

RSM 3012: Advanced Topics in Urban and Real Estate Economics
Syllabus

Location: Rotman 470

Schedule: Thursdays 1:10-2:25, (break), 2:40-3:55

Target Audience: This course is primarily aimed at PhD students who have completed the first year of a PhD program in Economics or a related field. MA students are welcome to consider the course, but should discuss with me first. Auditors are also welcome, I just ask that you let me know that you are auditing. All those sitting in on the course will be expected to present one paper of your choice to the class (about 45 minutes) at some point in the term.

Broad Goals: The course is intended to prepare students to do academic research in economics or related fields. The coursework assumes a strong background in microeconomic theory and econometrics. Methodologically, the course is split into about one-third applied theory, one-third structural empirical applications and one-third more reduced form empirical applications.

Topics: The material is chosen to complement the material in Michel Serafinelli's graduate Urban and Regional Economics course. Topics scheduled to be covered are listed in the course schedule below. I want to be flexible and respond to class demand on covered topics to some extent, particularly toward the end of the course. Please let me know if there is an urban/real estate topic not listed on the syllabus that you would be interested in seeing. For example, I would be glad to do more on agglomeration economies and economic geography at a regional scale, though I understand these topics are covered in Serafinelli's course and Morrow's international trade course.

Grading: I try to provide challenging but manageable work. I highly encourage you to work together on the problem sets and talk to each other about research ideas. The research process is increasingly collaborative and coursework should be as well.

- Problem Set 1 will be about manipulating the classical urban land use model and about implementing the Eaton-Kortum (2002) based quantitative urban model empirically. (20% of the grade)
- Problem Set 2 will be about manipulating and taking to the data a neighborhood choice model that also incorporates commuting mode choice and about conducting inference with spatially dependent data. (20%)
- Mock referee report of a paper to be provided. (10%)
- Presentation of one paper of your choice to the class for about 45 minutes. (10%)
- First presentation of paper idea(s) (5%)
- Second presentation of initial progress on paper (5%)
- Writeup of final paper (proposal) (20%)
- Class participation (10% - think of it as about 1% for each class meeting)

Meetings Outside of Class: I encourage everyone to come see me outside of class. If you would like to talk to me individually, catch me during the break, after class or send me an email (Nate.Baum-Snow@rotman.utoronto.ca) to set up a time.

Schedule: Below is a rough schedule of topics and readings. Listed below the schedule are other papers in the literature that may be useful. There will be 12 classes, but I will have to be away on January 25th and March 15th. The schedule below compensates with one class during February reading week and an additional class in April. If many will be away during February reading week, we will hold two classes in April instead.

January 4th: Introduction, Spatial equilibrium ideas, Marshallian approach to land use theory

Albouy, David “What are Cities Worth? Land Rents, Local Productivity, and the Capitalization of Amenity Values” NBER Working Paper #14981

M. Fujita. “Urban Economic Theory”. Cambridge University Press, Cambridge (1989). Chapter 1

January 11th: Bid-rent concepts, non-monocentric land use

M. Fujita. “Urban Economic Theory”. Cambridge University Press, Cambridge (1989) Chapters 2-4.

M. Fujita & H. Ogawa (1982) “Multiple Equilibria and Structural Transition of Non-Monocentric Urban Configurations” *Regional Science & Urban Economics* 12, 161-196.

January 18th: Modern quantitative models of cities and regions

Ahlfeldt, Redding, Sturm, Wolf (2015) “The Economics of Density: Evidence from the Berlin Wall” *Econometrica* 83: 2127–2189.

Redding & Rossi-Hansberg (2017) “Quantitative Spatial Economics” *Annual Review of Economics*

January 25th: NO CLASS

January 30th (Tuesday): PROBLEM SET 1 DUE

February 1st: Housing Supply & Real Options

Saiz (2010) “The geographic determinants of housing supply” *Quarterly Journal of Economics*

Combes, Duranton, Gobillon (2017) “The production function for housing” manuscript.

Murphy (2017) "A Dynamic Model of Housing Supply," *American Economic Journal: Applied Economics*

Titman, S., 1985. Urban land prices under uncertainty. *American Economic Review* 65, 505–514

February 8th: Presentations of paper ideas (10-15 minutes each)
Tiebout sorting theory

Calabrese, Epple & Romano, "Inefficiencies from Metropolitan Political and Fiscal Decentralization: Failures of Tiebout Competition" *Review of Economic Studies*

February 15th: The Hedonic Model and Applications

Diamond & McQuade (2017) "Who Wants Affordable Housing in their Backyard? An Equilibrium Analysis of Low Income Property Development

February 20th (Tuesday): Mock referee report due

February 22nd: Structural Models of Neighborhood Choice

Bayer, Ferreira, McMillan (2007) "A Unified Framework for Measuring Preferences for Schools and Neighborhoods" *Journal of Political Economy*

Bayer, McMillan, Murphy, Timmins (2016) "A Dynamic Model of Demand for Houses and Neighborhoods," *Econometrica* 84(3): 893-942

March 1st: Econometric Issues

Baum-Snow & Ferreira (2015) "Causal Inference in Urban Economics," in *Handbook of Urban and Regional Economics Vol IV*, Duranton, Henderson & Strange Eds.

Gibbons, Steve, Henry Overman and Eleonora Patacchini. 2015. "Spatial Methods," in *Handbook of Urban and Regional Economics*.

Cameron, A. Colin, Jonah B. Gelbach, and Douglas L. Miller. "Bootstrap-based improvements for inference with clustered errors." *The Review of Economics and Statistics* 90.3 (2008): 414-427.

Bester, C. Alan, Timothy G. Conley & Christian B. Hansen (forthcoming) "Inference with Dependent Data Using Cluster Covariance Estimators" *Journal of Econometrics*

March 9th: Urban Transportation: Mode Choice & Demand Estimation

K. Small. "Uncovering the Distribution of Motorists' Preferences for Travel Time and Reliability: Implications for Road Pricing," *Econometrica*, 73 (July 2005), pp. 1367-1382 (with Clifford Winston and Jia Yan) and Small, Winston & Yan. "Differentiated Road Pricing, Express Lanes, and Carpools: Exploiting Heterogeneous Preferences in Policy Design," Brookings-Wharton Papers on Urban Affairs 2006 53-96.

March 16th: NO CLASS

March 21st (Tuesday): Problem Set 2 Due

March 23rd: Local labor markets

Diamond, Rebecca "The Determinants and Welfare Implications of US Workers' Diverging Location Choices by Skill: 1980-2000" *American Economic Review*

Baum-Snow, Nathaniel and Ronni Pavan. 2012. "Understanding the City Size Wage Gap" *Review of Economic Studies*

March 30th: Place based policies

Glaeser, Edward L., and Joshua D. Gottlieb. The economics of place-making policies. No. w14373. National Bureau of Economic Research, 2008.

M. Busso, J. Gregory and P. Kline. "Assessing the Incidence and Efficiency of a Prominent Place Based Policy" *American Economic Review* (2013)

April 5th: Paper proposal presentations (15-20 minutes each)
Ghettos and Neighborhood Effects

Chetty, Hendren & Katz "The Effects of Exposure to Better Neighborhoods on Children: New Evidence from the Moving to Opportunity Experiment" *American Economic Review* 106(4): 855-902, 2016

E. Chyn (2017) "Moved to Opportunity: The Long-Run Effect of Public Housing Demolition on Labor Market Outcomes of Children" manuscript.

April 30th: Final paper proposal due

Additional Reading, Broken Out by Topic:

1. Land Use and Economic Geography Theory and Empirics

Duranton, Puga, Urban Land Use, Hdbk Regional, Urban Econ, 2014

Robert E. Lucas Jr. and Esteban Rossi-Hansberg (2002) “On the Internal Structure of Cities,” *Econometrica*, 70:4, 1445-1476.

Allen, Arkolakis and Li (2016) “Optimal City Structure,” manuscript.

Allen & Arkolakis (2014) “Trade and the Topography of the Spatial Economy” *Quarterly Journal of Economics*. Volume 129 (3), p.1085-1140

Donaldson & Hornbeck (2016) “Railroads and American Economic Growth: A ‘market access’ approach,” *Quarterly Journal of Economics*.

Lorenzo Caliendo, Fernando Parro, Esteban Rossi-Hansberg, and Pierre-Daniel Sarte (2017) “The Impact of Regional and Sectoral Productivity Changes on the U.S. Economy” *Review of Economic Studies*

N. Baum-Snow. “Did Highways Cause Suburbanization?” *Quarterly Journal of Economics*, May 2007

N. Baum-Snow “Suburbanization and Transportation in the Monocentric Model” *Journal of Urban Economics*, 2007

These are the three classic works on land use theory

W. Alonso. “Location and Land Use”. Harvard University Press, Cambridge (1964).

E. S. Mills. An aggregative model of resource allocation in a metropolitan area. *The American Economic Review* 57(2), 197—210 (1967).

R. Muth. “Cities and Housing”. University of Chicago Press, Chicago (1968).

2. Housing Supply & Real Options

E.L. Glaeser and J. Gyourko, “Urban Decline and Durable Housing,” *Journal of Political Economy*, April 2005, pp. 345-376.

D. Epple, Holger Sieg, B. Gordon “A New Approach for Estimating the Housing Production Function” *American Economic Review* 100(3), 2010; 905-924.

Albouy, Ehrlich & Shin (2017) “Metropolitan Land Values” *Review of Economics and Statistics*, Forthcoming.

Capozza, Dennis R., and Robert W. Helsley, “The Stochastic City,” *Journal of Urban Economics* 28:2 (1990), 187–203.

Capozza, Dennis, and Yuming Li. "The Intensity and Timing of Investment: The Case of Land," *American Economic Review* 84:4 (1994), 889–904.

Cunningham, C., 2007. Growth controls, real options and land development. *Review of Economics and Statistics* 89, 343–358.

Bulan, Mayer & Somerville, 2009. Irreversible investment, real options, and competition: Evidence from real estate development, *Journal of Urban Economics* 65 237–251.

Cosman, Williams & Davidoff, 2017. Housing Appreciation and Supply in Monocentric Cities with Topography, manuscript

Davidoff, 2017. Supply Constraints are Not Valid Instrumental Variables for Home Prices Because They are Correlated with Many Demand Factors, *Critical Finance Review*

3. Tiebout Sorting, Local Public Finance Theory and Fiscal Federalism

R. Fernandez and R. Rogerson. Income distribution, communities, and the quality of public education. *Quarterly Journal of Economics* 111(1), 135—164 (1996).

Epple, Dennis and Glenn J. Platt, "Equilibrium and Local Redistribution in an Urban Economy when Households Differ by Preferences and Incomes," *Journal of Urban Economics*, 43, January (1998), 23-51.

D. Epple and H. Sieg. Estimating equilibrium models of local jurisdictions. *Journal of Political Economy* 107(4), 645—681 (1999).

H.S. Banzhaf & R. Walsh. 2008. "Do People Vote with Their Feet? An Empirical Test of Tiebout's Mechanism" *American Economic Review*

L. Boustan "Was Postwar Suburbanization White Flight? Evidence from the Black Migration" *Quarterly Journal of Economics* (2010)

Alesina, R. Baqir, and C. Hoxby. Political jurisdictions in heterogeneous communities. *Journal of Political Economy* 112(2), 348—396 (2004).

Bucovetsky "Optimal Jurisdictional Fragmentation and Mobility" *Journal of Public Economics* 16(2) 171-191 (1981).

P. Rhode & K. Strumpf "Assessing the Importance of Tiebout Sorting: Local Heterogeneity from 1850 to 1990" *American Economic Review* 93 (2003) 1648-77

N. Baum-Snow & Byron Lutz "School Desegregation, School Choice, and Changes in Residential Location Patterns by Race" *American Economic Review* (2011)

T. J. Nechyba. Local property and state income taxes: The role of interjurisdictional competition and collusion. *Journal of Political Economy* 105(2), 351—384 (1997).

Fujita Chapter 6

These are the classic works in this literature

OATES, W. E. (1972), *Fiscal Federalism* (New York: Harcourt Brace Jovanovich).

C. M. Tiebout. A pure theory of local expenditures. *Journal of Political Economy* 64(5), 416—424 (1956).

4. Hedonics and Location Choice

N. Kuminoff, V. Kerry Smith and Christopher Timmins. 2013. “The New Economics of Equilibrium Sorting and Policy Evaluation Using Housing Markets” *Journal of Economic Literature*

Bajari, Patrick, and Matthew E. Kahn. 2005. “Estimating Housing Demand with an Application to Explaining Racial Segregation in Cities.” *Journal of Business and Economic Statistics*, 23(1):20–33.

Caetano, Gregorio. 2008. “Neighborhood Sorting and the Valuation of Public School Quality” manuscript

Sandra Black, “Do Better Schools Matter? Parental Valuation of Elementary Education,” *Quarterly Journal of Economics*, 114(2), 1999: 577-599. (JMP)

Ekeland, I., J. Heckman and L. Nesheim, "Identification and Estimation of Hedonic Models," *Journal of Political Economy* 112(1-2) pp. S60-S109

Brown, J. and H. Rosen, "On the Estimation of Structural Hedonic Price Models," *Econometrica*, May 1982.

Ekeland, I., J. Heckman and L. Nesheim, "Identifying Hedonic Models," *American Economic Review*, May 2002.

Quigley, J., "Nonlinear Budget Constraints and Consumer Demand: An Application to Public Programs for Residential Housing," *Journal of Urban Economics*, September 1982.

David N. Figlio and Maurice E. Lucas, “What’s in a Grade? School Report Cards and the Housing Market,” *American Economic Review*, 94(3), 2004: 591-605.

This is the classic work in the hedonics literature

Rosen, Sherwin. "Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition." *Journal of Political Economy*, January-February 1974, 82(1) 34-55.

5. Urban Transportation and Mode Choice

Nick Tsivanidis (2017) "The Aggregate And Distributional Effects Of Urban Transit Infrastructure: Evidence From Bogotá's TransMilenio" manuscript.

Van Benthem, Arthur. "Do We Need Speed Limits on Freeways?" manuscript.

Ian Parry and K. Small. "Should Urban Transit Subsidies be Reduced?" *American Economic Review*.

Ian Parry and K. Small. "Does Britain or The United States Have the Right Gasoline Tax?" *American Economic Review*.

Bento, Goulder, Henry, Jacobson, von Haefen. 2009. "Distributional and Efficiency Impacts of Gasoline Taxes: An Econometrically-Based Multi-Market Study" *American Economic Review*.

N. Baum-Snow & M. Kahn. "The Effects of Urban Rail Transit Expansions: Evidence from Sixteen Cities." Brookings-Wharton Papers on Urban Affairs (2005)

Duranton & Turner. 2011. "The Fundamental Law of Road Congestion: Evidence from U.S. Cities" *American Economic Review*.

Duranton & Turner. 2012. "Urban Growth and Transportation" *Review of Economic Studies*.

Leroy & Sonstelie. "Paradise Lost and Regained: Transportation Innovation, Income and Residential Location." *Journal of Urban Economics*, 13:1 67-89

Jan Brueckner "The Political Economy of Urban Transport-System Choice" (with Harris Selod), *Journal of Public Economics*, forthcoming (2005).

Fujita Chapter 7

W. S. Vickrey. Congestion theory and transport investment. *American Economic Review* 59(2), 251—260 (1969).

K. Small. Urban Transportation Economics, Harwood Fundamentals of Pure and Applied Economics series, 1992.

This is the classic paper that is the basis for much of modern structural IO demand estimation

D. McFadden. "The Measurement of Urban Travel Demand," *Journal of Public Economics*, Vol. 3, No. 4, 303-328, 1974.

6. Applied Spatial Econometrics

H. Kelejian and I.R. Prucha (2010) "Specification and Estimation of Spatial Autoregressive Models with Autoregressive and Heteroskedastic Disturbances," *Journal of Econometrics* 157:1.

H. Kelejian and I.R. Prucha, "HAC Estimation in a Spatial Framework," *Journal of Econometrics* 140, 2007, 131-154.

T.G. Conley. "Spatial Econometrics," New Palgrave Dictionary of Economics 2009

Calvó-Armengol, A., Patacchini, E. and Y. Zenou (2009), "Peer effects and social networks in education", *Review of Economic Studies*, 76, 1239-1267.

K. Baicker. "The Spillover Effects of State Spending," *Journal of Public Economics*, Vol. 89, no. 2-3, pp 529-544, February 2005

A. Case & H. Rosen. "Budget Spillovers and Fiscal Policy Interdependence: Evidence from the States," *Journal of Public Economics* (1993) 52 285-307.

T.G. Conley. "GMM Estimation With Cross-Sectional Dependence," *Journal of Econometrics* (1999) 92 1-45

X. Chen & T. Conley. "A New Semiparametric Spatial Model for Panel Time Series," *Journal of Econometrics* (2001) 105 59-83

Giuliano & Small. "Subcenters in the Los Angeles Region." *Regional Science and Urban Economics* (1992) 21:2 163-182

D. McMillen. "Nonparametric Employment Subcenter Identification," *Journal of Urban Economics* 50 (Nov. 2001), 448-473.

D. McMillen. "The Number of Subcenters in Large Urban Areas," *Journal of Urban Economics* 53 (May 2003), 321-338, with Stefani C. Smith.

7. Local Labor Markets and Inequality

Ferdinando Monte, Stephen Redding, and Esteban Rossi-Hansberg (2017) "Commuting, Migration and Local Employment Elasticities," *American Economic Review*.

Notowidigdo. 2013. "The Incidence of Local Labor Demand Shocks," manuscript.

Baum-Snow & Pavan (2013) "Inequality and City Size" *Review of Economics and Statistics*, 2013, 95(5): 1535-1548.

N. Baum-Snow, Ronni Pavan and Matthew Freedman (2017) "Why Has Urban Inequality Increased?" *American Economic Journal: Applied Economics*

Suarez Serrato, Juan Carlos and Philippe Wingender. 2016. "Estimating Local Fiscal Multipliers," manuscript.

Wang, Zhi. 2014. "Location Choice at Labor Force Entry and New Estimates of Selection, Growth, and Level Effects from U.S. Census Data" manuscript.

Lee, Sanghoon. 2010. "Ability Sorting and Consumer City" *Journal of Urban Economics*, vol. 68(1), pages 20-33.

Dahl, Gordon "Mobility and the Return to Education: Testing a Roy Model with Multiple Markets" *Econometrica*, 2002, Vol. 70, No. 6, pp. 2367-2420.

J. Kennan & JR Walker. 2011. "The effect of expected income on individual migration decisions" *Econometrica*

This is the classic spatial equilibrium paper

Roback, Jennifer "Wages, Rents and the Quality of Life" *Journal of Political Economy* 90 1257-1278 (Dec. 1982)

8. Housing Demand and Housing Policy

Mian & A. Sufi "The Consequences of Mortgage Credit Expansion: Evidence from the U.S. Mortgage Default Crisis" *Quarterly Journal of Economics* Nov. 2009 124(4)

Autor, Palmer, Pathak, Housing Mkt Spillovers, End of Rent Control in Camb, MA, JPE 2014

Turner, Matthew A., Andrew Haughwout and Wilbert van der Klaauw. 2014. "Land Use Regulation and Welfare," *Econometrica*, forthcoming.

Esteban Rossi-Hansberg, Pierre-Daniel Sarte and Raymond Owens III. "Housing Externalities." *Journal of Political Economy*, 118:3, 409-432.

Christopher Palmer "Why Did So Many Subprime Borrowers Default During the Crisis: Loose Credit or Plummeting Prices?" manuscript

M. Davis & F. Ortalo-Magné. "Household Expenditures, Wages, Rents" *Review of Economic Dynamics*, 2011, vol. 14 (2), p. 248-261

Keys, Mukherjee, Seru "Did Securitization Lead to Lax Screening? Evidence from Subprime Loans" *Quarterly Journal of Economics*, forthcoming

Rosenthal, Stuart. "Are Private Markets and Filtering a Viable Source of Low-Income Housing? Estimates from a "Repeat Income" Model" *American Economic Review*

Baum-Snow, Nathaniel and Justin Marion. 2009. "The Effects of Low Income Housing Tax Credit Developments on Neighborhoods", *Journal of Public Economics*

Arnott, Davidson, Pines. "Housing Quality, Maintenance and Rehabilitation," *Review of Economic Studies* 1983 50 467-494

Sieg, Holger "Interjurisdictional Housing Prices in Locational Equilibrium ." *Journal of Urban Economics*, 2002, 52, 131-153. (with V. K. Smith, S. Banzhaf and R. Walsh).

Daniel McMillen & John McDonald. "Land Values in a Newly Zoned City," *Review of Economics and Statistics* 84 (Feb. 2002), 62-72

E. Rossi-Hansberg. Optimal urban land use and zoning. *Review of Economic Dynamics* 7(1), 69—106 (2004).

Rosenthal, Stuart. "Residential Buildings and the Cost of Construction: New Evidence on the Efficiency of the Housing Market," *Review of Economics and Statistics*, 81(2): 288-302 (1999).

J. Gyourko and A. Saiz, "Reinvestment in the Housing Stock: The Role of Construction and Supply Side Costs," *JUE*, March 2004, pp. 238-256.

Bui, Linda and Christopher Mayer. 2003. "Regulation and Capitalization of Environmental Amenities: Evidence From the Toxic Release Inventory in Massachusetts." *Review of Economics and Statistics*, 85(3), pp. 693-708.

Sinai & Waldfoegel. "Do Low Income Housing Subsidies Increase the Occupied Housing Stock?" *Journal of Public Economics*, 89(11-12) 2137-2164 (Dec. 2005)

Gyourko, J. and Linneman, P., "Rent Controls and Rental Housing Quality: A Note on the Effect of New York City's Old Controls," *Journal of Urban Economics*, May 1990.

Glaeser & Luttmer "The Misallocation of Housing Under Rent Control" *American Economic Review*, 2003, 93(4), 1027-1046.

John M. Quigley, Steven Raphael, and Eugene Smolensky, "Homeless in California, Homeless in America," *Review of Economics and Statistics*, 83(1), 2001: 37-51.

9. Ghettos, Crime and Evaluation of Policy Responses

Chetty et al, Where is the Land of Opportunity? The Geography of Intergenerational Mobility in the United States, QJE 2014

Chetty & Hendren "The Effects of Neighborhoods on Intergenerational Mobility I: Childhood Exposure Effects" *Quarterly Journal of Economics*, forthcoming

Kling, J, J. Liebman and L. Katz. "Experimental Analysis of Neighborhood Effects" *Econometrica* 75 (Jan. 2007) 83-119

Galiani, S., A. Murphy and J. Pantano. "Estimating Neighborhood Choice Models: Lessons from a Housing Assistance Experiment." *American Economic Review*

Boustan, Was Postwar Suburbanization "White Flight" -- Evidence from the Black Migration, QJE 2010

Cutler, Glaeser & Vigdor "The Rise and Decline of the American Ghetto." *Journal of Political Economy* 107 (1999) S225-S258

Kling, J, J. Ludwig & L. Katz. "Neighborhood Effects on Crime for Female and Male Youth: Evidence from a Randomized Housing Mobility Experiment," *Quarterly Journal of Economics* (2005) 120 87-130

Card, Mas, Rothstein. "Tipping and the Dynamics of Segregation," *Quarterly Journal of Economics*

J. Ham, C. Swenson, A. Imrohorglu, H Song. "Government Programs Can Improve Local Labor Markets: Evidence from State Enterprise Zones, Federal Empowerment Zones and Federal Enterprise Communities", *Journal of Public Economics*, August, 2011

Gobillon L., Magnac T. and H. Selod (2012), "Do Unemployed Workers Benefit from Enterprise Zones: the French experience", *Journal of Public Economics*, forthcoming

M. Freedman. "Teaching New Markets Old Tricks: The Effects of Subsidized Investment on Low-Income Neighborhoods", *Journal of Public Economics* (2012)

A. Hanson. "Local Employment, Poverty, and Property Value Effects of Geographically-Targeted Tax Incentives: An Instrumental Variables Approach" *Regional Science and Urban Economics*, Vol. 39, No. 6 November 2009: 721-731

Cullen & Levitt. "Crime, Urban Flight and the Consequences for Cities." *Review of Economics and Statistics* (1999) 81:2 159-169

Kain, John, "Housing Segregation, Negro Employment, and Metropolitan Decentralization", *Quarterly Journal of Economics*, 1968. Vol 82 No 2. pp. 175-197.

E. Glaeser & B. Sacerdote. "Why is there more crime in cities?" *Journal of Political Economy* (Dec. 1999) 107:6 S225-S258

D. Cutler & E. Glaeser "Are Ghettos Good or Bad?" (1997) *Quarterly Journal of Economics* 112:3 827-872

Brueckner & Zenou. "Space and Unemployment: The Labor-Market Effects of Spatial Mismatch", *Journal of Labor Economics* 21, 242-266 (January 2003).