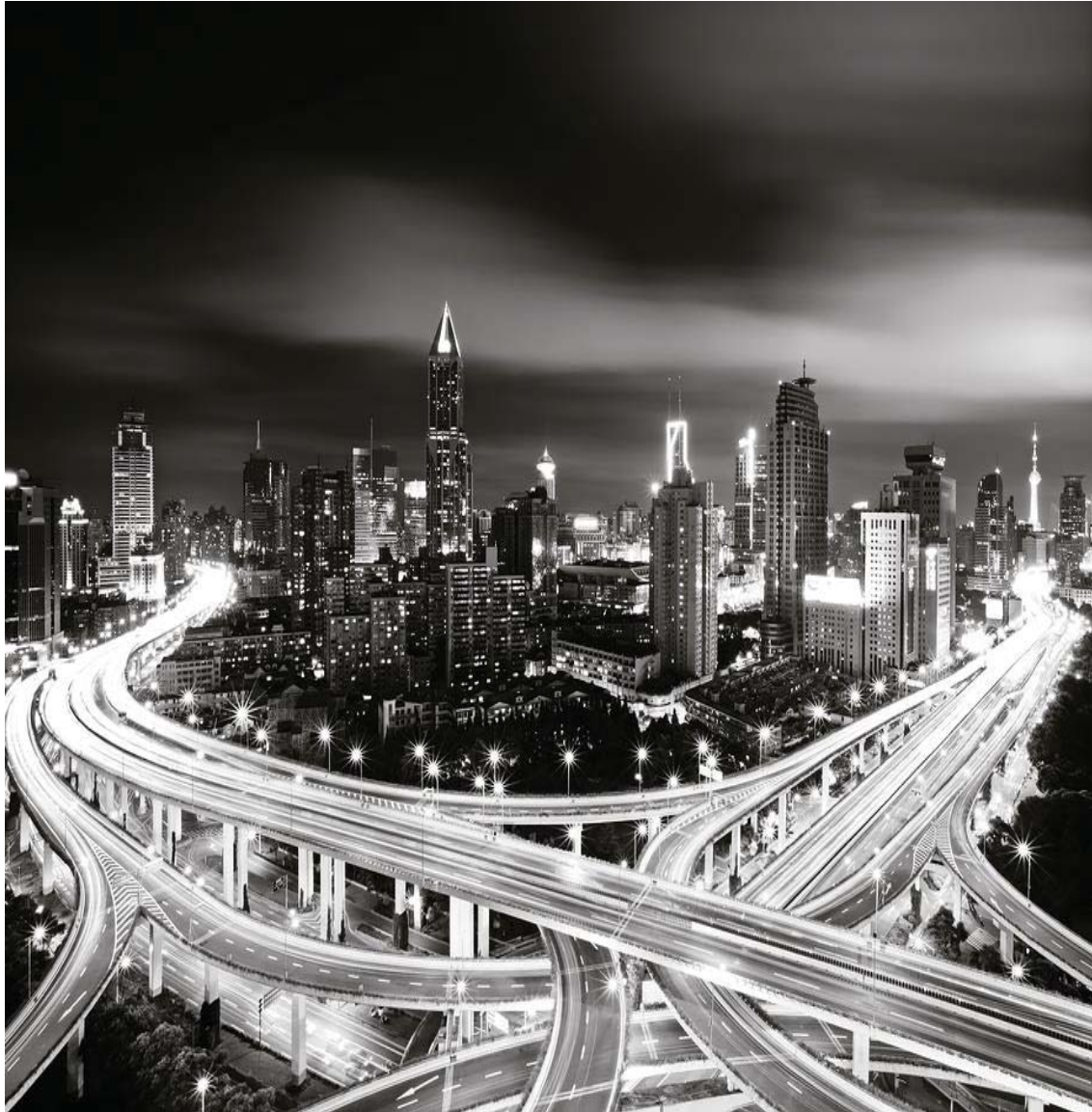


The impact of urban form on commuting in Chinese megacities



Lara Engelfriet
March 2016
VU University, Amsterdam
Supervisor: Dr. E. Koomen

Table of contents

Summary.....	3
1. Introduction.....	4
2. Literature Review	7
2.1 Conceptual model.....	7
2.2 Urban form and its dimensions.....	8
2.3 The influence of urban form on jobs-housing balance and commuting.....	10
2.3.1 City size	11
2.3.2 Density.....	11
2.3.3 Polycentricity.....	12
2.3.4 Land-use mix.....	13
2.4 Other city level characteristics.....	13
3. Data and empirical methodology	16
3.1 Commuting distance and time	16
3.2 Metrics of urban form	18
3.2.1 Development density and land-use mix per parcel	19
3.2.2 Inhabitants per <i>Jiedao</i>	20
3.2.3 Calculated metrics	21
3.2.3.1 City size	21
3.2.3.2 Density.....	21
3.2.3.3 Polycentricity.....	21
3.2.3.4 Land-use mix.....	23
3.2.3.5 Compactness.....	23
5. Results.....	26
5.1 Urban form, commuting distance and time	26
5.2 Polycentric, compact urban structure and commuting distance and time	28
6. Discussion and conclusion.....	29
References.....	32
Appendix A: Full dataset on urban form and commuting distance and time	40
Appendix B: Correlation coefficients.....	42
Appendix C: Example maps of population density per <i>Jiedao</i>.....	43
Appendix D: Example maps of land-use mix per parcel.....	45
Appendix E: Example maps of development density at parcel level	47

Summary

Chinese cities are growing at an unprecedented rate and the way this urban expansion develops will have long lasting effects on the amount of greenhouse gasses (GHG) those cities will emit. One of the major contributors to a city's GHG emissions is the transport sector and cities can influence their residents' travel behavior by changing land-use patterns and urban design. In order to do evidence based urban planning, knowledge on how urban form influences transport GHG emissions is of crucial importance.

A large body of literature based on data from European and U.S. cities shows that urban form has notable effects on commuting and transport GHG emissions. This relation, however, might be different for developing countries, including China, as the rate and the patterns of urban growth are not comparable. This research is a first step towards better understanding the impact of urban form characteristics on commuting patterns at city scale in China.

An intra-city analysis has been conducted for 41 major cities in China. It has been tested what the effect of several urban form variables is on commuting time and distance, controlling for city per capita GRP. Urban form variables that were included are city size, urban density, land-use mix, polycentricity and compactness.

The analysis is based on three datasets. First of all, a dataset on commuting with average commuting distances and times. Secondly, a dataset on development density per city block, based on data from the crowd source platform OpenStreetMap and Points-of-Interest data. This innovative method provides a unique opportunity to do an intra-city analysis on Chinese cities, as spatial data for China is very scarce. Lastly, a dataset on population density was used.

The results show that urban compactness, city size and per capita GRP are important determinants of commuting: cities that are less compact, larger and richer have longer average commuting times and distances. Whether a city is more monocentric or polycentric does not have an effect on commuting. Furthermore, higher average densities do not result in less commuting, which is contrary to findings on European and U.S. cities. From the results of this research it thus seems that spatial planning should be directed towards keeping the city as compact as possible. However, the opposite is happening in Chinese cities today, as those cities are increasingly sprawling.