Regional Science Policy & Practice 16 (2024) 100152

Contents lists available at ScienceDirect

Regional Science Policy & Practice

journal homepage: www.sciencedirect.com/journal/regional-science-policy-and-practice

The impact of speed limits on labour sheds in the mountain west United States

Benjamin Whipple [a], Karl R. Geisler [b,1,*]

[a] Pocatello, ID, USA
[b] Idaho State University, Department of Economics, 921 South 8th Ave, Pocatello, ID 83209-8020, USA

ARTICLE INFO

JEL Classifications:
J61
R12
R23

Keywords:
Labour Shed
Speed Limit
Commuting

ABSTRACT

Many state-level policies impact the location decisions of both employees and employers. As most jobs require some form of commute, one such state-level policy impacting location choices are speed limits. We consider the effect of speed limits on the size of the labour sheds in the mountain west United States. Our analysis leverages the natural experiment of changing speed limits in the 281 counties of Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming over the years 2004–2018. Utilizing the revealed commuting behaviour in the origin-destination data available through the Longitudinal Employer-Household Dynamics program we measure the geographic labour shed size as the radius of containment of commuters. Employing spatial panel methods to evaluate the significance of speed limits on the radius of containment we find evidence in favor of the hypothesis that higher speed limits correspond to larger labour sheds.

1. Introduction

A common goal for regional economic policy is to facilitate local economic development. To drive such development, policy makers often work to convince firms to locate in their region. A key factor in a firm's decision to locate in a region is the availability of labour. It therefore becomes important for policy makers to understand the boundaries of the regional labour pool. This understanding requires knowledge of the determinants of those boundaries. In this way, strengthening our understanding of the determinants of the labour supply better enables regional economic development policy.

Given that commuting time is a cost incurred by the worker, and that there is a direct relationship between commuting time and speed limits, it is reasonable to expect that speed limit policy impacts the labour supply available in a region. This is of particular importance in regions where commuting primarily occurs by automobile. To better inform regional development and transportation policy it is therefore necessary to quantify the impact of speed limit changes on the geographic area from which labour is drawn. This geographic area is sometimes referred to as the labour shed.

Our statistical analysis provides evidence that higher speed limits correspond to workers accepting longer commuting distances within the mountain west region of the United States. We find that an increase of speed limits by 1 mph within the studied region corresponds to an increase in the regional labour supply by expanding the labour shed radius by about 0.85 miles.

These results contribute to the cost-benefit analyses faced by policy makers when considering transportation policy. It is understood that increased public safety is associated with lower speed limits (Farmer, 2019). However, our results may demonstrate that lower speed limits may have consequences on the economic development of subject regions which may need to be weighed against public safety benefits by policy makers.

2. Background and related literature

The concept of a labour shed seems to originate from Vance (1960). He described the labour shed as the region of space around the central business district (CBD) from which labourers are drawn to work in the CBD. The idea of commuting toward employment in the CBD has only grown stronger over time. Olsen, Munroe, (2012) more recently pointed out "the rural population is increasingly reliant on more traditional urban functions and places for their livelihoods." (pg. 356)

One of these key urban functions serving the rural population is

* Corresponding author.
E-mail addresses: benjaminwhipple@isu.edu (B. Whipple), karlgeisler@isu.edu (K.R. Geisler).
[1] ORCID: 0000-0001-9998-4211

https://doi.org/10.1016/j.rspp.2024.100152
Received 10 October 2024; Received in revised form 25 October 2024; Accepted 9 November 2024
Available online 15 November 2024

employment. Fowler and Jensen (2020) summarize the attributes and estimation methods of various concepts in regional analysis of labour markets. They view a labour shed as a geographic region featuring economic containment: the people that live within the area generally work within the area. From this point of view they suggest three possible measures of containment from which a labour shed could be defined. First, the measure of home containment which considers the percentage of residents who work within a defined region. Second, the measure of work containment which considers the percentage of jobs within a defined region that are worked by residents of the region. Third, a measure could be constructed considering the percentage of national population that lives and works within the same region. For the purposes of our analysis, we employ the home containment measure from Fowler and Jensen (2020).

Microeconomic theory posits that commuting occurs due to irregularities in compensation across space, as a worker would not choose to exchange leisure time for commuting costs and time without compensation. More succinctly, commuting occurs because the worker benefits by commuting. As a simplistic example, it is often the case that rural housing further from the central business district (CBD) is less expensive than urban housing due to higher supply and lower demand, and that urban wages are higher than rural wages due to a higher demand for labour. An urban worker can therefore benefit from a higher wage and lower cost of housing in exchange for increasing the costs incurred by commuting further. Brueckner (2011) provides thorough exposition of such theoretical modeling.

The present analysis builds on the rich literature examining the value of time, especially in relation to income, but also in relation to travel. Johnson (1966), for example, models the trade-off between work, travel, and leisure. Under the assumptions that an individual's behaviour is subject to constraints from both time and money, he applies traditional price theory and found the values of leisure and travel each to be less than the monetary wage rate. Furthermore, Johnson (1966) outlines that commuting – a type of work trip, in his terminology – possesses several characteristics, of which we focus on two. First, commuting is bundled with the choice of employment. Second, the costs of commuting are accounted for as a reduction in the gross wage rate and an addition to the time price of work.

Commuting is bundled with the choice of employment insofar as individuals choose both where to work and where to live. These decisions have a degree of interdependency. Alonso (1964) is one of the first to outline this interconnectedness via a basic model of residential location. We take his key results as summarized in Coulson (1991) as being that "the spatial distribution of land and housing prices, consumption of land, and the spatial arrangement of residents are determined by the transportation costs to the central business district" (Coulson, 1991, pg. 299).

To test the theoretical construct presented by Alonso (1964), Coulson (1991) links the choices of where to live and where to work by analyzing housing sales in the State College, Pennsylvania metropolitan area. The State College metropolitan area is stated to be an ideal testing ground for the monocentric model due to its relatively small size and limited divergence from monocentricity. Using a hedonic pricing model which incorporated distance from the CBD, as well as references to estimates of automobile costs, the author concludes that price of housing falls as distance from the CBD increases, and moreover, that the decline in housing prices is approximately equal to the increase in transportation costs.

These transportation costs, as per Johnson (1966), are essentially a reduction in the gross wage and an increase in the time price of work. To quantify this, Madden (1985) utilizes the Panel Survey of Income Dynamics to consider whether heads of households who increase their work trips also increase their income. Comparing those who moved, those who changed jobs, or both, the author finds that those who moved further from their work increased their wage or work hours, which translated to an increase in income. The author also finds that wages are systematically lower in less urban jobs.

Employment characteristics such as wages are not the only important factor influencing commuting. Vickrey (1969) outlines different kinds of congestion, as well as their respective causes. Of particular importance to our analysis is the outline of long run congestion as being a function of density of transportation within a region. From this description of congestion it is reasonable to assume that population density is a significant determinant of congestion costs within a region.

A related body of literature examines the effects of incentives on individual choice behaviour related to commuting. Johansson et al. (2002), for example, investigate how decreasing the time distance between locations increases the labour market size through impacting individual choice behaviour. They use a random choice preference function to model willingness to commute. This willingness is encapsulated by the preference value of working at a location as involving location specific attributes, the difference in wages between two locations, the monetary costs of commuting, and the time distance of commuting. Their model of preference value finds that the value increases as the difference between the wages between two locations is increased, and that it decreases when either the monetary cost of commuting increases or as the time distance (and thus time cost) between the two locations increases.

It is reasonable to ask if commuting behaviours such as those found by Johansson et al. (2002) are universal, or if they are particular to the places and populations studied. To this point, Carra et al. (2016) find that commuting patterns differ across countries. Looking at Denmark, the United Kingdom, and the United States, they report differences in commuting distances undertook by workers in each country. Nonetheless, each of these three countries exhibit a similar pattern: "[t]he three datasets observed here display a slow increase of the average commuting distance with income and, more importantly, a slowly decaying tail for large distances." (pg. 2) In light of this finding, it seems rational to conclude the broader trends of commuting are universal in spite of local idiosyncrasies.

One such broader commuting trend is in how remote or telework relates to commuting distance. The proportion of remote or teleworkers has steadily been increasing in recent years. Analyzing Swiss data, Ravalet and Rérat (2019) report 18.2 % of employees worked partially remote in 2015, were as 6.1 % of employees worked primarily remote. Both classifications included nearly 2 % more of the population than in 2010 when these numbers were respectively 16.5 % and 4.6 %. In the same study, Ravalet and Rérat (2019) find employees who worked remotely lived further from their offices. This confirms findings from the Netherlands and the United States (US). Zhu (2013) concludes "that telecommuting considerably increases the one-way commute distance and duration for the majority of US households." (pg. 2456) Similarly, de Vos et al. (2018) report Dutch employees who telework at least one day a week live further from their offices, resulting in longer commuting times on days when they do go to the office.

This longer distance between the home and office has unintended consequences. Ravalet and Rérat (2019) further find that Swiss teleworkers travel more per week than daily commuters. Because remote workers sometimes worked in their office, and because they also have other reasons to travel "including taking children to school or other activities such as shopping or leisure," remote workers actually travel longer total distances each week than workers who commute to work five days a week. (pg. 594) This finding is not limited to Switzerland. Helminen and Ristimäki (2007) report that between 1985 and 2000, "average one-way commuting distance in Finland increased by 3.8 km from 6.5 km to 10.3 km." (pg. 335) This makes sense in light of the key findings from Van Ommeren and Dargay (2006). Estimating the income elasticity of commuting speed in Great Britain, Van Ommeren and Dargay (2006) find commuters will choose faster modes of transportation as incomes increase. They in turn propose this will lead to increasing utilization of automobiles as the preferred method of commuting. Looking at commuting distances in rural England, Champion et al. (2009) find a direct relationship between duration of residency and commuting distance. Recent arrivals in rural places tend to commute longer distances than do more established residents.

The paradoxical finding that teleworkers travel longer distances has environmental implications. Marz and Şen (2022) find that working from home leads to a reduction in emissions initially, but then "show that these immediate savings in carbon emissions are more than offset as households switch to less efficient cars and move away from the city center benefiting from lower real-estate prices." (pg. 14)

All in all, it seems safe to say that worker location relative to their place of employment is far from fixed. Indeed, the studies cited above illustrate that workers move relative to their places of employment for a wide variety of reasons. As this study seeks to quantify the impact of speed limits on the available labour in an area, the many reasons for location choice need to be accounted for.

3. Data

Based on the literature reviewed in the preceding section it is reasonable to assume that a labour shed's radius adjusts due to the net effect of changes to costs and benefits of commuting as faced by the population of feasible commuters. Thus, in order to explain how speed limits impact labour sheds, our model must also enumerate the key the costs and benefits of commuting.

Our analysis utilizes the 8 contiguous states making up the mountain west of the United States: Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming. We select these states for their similar mixtures of rural and urban places. These states are characterized by large geographic areas which rely heavily on automobiles for transportation; above-ground public transit is available in the major urban centres though usage is typically much lower than that found elsewhere in the US. We utilize data from 2004 to 2018 covering 281 counties for a total of 4215 observations.

While the present analysis deals with the aggregate behaviour observed as a local labour shed, we choose similar explanatory variables as Johansson et al. (2002) used in their model examining individual commuter behaviour. After all, the aggregate commuting behaviour which determines the radius of the labour shed is determined by the collection of individuals' commuting behaviour. To enumerate the aggregate impact of individual choices on the size of the labour shed we use county level summary statistics.

As explanatory variables, our model employs county population, county population density, state speed limits, county level housing values, and county employee compensation. To measure costs we use the first three of variables. County population and population density serve as indicators of severity of congestion costs, whereas the key variable of interest, state highway speed limits, serve as a negative indicator of the time cost of commuting. We assume that the primary method for commuting within the mountain west is by automobile which is reasonable given the general lack of public transportation across much this region. The benefits of commuting come from decreased housing costs and increased income. For the response variable we calculate each county's labour shed using percentile commuting distances. These variables are outlined in detail below.

3.1. Constructing the labour shed estimates

To measure the geographic size of each county's effective labour shed we utilize the home containment measure from Fowler and Jensen (2020). We start with data from the Longitudinal Employer-Household Dynamics Origin-Destination Employment Statics (LODES) dataset from the US Census Bureau (U.S. Census Bureau LODES Data, 2022). At the census block level, this dataset links the number of commuters from each home block to every workplace block. We then approximate the commuting distance between census blocks utilizing the haversine formula to compute distances between the containing census tracts. These interior points of the containing census tracts were obtained from the U. S. Census Bureau Counties Gazetteer Files (2022).[1] As census tracts are fully contained within counties, this tract-to-tract measure of distance approximates how far each person employed within a county lives from where they work.

The data on employment by county is then sorted by distance from closest worker to most remote. To aggregate the distance and commuting data at the county level, we then establish the radius of a circle for each county which contains 90 % of the county's labour. This 90th percentile commuting distance was used for two reasons. First, the LODES data is collected from administrative data and not cleaned in any way. If a person moved three states away but did not change their legal address, they would show up in the dataset as commuting 1000 miles for work daily. Second, remote or teleworkers likely increased over the years included in our study. As Ravalet and Rérat (2019) reported in the Swiss case, just under 2 % of workers switched classifications from fully in office to working partially or full remote between 2010 and 2015. For the 15 years of our analysis, excluding the farthest out 10 % of workers should more than cover any increase in remote workers moving outside the labour shed.[2]

3.2. Independent variables

The primary variable of interest in this study is the speed limit. Speed limits by state and across years are used as reported in Farmer (2019). The speed limits used represent the maximum highway speed limits present within the state, which are commonly the freeway speeds on the interstate system.

County level annual populations are from the U.S. Census Bureau County Population Data (2022) and was accessed through the Federal Reserve Economic Database of St. Louis (FRED). It is presented in the thousands of persons. Population density was computed using the land area column available within the 2010 county gazetteer file available on the Census website, resulting in a variable with units of thousands of persons per square mile.

Employee compensation data was gathered from the U.S. Department of Commerce, Bureau of Economic Analysis (2022). The dataset used was labelled as CAINC6N, which contains data on compensation of employees by locality and NAICS industry. We used the data corresponding to average compensation per job by county, which is reported in dollars.

Housing price data was obtained from Zillow's housing value index (ZHVI) database, specifically the ZHVI All Homes time series. The ZHVI All Homes index represents the typical value for homes in the region. It is computed by taking the mean of 35–65 percentile home value ranges, as estimated by Zillow, within the region. The dataset chosen was smoothed and seasonally adjusted. The coverage over the region and time of interest was limited to 241 counties across the states of interest. Some of these 241 counties which had data also had gaps between reported values, however, sufficient data existed to impute missing values using backwards chain weighting by the observed average growth rate. Data was then transformed from monthly observations to an annual value to match the observation frequency of other variables.

4. Analysis

Due to the limitations of the housing price variable noted above, we perform estimations both with and without the housing price. A simple

[1] The haversine formula is not adjusted for the ellipsoid shape of the earth, though we judge the resulting errors as insignificant within the scope of our analysis.

[2] The 95th percentile commuting distance was also tested and yielded similar results; for a more conservative estimate the smaller 90th percentile commuting distance was chosen.

Table 1
Comparison of means. "Missing Data" are from counties not represented in the housing price data.

Variable	2004		2018	
	Missing Data	Existing Data	Missing Data	Existing Data
Commuting Distance (90th%)	114.28	77.17	159.04	113.31
Population (1000 people)	5.14	81.43	5.50	100.89
Population Density (1000 people /mile^2)	0.002	0.066	0.002	0.083
Total Commuters	1662.25	34484.21	2050.38	43112.53
Employee Compensation ($)	32278.45	36266.01	51538.68	54412.33
Speed Limits (mph)	75	75	79	77.842

comparison of means as shown in Table 1 suggests that the counties not represented in the housing price data are heavily rural communities. Of the 40 counties that are missing in the housing data, 22 are in Montana, 8 are in New Mexico, 5 are in Utah, 2 are in Idaho, 2 are in Wyoming, and 1 is in Nevada. A visualization of the excluded counties within the mountain west United States is presented below in Fig. 1.

We refer to the USDA Rural-Urban Continuum Codes (2013) to further characterize the missing counties. These codes classify counties by whether they are metro or nonmetro counties and then by population level and adjacency to metro areas. The metro/nonmetro status is determined by reference to the OMB definition from February 2013. The frequency of codes in the missing counties are summarized in Table 2. We see that the most common codes are 9, 8, and 7, which all correspond to nonmetro areas with an urban population of less than 20,000. Codes 9 and 8 correspond to regions with less than 2500 urban residents. The USDA classifications of the counties missing housing price information provides further evidence that they are nearly entirely nonmetro and generally highly rural.

We present the results of a standard OLS fixed effects model in Table 3 as a starting point for analysis. The estimation results indicate that an increase in the speed limit actually has a slightly negative impact on commuting distance, although the effect is statistically insignificant in both model specifications.

Regardless of whether or not housing is included in the OLS model, the impacts of population and population density largely agree *a priori* expectations. Paradoxically, housing price has a significant and negative relationship with commuting distance. This runs counter to the predicted positive relationship where one would expect higher-priced homes to encourage commuters to live further from work (and more cheaply).

Both the insignificance of speed limits and the negative estimated coefficient for housing price in the OLS models point to a misspecification. Given the explicitly spatial nature of the data, it is likely that at least one assumption necessary for OLS is violated. To better control for possible spatial correlation we employ a spatial panel model estimation through the Stata software using the XSMLE routine (Belotti et al., 2017). The strong statistical significance of ρ and σ^2 parameters, as seen in Table 4, indicate that spatial effects warrant a spatial panel model. A spatial Durbin model (SDM) is employed over a spatial autocorrelation (SAR) or spatial error model (SEM) based on rejections of the null in the tests that $\theta = -\beta\lambda$ and $\theta = 0$ which correspond to selecting SDM over SEM and SDM over SAR, respectively.

The SDM analysis uses an inverse distance matrix constructed using the previously mentioned haversine formula. We chose an inverse distance matrix because we consider it to more faithfully model Tobler's first law[3] than a contiguity matrix. We do not normalize the spatial

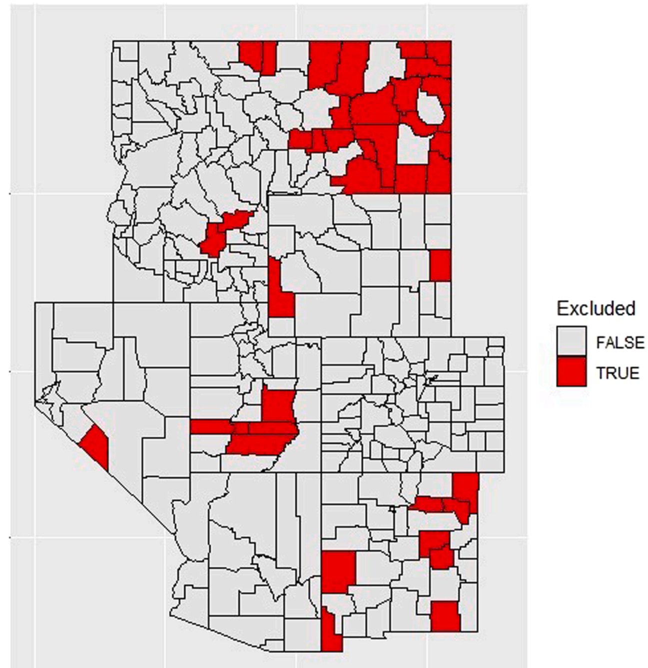

Fig. 1. Visualization of Excluded Counties compared to all Counties in region considered.

Table 2
USDA 2013 Urban Rural Continuum code by frequency in removed counties.

Code Value	Frequency	Meanings (7)
9	27	Completely rural or less than 2500 urban residents, not adjacent to a metro area
8	2	Completely rural or less than 2500 urban residents, adjacent to a metro area
7	7	Urban population of 2500 to 19,999, not adjacent to a metro area
6	1	Urban population of 2500 to 19,999, adjacent to a metro area
5	1	Urban population of 20,000 or more, not adjacent to a metro area
3	2	Counties in Metro areas of fewer than 250,000 population

weights matrix in our estimation. Elhorst (2014, pg. 12) identifies that row normalization of an inverse distance matrix invalidates the economic interpretation of distance decay which it is generally used to

Table 3
Standard Fixed Effects OLS Regression Results.

	Model with Housing		Model without Housing	
Direct Effects	Coefficient	p-value	Coefficient	p-value
Speed Limits (mph)	−0.048 (0.264)	0.856	−0.241 (0.295)	0.415
Employee Compensation ($1000)	2.389 (0.0826)	0.000	2.272 (0.089)	0.000
Housing Price ($10,000)	−0.396 (0.1257)	0.001	-	-
Pop Density (1000 people/mi^2)	−65.007 (14.632)	0.000	−70.176 (17.855)	0.000
Population (1000 people)	−0.0526 (0.019)	0.004	−0.04514 (0.023)	0.046
Within R^2	0.201		0.128	

[3] "[...] everything is related to everything else, but near things are more related than distant things." Tobler (1970).

Table 4
Spatial Durbin Regression Results. Standard errors are enclosed in parenthesis.

Direct Effects	Model with Housing Coefficient	p-value	Model without Housing Coefficient	p-value
Speed Limits (mph)	0.850 (0.436)	0.051	0.527 (0.495)	0.287
Employee Compensation ($1000)	1.683 (0.141)	0.000	1.781 (0.152)	0.000
Housing Price ($10,000)	0.165 (0.127)	0.194	-	-
Pop Density (1000 people/mi^2)	−25.823 (14.412)	0.073	−26.147 (17.576)	0.137
Population (1000 people)	−0.499 (0.018)	0.005	−0.045 (0.021)	0.030
Wx	Coefficient	p-value	Coefficient	p-value
Speed Limits	−3.897 (1.122)	0.001	2.141 (1.074)	0.046
Employee Compensation	1.013 (0.444)	0.023	−0.026 (0.403)	0.948
Population Density	−531.542 (149.427)	0.000	−465.981 (173.048)	0.007
Population	−0.993 (0.400)	0.013	−0.435 (0.437)	0.320
ρ	0.866 (0.059)	0.000	0.786 (0.053)	0.000
σ2	448.229 (10.936)	0.000	668.100 (14.581)	0.000
Overall R^2	0.078		0.095	
Between R^2	0.101		0.130	
Within R^2	0.275		0.194	

represent. This is due in part to the breaking of the symmetric property of such matrices that may result, as well as the feature that a row normalized matrix assigns equal weight to remote and central regions.

The SDM regression results presented in Table 4 are generally as expected from theory and are mostly consistent across both specifications – that is, with and without housing price. Direct effects represent the effect of a county's own explanatory variable on the labour shed of that county. Considering the estimated direct effects, we see that speed limits, employee compensation, and housing price are all positive where present. These conform to *a priori* expectations due to their role in incentivizing commuting behaviour. Population density is negative, which is similarly expected due to the role it plays in generating congestion costs. The effect of population is negative, contrary to our expectations, but possibly due to the slight correlation observed between population and population density (about 0.32).

From the direct effects estimates in Table 4, we see that the model excluding housing cost does not indicate a statistically significant effect of speed limits, whereas the model incorporating housing cost does. When the housing price variable is included in the Spatial Durbin model, the estimated coefficient for housing price lacks individual significance. One potential explanation for this lack of significance may be in the significant overlap between location and housing price, with the SDM specification absorbing some of the significance. In spite of the lack of individual significance of the housing price variable when it is included in the SDM estimate, the model including housing prices is arguably more accurate: housing prices are an important determinant of residential location, and thus of commuting distance.

5. Conclusions and extensions

Overall the spatially-explicit regression results provide evidence that highway speed limits have a significant impact on the size of the labour shed. Having defined the labour shed as the 90th percentile of the distances employees who work at some region commute to work, we notice that, *ceteris paribus*, an increase in the highway speed limit of by 1 mile per hour corresponds to an increase in labour shed radius of approximately 0.85 miles.

The other independent variables support this finding with logical impacts on the size of the labour shed. An increase in housing price at the location of work by $100,000 corresponds to an increase in the radius of the labour shed by about 1.65 miles. Employee compensation has the marginal effect of increasing labour shed radius by 1.68 miles per thousand dollars in average total compensation per job. An increase in population density of a county by 1000 people per square mile has an impact of decreasing the radius of the labour shed by about 25.8 miles. Similarly, an increase in the population of a county by 1000 people corresponds to a decrease the radius of the labour shed by about 0.50 miles. These findings all conform to the theoretical predictions of rural/urban labour markets. Workers will live further out (and thus commute longer) when housing is expensive in the central business district and when urban compensation is high. On the other hand, workers are less willing to commute when congestion increases. Taken together, the estimated signs and coefficients of these four variables support the conclusion that the explicitly-spatial model which includes housing prices is well-specified.

Our research provides a degree of confirmation of the hypothesis: we find evidence that the radius of a labour shed increases as highway speed limits within the region increase. More specifically, within the mountain west United States an increase in the highway speed limit by 1 mile per hour corresponds to an increase in the size of the labour shed by about 0.85 miles. This is a fairly intuitive result, but one which has not yet been tested in a similar manner.

The present analysis is framed with the policy goal of increasing labour shed size to attract more workers and thus more employers. Indeed, this is the goal of many economic development organizations in the predominantly rural mountain west United States. Policy makers in urban areas, however, may view this study's key finding differently. If the goal is to move toward more compact cities, employing a reduction in the speed limit to decrease the labour shed may be a useful policy tool. As reducing the speed limit would increase the time cost of commuting, it may encourage higher density polycentric development in urban areas.

Insofar as reducing emissions is concerned, more compact cities are better. In their study on Italian urban areas (UAs), Cirilli and Veneri (2014) find "densely inhabited UAs appear to be more sustainable in terms of per commuter CO2 emissions" (pg. 2001). Muñiz and Sánchez (2018) draw similar conclusions in their study of commuting emissions in the Metropolitan Zone of Mexico Valley. They conclude the concentration of mixed-use economic activity into decentralized subcenters leads to reduced overall emissions. While outside the scope of the present analysis, more investigation into applying speed limits as a tool to increase urban density is warranted to inform concepts such as the 15-minute city proposed by Moreno et al. (2021).

Even though the results of this analysis may be specific to the region we have studied, the concept of a faster transportation network leading to larger labour sheds is highly generalizable. Furthermore, the framework of using observed commuting patterns can be used to estimate labour sheds in other geographies. This framework could even be expanded to account for transportation modes more commonly found outside the mountain west of the United States, such as underground metro systems. While we don't anticipate that our overall result of faster transportation implying a larger labour pool would change much when looking at another geographic region or another primary mode of transportation, we expect that analyses of other regions may yield different numerical results. Indeed, any variation found in future work focused on testing these findings in different regions are welcome as they would contribute to a richer understanding commuting and labour sheds. These results may also serve as a starting point for policy makers seeking to expand investment in other forms of transportation, even to the point of being a tool of increasing density when applied in the opposite direction studied here.

CRediT authorship contribution statement

Karl R Geisler: Writing – review & editing, Writing – original draft, Supervision, Project administration, Methodology, Investigation, Conceptualization. **Benjamin Whipple:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Conceptualization.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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