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Gentrification, Transit, and Land Use: Moving Beyond Neoclassical Theory

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Abstract

Despite attention to social equity in the way public transit services are distributed, little work has considered how transportation systems may impact social equity through land use changes, particularly gentrification. Existing research on transportation and land use has been grounded primarily in a neoclassical urban economic perspective. However, the neoclassical framework is limited in its ability to handle issues of social justice such as the gentrification process. Meanwhile, critical gentrification literature has seldom considered the potential influence of transport systems to alter the distribution of accessibility benefits within a city. It is argued that a Marxist approach that considers the roles of capital and class in the gentrification process offers a better understanding of how transit infrastructure matters and contributes to a reinvigoration of transport geography. Finally, some directions for future research are suggested.

Introduction

Public transit is widely thought of as a means of promoting social equity within the city by providing an alternative mode of transportation to those unable to afford or otherwise use the private automobile: those of low income but also the young, elderly, or disabled. An obvious corollary to this, then, is a need to understand the way in which the provision of transit services is distributed with respect to social need, particularly in the context of the neoliberal city in which limited transit funding is often directed towards alleviating concerns over traffic congestion, road expansion, and other environmental concerns at the expense of broader social equity goals (Garrett and Taylor 1999; Grengs 2004; Enright 2013; Farmer 2011). Indeed, considerable recent work has examined the (in)equitable distribution of transit services in various cities from the perspectives of gender, race, class, and social disadvantage (Fan et al. 2012; Foth et al. 2013; Golub et al. 2013; Grengs 2012; Hine 2008; Lucas 2004).

However, an understudied aspect of equitable transit provision is the way in which access to transit infrastructure may alter surrounding neighbourhoods through gentrification (Grube-Cavers and Patterson 2014; Rérat and Lees 2011). Gentrification is widely conceived as a process with inequitable outcomes fundamentally tied to class conflict, in which reinvestment in urban areas primarily benefits in-moving members of the middle or upper classes at the expense of pre-existing lower-income residents (Lees et al. 2008; Slater 2011). This may occur not only through the rehabilitation or replacement of existing residential land uses, but through new-build developments on former industrial lands as well (Davidson and Lees 2010). If neighbourhoods receiving new transit infrastructure gentrify, social equity will be undermined on two fronts as existing residents endure housing affordability problems or are displaced (Newman and Wyly 2006), and as the mobility benefits of the new infrastructure fail to reach those it displaces.

There is a large body of literature on the interactions between transportation investments and land use.[1] This existing literature, however, is based primarily on a neoclassical economic

perspective, which has largely ignored these types of social justice/equity questions. Unlike the dominant literature on gentrification (Lees et al. 2008), the neoclassical perspective views urban land market outcomes as natural and self-regulating, with a tendency toward equilibrium. This perspective is therefore of minimal use in understanding how transit improvements – particularly rail rapid transit – may encourage gentrification.

Transport systems may bring about gentrification as they alter the social and spatial distribution of accessibility benefits throughout the city, thereby influencing how urban land is used and by whom. While this is seldom considered, some recent works within the gentrification literature have highlighted the significance of transport infrastructure (Grube-Cavers and Patterson 2014; Rérat and Lees 2011) and planning (Enright 2013; Farmer 2011), as discussed below. This review, therefore, seeks to flesh out this influence and illuminate the ways that critical gentrification literature can contribute to a reinvigoration of transport geography (Schwanen 2015).

Literature on mobilities has to some extent contributed to such a reinvigoration of transport geography (Cresswell 2011). The so-called 'new mobilities paradigm' challenges social science which takes movement for granted (Sheller and Urry 2006), by considering mobility a social facet of life steeped with meaning and power (Cresswell 2006). It therefore investigates not only movements within contexts of power, but also 'systems' of mobility, including technologies, infrastructures, and social relations, that make possible movement central to social life (Urry 2007). This is not limited to human movements but includes the movements of animals, things, and ideas as well (Cresswell 2012, 2014). However, this focus on conditions of mobility (and immobility) does not deal directly with the connection between transport and land rent *per se*. Therefore, more explicit consideration of how 'systems' of mobility shape the role of capital (Cresswell 2014) in processes such as gentrification, and the class-based implications thereof, is warranted.

In light of this, I seek to push transport geography towards a more critical analysis that examines gentrification. In particular, this review suggests a Marxist approach, which recognizes class conflicts and the role of capital within them, to move forward in this regard. I begin by reviewing literature on the relationship between rapid transit and residential land use, and the neoclassical economic perspective on which it is based. In the subsequent section, I outline critiques of this perspective and provide a brief review of literature establishing gentrification as a manifestation of class inequality amenable to a Marxist analysis. Finally, I chart some paths forward for theoretical and methodological focus.

Transit and Housing: The Neoclassical Perspective

Access to transportation infrastructure may bring about land use changes associated with gentrification (Grube-Cavers and Patterson 2014; Rérat and Lees 2011). Indeed, a considerable amount of research has examined the relationship between transportation systems and urban land use; most of this has used hedonic price or repeat-sales methods to isolate the impact of transit accessibility (or proximity) on house prices independent of other characteristics of the house or neighbourhood using multiple regression techniques. Positive price effects of transit infrastructure are often construed as a measure of the benefit provided by the service (Cervero and Duncan 2002). While this work has predominantly focused on price changes, a small number of authors have conceived of upward price changes as a sign of gentrification (e.g. Lin 2002; Kahn 2007; Pollack et al. 2011).

Transit access is found to have a positive effect on prices of residential properties in a number of contexts (Bowes and Ihlanfeldt 2001; Cervero and Duncan 2002; Dewees 1976; Duncan 2008, 2011; Hess and Almeida 2007; McMillen and McDonald 2004; Nelson 1992) as well

as on apartment rents (Benjamin and Sirmans 1996). Widely observed in North America, these price premiums have also been reported in cities as diverse as Bangkok (Chalermpong 2007), Izmir, Turkey (Celik and Yankaya 2006), and Lisbon (Martinez and Viegas 2009), among others. However, the relationship between transit access and housing prices is not necessarily straightforward. For example, the premium on house prices may be variable over time, even appearing before the transit line is constructed, in anticipation of future benefits (Agostini and Palmucci 2008; Knaap et al. 2001; McMillen and McDonald 2004). House values are higher near transit stations in Atlanta, but not too near, as negative externalities such as increased traffic, noise, and potential for crime are dominant immediately adjacent to stations (Bowes and Ihlanfeldt 2001), a situation similar to that observed in Helsinki (Laakso 1992). Bowes and Ihlanfeldt (2001) also find that the positive price effect is highest farther from the central business district, and in higher-income neighbourhoods. This echoes the findings of Hess and Almeida (2007) in Buffalo, who find the largest positive price effects are in higher-income areas, while large negative effects occur in lower-income areas, although Nelson (1992), also studying Atlanta, finds the opposite relationship with neighbourhood income.

On the other hand, some studies find insignificant or weak effects on house prices in several cities, including Rotterdam (Debrezion et al. 2011), Miami (Gatzlaff and Smith 1993), Sacramento (Landis et al. 1995), and along the Batong light rail line in Beijing (Zhang and Wang 2013). Comparing neighbourhoods receiving expanded rail transit service to those without, rail transit is also found to have an insignificant impact on land value in Sunderland, UK (Du and Mulley 2007). A negative effect on house prices has even been observed in San Jose, California (Landis et al. 1995). Interestingly, in a later study, positive price impacts were found in Santa Clara County, which contains San Jose, which may be attributable to improvements in the transit network, regional growth, and increased road congestion in the intervening years (Cervero and Duncan 2002).

These variations in findings may depend on differences in methodological approaches. For instance, studies more often identify a positive price impact when accessibility is most accurately captured, that is, in terms of travel time savings rather than distance to a station (Ryan 1999). The functional form of the model used and the type of transit system under study also affect results, with commuter rail and light rail generally yielding higher increases in value than heavy rail (Debrezion et al. 2007; Mohammad et al. 2013).

Local factors may have an impact, too, as transit improvements may be less valuable in dispersed, automobile-oriented urban environments (Gatzlaff and Smith 1993). Indeed, rail transit has a greater impact on land and property values in Europe and East Asia than in typically more automobile-friendly North America (Mohammad et al. 2013). In a study of Hong Kong and the Taiwanese cities of Kaohsiung and Taipei, Shyr et al. (2013) find that price premiums are inversely related to the extensiveness of the rapid transit network. Where service is ubiquitous, the relative advantage of proximity to transit, and therefore the price premium, is less; where service is uneven, a more distinct advantage and a higher price premium accompany those locations that do have transit service. Also, a 'synergistic relationship' may exist between transit access and neighbourhood built form (Duncan 2011, p. 121), the characteristics of stations themselves (Bowes and Ihlanfeldt 2001), or local policy (Dueker and Bianco 1999). On balance, however, proximity to transit corresponds to higher land values for residential properties in more cases than not (Debrezion et al. 2007; Hess and Almeida 2007; Mohammad et al. 2013).[2]

Some have gone a step further and considered land value increases an indicator of gentrification. For instance, Lin (2002) simplistically frames increases in property value of city blocks as an indicator of gentrification and finds that the greatest percentage change in property value is

associated strongly with proximity to rail rapid transit in Northwest Chicago between 1975 and 1991. Kahn (2007) expands this definition of gentrification to mean increased property values and a larger proportion of college graduates inhabiting a census tract. Using a 14-city panel dataset of major US cities that built or expanded rail transit systems between 1970 and 2000, census tracts receiving new transit service are compared to control tracts with similar attributes at the beginning of the study. Results differ by city, but gentrification (as defined here) often occurs near new walk-and-ride stations, while property values more commonly fall near park-and-ride stations (Kahn 2007).

Considering 42 neighbourhoods served by rail transit between 1990 and 2000 in 12 American metropolitan areas, Pollack et al. (2011) find that rents, incomes, and rates of car ownership typically increased more rapidly in these neighbourhoods than the metropolitan areas as a whole. The authors also find circumstantial evidence for displacement of low-income and minority populations. While they only consider each of these variables in isolation, they take them to be indicators that gentrification is occurring. Gentrification is found to be most pronounced in neighbourhoods with light rail as opposed to heavy rail or commuter rail (Pollack et al. 2011).

Much of this literature on the impacts of changes to the transportation network on housing prices draws explicitly on location theory pioneered by economists in the 1960s (e.g. Agostini and Palmucci 2008; Bowes and Ihlanfeldt 2001; Celik and Yankaya 2006; Debrezion et al. 2011; Dewees 1976; Duncan 2008, 2011; Hess and Almeida 2007; Lin 2002; Martinez and Viegas 2009). These early models, such as those of Wingo (1961), Alonso (1964) and Muth (1969), explained patterns of residential land use primarily on the basis of urban transportation – or more specifically, commuting costs – and how market prices for land are produced by supply and demand. Alonso (1964) and Muth (1969) also considered changes to the transport network in theoretical terms, predicting that the improved accessibility to the centre will be manifested in higher land values, a prediction consistent with the observation that, historically, urban growth tends to be faster along transport networks and slower in interstitial spaces (Adams 1970).

In Wingo's (1961) early model, if workers earn the same gross wage, a worker living nearer the employment centre will earn a higher net wage than a worker living farther away when journey-to-work costs (including the marginal value of leisure time surrendered to commuting) are taken into account. This advantage disappears as the rent for that location is bid upwards. As a result, workers substitute directly between transportation costs and rents; the sum of these is the same everywhere. Growth in population increases rent throughout the city, leading to higher population densities in the long run as individuals reduce their consumption of space to offset these higher costs. Transportation technology factors into the model explicitly, as the time cost and the monetary cost of the method of transportation determine the spatial extent and shape of the city, and the rent structure. In this way, faster, cheaper transportation technology can offset the impact of growth on rent (Wingo 1961).

Alonso (1964) presents a model in which the influence of transportation is less direct, though no less important, and manages to incorporate the consumption of other goods besides housing and transportation. Commuting costs increase with distance while the price of land decreases. The quantity of other goods that can be purchased thus varies with the quantity of land purchased, and the distance at which it is purchased, creating a three-dimensional 'locus of opportunities' (Alonso 1964, p. 21). The locus of opportunities represents all possible combinations of land, distance, and other goods an individual could consume within the constraints of its income. At the same time, individuals have preferences. In the assumed monocentric (single-centred) city, all shopping and employment is at the centre, so all else equal, an individual derives satisfaction from locating closer to the centre and consuming larger quantities of land

and other goods. To maintain a constant level of satisfaction, an increase in distance must be compensated with an increase in the quantity of land and other goods; a small decrease in quantity of land must be compensated with a small increase in other goods, and *vice versa*. The result is an indifference surface in three dimensions, indicating the various trade-offs between distance, the quantity of land, and the quantity of other goods the individual can make to maintain the same level of satisfaction. The point at which these two three-dimensional surfaces are tangent represents the combination of distance and the quantities of land and other goods the individual consumes in equilibrium (Alonso 1964).

Building on Alonso's basic premises, Muth (1969) presents a similar model. Households consume housing and other goods to maximize satisfaction, and therefore they will move farther away from the central business district if the savings in expenditure from an increased quantity of housing (available at a reduced price) is greater than the increased transportation costs. The model elaborates on the earlier work by accounting explicitly for the production of housing at different intensities of land use (or densities) as a result of the land rent surface, and by providing a thorough empirical analysis using census data for the Chicago metropolitan area. More recently, the Alonso–Muth framework has been extended to consider transportation mode choice and residential location (DeSalvo and Huq 2005), while Kwon (2005) has suggested the use of a commuting cost function based on both distance and income within the basic structure of the Muth model. Ahlfeldt (2011) has gone so far as to expand Alonso's work for use in polycentric cities by accounting for land values through the use of an accessibility model that captures the urban area's transport geography and labour markets.

This neoclassical urban economic framework, in the tradition of Alonso (1964) and Muth (1969), therefore continues to be highly influential in the vast body of literature examining transportation and land use. Despite the prominence of this approach within this context, little attention is given to the social equity implications of changing land values. Indeed, as the following section will show, it is problematic in the context of social equity issues, particularly gentrification. Instead, an alternative Marxist view of the urban land market and gentrification processes is introduced.

Marxist Geography and Gentrification: Beyond Neoclassical Perspectives

On the surface, the neoclassical models seem to present a reasonable view of the way in which urban land markets – and in particular markets for residential space – operate. For instance, they explain long-standing observations of decreasing land value and residential density with distance from the urban centre and the development of progressively faster modes of transportation (Clark 1951, 1958; Muth 1969). On another level, they imply an equitable equilibrium outcome: locational advantages such as proximity to employment, services, or shopping are offset by higher rent while locational disadvantages such as increased commuting costs are compensated with cheaper and more spacious housing. While some have questioned the restrictive assumptions built into these models, their purpose is to provide a starting point from which more complicated analysis can proceed by altering or elaborating on the models (Muth 1985). For example, by relaxing the assumption of a monocentric city, a declining housing price gradient with distance to the central business district should still be observed as long as employment remains relatively more concentrated there than elsewhere (Muth 1985; see also Ahlfeldt 2011).

But other problems with the neoclassical models remain. Gentrification is particularly problematic for the neoclassical models in the Alonso–Muth tradition, which assumed that wealthier households preferred newer, larger homes and thus tended to live in the suburbs, while some of these wealthier households began to move into smaller, older homes in the urban core. Changing the assumptions of the theory and appealing to the presence of external factors to account for

this difference throws into question the validity of the theory as explanation, rather than mere description (Lees et al. 2008; Smith 1982).

More profoundly, this view of the urban system has been critiqued on the grounds that the rate at which components of the system can adapt to change is variable (Harvey 1973). Changes to the location of transportation infrastructure, housing, or employment opportunities within a city alter the distributions of locational advantages. Those households able to adapt more rapidly – presumably those of means and education – thus have an initial advantage, which they are apt to use to further their own interests through 'an attempt to organize the distribution of externality effects to gain income advantages' (Harvey 1973, p. 58). In this way, redistribution of wealth within the city tends toward inequality.

Addressing these two problems is part of the goal of Marxist urban geography, including the extensive Marxist literature on gentrification. In contrast with the neoclassical models of location theory, Harvey (1978) proposed an alternative theory of urban development in which the capitalist class must continue the process of capital accumulation in order to sustain or 'reproduce' itself (and thereby its domination over labour). Partly, this is achieved through investment in the built environment designed to enhance further accumulation of capital; although, by establishing a particular fixed spatial form, the accumulation process is also inhibited by the physical constraints this spatial form entails. Over-accumulation of capital in a given sector or region therefore results in capital switching: changes in the pattern of capital circulation that reproduce and reinforce class structures.

This theory was put into practice in Smith's (1979) 'rent gap' explanation of gentrification, whereby prolonged capital depreciation and disinvestment in the older urban core create a 'gap' between a site's potential ground rent and its current capitalized ground rent. Potential ground rent represents the maximum amount that could be capitalized under the site's most productive use, while the capitalized ground rent is the amount currently capitalized by the landowner under present use of the land. The widening of this rent gap creates opportunity for profit-seeking capital to move 'back to the city', resulting in gentrification. The implication is that the formation of ghettos or slums and subsequent gentrification of these areas are a structural result of the capitalist and landlord classes' drive for capital accumulation, at the expense of the working class (Harvey 1973, 1978; Smith 1979).

The rent gap thesis has been critiqued as being overly deterministic in that it downplays other factors contributing to gentrification, including the agency of individuals (Hamnett 1991). Many alternative explanations of gentrification have centred on consumption as the mechanism by which segments of the middle class engage in gentrification. Changes in the employment structure – notably an increase in white-collar service workers – in post-industrial cities and the concentration of this new work in the central business district has produced a 'new middle class' keen on consuming the urban amenities offered by close residential proximity to the inner city (Caulfield 1994; Ley 1986, 1996). Later specifications of the rent gap thesis provided a less rigid take (Ley 1996; Smith 1987); however, it was never intended to be a complete explanation of both the necessary and sufficient conditions for gentrification in the first place (Smith 1992). Indeed, Smith (1992, p. 114) suggests a 'non-essentialist' approach where class is viewed as an entry point to the study of gentrification – capital is but one of many social factors tempering decisions made by individuals. Of course, those individuals with greater command of capital have a greater ability to make decisions that achieve their preferences. Ultimately, most researchers now accept a combination of both production-side and consumption-side explanations of gentrification (e.g. Lees 1994), and some have further argued for increased attention to the connections between race, ethnicity, colonialism, and gentrification (Lees 2000, 2012).

However, a focus on consumption-side explanations overlooks the class-based consequences of gentrification and thereby centers on resistance to bland suburbia rather than the injustices of

gentrification (Lees et al. 2008). If we are interested in the social equity impacts of public transit *vis-à-vis* gentrification, then it would therefore seem valuable to emphasize a Marxist approach. Furthermore, Marxist perspectives, though less common since the so-called 'cultural turn' of the 1990s, provide a useful framework of analysis particularly where rent and property are concerned (Anderson 2014), as is the case with changes in land use accompanying transit-induced gentrification.

Notably, such an approach differs from the neoclassical perspective in two key ways. First, the Marxist approach recognizes the class conflicts inherent in the movement of capital in urban space rather than view urban land market outcomes as an 'optimal' and thereby equitable distribution (Harvey 1973, 1978). Second, it recognizes that the investment of capital takes place not on the 'featureless plain' of neoclassical models, but rather upon an existing legacy of earlier built form investments by capital (Smith 1982). Given these differences, certainly a Marxist approach represents a more appropriate framework to study transit-induced gentrification than the neoclassical perspective. After all, 'gentrification is nothing more and nothing less than the neighbourhood expression of class inequality' (Lees et al. 2008, p. 80).

Transit, Land Use, and Gentrification

Despite the obvious possibility for changes in public transit infrastructure to alter the distribution of accessibility benefits socially and spatially throughout the city on the one hand, and the richness of theoretical approaches to explaining and analyzing gentrification in geography on the other, very little has been written on the interaction between public transit improvements and gentrification from a geographical perspective. Scholars who have noted the apparent coincidence of gentrification with transit networks have typically done so in passing, without further analysis (e.g. Filion 1991; Walks and Maaranen 2008). Nevertheless, it is possible to outline some possible paths forward to reconcile this shortcoming.

Earlier studies of the link between transit infrastructure and gentrification have been critiqued for their narrow definitions of gentrification by Grube-Cavers and Patterson (2014), who instead consider gentrification to be an event defined by a simultaneous change in a number of indicators, for tracts initially defined as 'gentrifiable' – those with below-average mean family income and degrees per capita. Gentrification thus occurs if a gentrifiable tract experiences an increase in average monthly rent, proportion of the population in professional occupations, the percentage of owner-occupied dwellings, average family income, and degrees per capita that is above the metropolitan average for the time period in question. A positive relationship is found between rapid transit and gentrification in Montreal and Toronto, though not in Vancouver. This approach offers a vast improvement on identifying what may be called transit-induced gentrification: the broader list of indicators more suitably captures changes in the class character of neighbourhoods than earlier works (e.g. Lin 2002; Kahn 2007; Pollack et al. 2011), and increasing rents are suggestive of a closing rent gap. However, these changes are not theorized as such, and therefore, notions of class struggle remain absent from the theoretical underpinnings of the study.

In a rare departure from the neoclassical framework, the term 'spatial capital' has been coined to describe locational advantage and mobility, key factors in new-build gentrification in Swiss central cities (Rérat and Lees 2011). The work of Rérat and Lees (2011) focuses on the reasons middle-class households choose central-city residential locations in new-build developments in Neuchâtel and Zurich. Gentrifiers are drawn to these developments for practical reasons, capturing advantages of both proximity and mobility. Their central locations offer easy access to the national rail network, facilitating inter-city commuting, or the opportunity to walk or cycle to work (see also Danyluk and Ley 2007), thereby increasing the spatial capital and reinforcing the middle-class position of their residents.

Absent from these studies is any serious discussion of class conflict or social justice. In particular, most of the research on transit-induced gentrification still draws on the neoclassical perspective, which is ironic given that such a framework had considerable difficulty accounting for gentrification in the first place. While Rérat and Lees (2011) do frame their discussion of gentrification in terms of class and capital, they do not address the ways in which access to conventional economic capital provided by – or constitutive of – class position facilitates the capture of spatial capital. There is similarly no discussion of the ways in which displaced populations cope with the loss of spatial capital, although these points are suggested as areas of future research. What emerges is a clear gap in the literature: the lack of Marxist approaches to a problem clearly tied to class conflict and capital.

A useful starting point to the study of transit-induced gentrification may be a return to the rent gap thesis – even if only as a heuristic device – and the class implications thereof. Smith (1982) identifies the positive impact of transportation infrastructure on land prices as an increase in capitalized ground rent. But, surely it is possible to conceive of new rapid transit stations raising the potential ground rent of an area as well, by allowing for more intensive use of the land (higher density). In this way, new transit lines could open a larger rent gap than would otherwise exist, even in the absence of substantial neighbourhood depreciation and disinvestment. In this case, it seems that capital in the conventional sense would suffice, without recourse to the idea of 'spatial capital'. There is, however, room to make connections between different forms of mobility and their influence on the spatial expression of capital (Cresswell 2014) in the gentrification process. Either way, what is required is a better account of displacement and housing affordability struggles (Slater 2006, 2011) in the neighbourhoods afflicted with transit-induced gentrification, which is not provided by existing neoclassical studies of house price increases.

Another direction worth taking is an examination of how agencies plan transit. As cities have become increasingly entrepreneurial in attempts to attract capital (Harvey 1989), the state (including urban government) has become increasingly active in promoting and facilitating gentrification alongside private capital (Smith 2002). For example, Farmer (2011) shows that Chicago's planned Circle-Line rail transit route is intended to further a 'global city' image and extend the downtown core westward, resulting in a deliberate gentrification of the area. Likewise, Enright (2013) demonstrates how proposed expansions to the Paris Métro aim to gentrify specific nodes within the physically and socially peripheral banlieues. The extent to which these plans are ultimately successful in meeting their stated development aims, and thereby serve particular class interests, deserves attention.

Conclusion

Our understanding of the social equity impacts of transportation systems is not complete without considering the ways in which land use changes – including gentrification – brought about by the transportation system affect social equity. Likewise, our understanding of how changes in the transportation system – which alter accessibility and mobility across the urban system – play into the gentrification process remains incomplete. Such an endeavor requires moving beyond the neoclassical economic framework that dominates the transportation and land use literature. The small body of work that does engage with the conjectured relationship between transit and gentrification remains rooted primarily within this perspective, ignoring conceptualizations of gentrification as a manifestation of class struggle. Likewise, the mobilities literature has not given adequate attention to the links between capital and gentrification. Instead, we need a critical approach that recognizes the class character of the gentrification process and the role of capital within it. Some recent studies point to new methods that could aid in capturing this character,

but a corresponding theorization still lags. A rapprochement between transport and Marxist-inspired geography could be a fruitful start.

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Short Biography

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Notes

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[1] For example, Duncan (2011) counts over 50 published studies examining the impact of rail transit infrastructure on property values since 1970.

[2] Conducting a meta-analysis of published and unpublished studies, Mohammad et al. (2013) do not find a publication bias in favour of positive results (but do find evidence of bias in favour of statistically significant results for both positive and negative findings).

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