Natural Amenity Benefits and the Residential Development Market

By

Kent Forrest Kovacs

B.A. (Vassar College) 2000

DISSERTATION
Submitted in partial satisfaction of the requirements for the degree of

DOCTOR OF PHILOSOPHY
in
Agricultural and Resource Economics
in the
OFFICE OF GRADUATE STUDIES
of the
UNIVERSITY OF CALIFORNIA

DAVIS

Approved:

[Signatures]

Douglas M. Larson (Chair)

James E. Wilen

Aaron Smith

Committee in Charge

2006
## Contents

1 Introduction  
1.1 Spatial City Model of Open Space and Community .................................. 1  
1.2 The Hedonic Price Method for Separating Recreation and Amenity Benefits 5  
1.3 Stated Preference Methods for Identifying Open Space Benefits and Individual Discount Rates 8  
1.4 Outline of the Dissertation 11  

2 Parameters for the Spatial City Model, Portland Assessor's Data, and the Portland Parks Survey 15  
2.1 Spatial City Model Parameters ...................................................... 16  
2.2 Multnomah County Assessor and the Regional Land Information System 18  
2.3 Portland Parks Survey ................................................................. 26  
2.3.1 Recreation Demand Data Set .................................................. 29  
2.3.2 Contingent Valuation Data Set ............................................... 31  
2.4 Summary ....................................................................................... 32  

3 A Spatial City Model for the Influence of Recreation and Amenities on Residential Development 35  
3.1 The household location decision .................................................... 36  
3.1.1 Household choices when recreation trips are consumed .............. 37  
3.1.2 Households with no recreation trips ....................................... 40  
3.2 The residential development decision .......................................... 41  
3.3 Conditions of spatial market equilibrium .................................... 42  
3.4 Total social benefit of open space policies .................................. 43  
3.5 Towards the implementation of the spatial city model ................. 44  

4 Simulations of the Spatial City Model for the Influence of Recreation and Amenities on Residential Development 46  
4.1 A closed city with no open space ............................................... 47  
4.2 Policies to improve open space benefits ..................................... 48  
4.3 Policies to provide additional open space .................................... 51  
4.4 Housing durability and migration ............................................... 57  
4.5 Sensitivity of the total social benefits to parameter values .......... 60  
4.6 Adjustment of recreation costs and benefits ................................. 62  
4.7 Two income groups in cities with open space .............................. 68  
4.7.1 Location patterns of two income groups ................................ 70  
4.8 From a simulation to an empirical model .................................... 72  

5 Separating Recreation and Amenity Benefits from the Residential Development Market 74  
5.1 A household model of simultaneous housing, recreation and amenity benefits choice ....................................................... 75  
5.2 Empirical models of recreation and amenity benefits from the housing market and survey data ..................................................... 77
5.3 Empirical results .......................................................... 81
  5.3.1 Separating recreation and amenity benefits from the housing market 81
  5.3.2 Trip elasticities for recreation at a system of regional parks in a residential area 94
5.4 Towards a model of the total value of open space ................................ 98

6 Stated Preference Models for Identifying Open Space Benefits and Individual Discount Rates 99
  6.1 A model for the identification of discount rates with a double-bounded contingent valuation question 100
    6.1.1 Payment Schedules ............................................. 100
    6.1.2 Incentive compatibility ....................................... 101
  6.2 An empirical model of willingness to pay ................................ 102
  6.3 Empirical results ..................................................... 105
  6.4 Discussion .............................................................. 114

7 Summary and Conclusions .................................................. 117
  7.1 Simulations of the spatial city model .................................. 118
  7.2 Separating recreation and amenity benefits from the residential development market ........................................ 119
  7.3 Stated preference models for open space benefits and discount rates .... 120
  7.4 Concluding remarks and further work .................................. 122