (1997) who evaluated eight case studies related to firms, which implemented a parking cash-out legislation in the state of California. The cash-out program was indeed effective in: (1) reducing the number of solo drivers to work; (2) increasing the number of carpoolers, transit riders and employees walking or biking to work. A reduction in gasoline consumption, CO<sub>2</sub>, CO, NO<sub>x</sub> and PM<sub>10</sub> accompanied the change in travel mode choice. A survey performed by Watters et al. (2006) in Ireland and the evaluation of some case studies in the UK by Enoch (2002) also suggest a potential decline in private car use as a response to cash-out.

Although the number of case studies concerned with the practical implementation of cash-out programs is limited, they all suggest a potential reduction of single occupancy car trips and road traffic externalities, thus inducing social welfare improvements.<sup>7</sup> However, the available cash-out studies are predominantly descriptive and, thus, do not allow drawing conclusions with respect to the significance of cash-out responses and explaining their main drivers. In other words, they do not permit deriving general response measures such as travel demand elasticities. On the contrary, investigating stakeholders' acceptability and reaction to innovative policy interventions, based on behavioral modeling, represents an important building block for providing decision-makers with useful tools (e.g. Gatta and Marcucci, 2014, 2016a; Marcucci et al., 2015; Marcucci and Gatta, 2017). Therefore, the present paper performs a two-stage mode choice experiment among 681 commuters in Germany that allows the estimation of parking cash-out effects on mode choice. In the first stage revealed data on commuting behavior are collected and, in the second stage, used to tailor stated cash-

<sup>2</sup> The argument also applies to other contexts, e.g. employer-paid charging of electric vehicles (Fetene et al., 2016), or the provision of fuel cards or company cars (De Borger and Wuyts, 2011; Gutiérrez-i-Puigarnau and van Ommeren, 2011).

<sup>3</sup> The fringe benefit character of employer parking is more relevant in European countries where labor taxes are usually higher compared to e.g. the US.

<sup>4</sup> There may be good reasons in favor of minimum parking requirements (see Arnott and Inci, 2006; Hasker and Inci, 2014; Shoup, 2005a) but also arguments against such a regulation (see below).

<sup>5</sup> Using Dutch data, van Ommeren and Wentink (2012) find that the policy of not taxing parking at the workplace as a fringe benefit increases the number of parking spaces by one-third. The annual deadweight loss was found to be 77 € per parking space which is roughly 10% of the resource cost of the parking lot (750 €). Aggregating over all employer-provided parking spaces in the Netherlands this is equivalent to an economy-wide welfare loss of about 230 million € per year. Imposing a minimum parking requirement policy on top (excess supply of 30% above the already tax distorted level) causes an additional deadweight loss of 135 € per parking space (18% of the resource cost).

<sup>6</sup> Rye and Ison (2005) point to the low adoption rates exemplarily for the UK and discuss how to overcome the pitfalls in regard to a practical implementation, mainly focusing on 'soft' factors such as communication of the measure or transparency.

<sup>7</sup> By using numerical simulations, De Borger and Wuyts (2009) show in a 'representative commuter' model that cashing out parking cost may even outperform a congestion tax policy in terms of modal shift and welfare improvement.

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