



Land Use Research: Scientific Publications from 1986 to the Present

by Anil Rupasingha and Stephan J. Goetz
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“Contributing to the well-being of small towns and rural communities.”

Land Use Research: Scientific Publications from 1986 to the Present



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ABSTRACT. We present a collection of over 300 studies on the subject of land use completed since 1986. Most of these studies appear in peer-reviewed journals. The studies are primarily drawn from economics, agricultural economics, and regional science with a smaller number selected from other social sciences. The studies were grouped into 13 areas. A short overview introduces the reader to the primary questions and issues addressed in these studies.

INTRODUCTION

Growing problems attributed to housing sprawl, including traffic congestion, pollution and related issues have heightened policy makers' concern over land use patterns, land values and land use planning. The concern stems from the belief that uncoordinated development, in the form of sprawl, is no longer in the long-term interest of local communities and their environments. There is also a growing sense of urgency because of the realization that these new uses of land are largely irreversible. Although growth in the stock of housing is necessary to accommodate increasing population numbers and technological change, communities are questioning the economic and social costs of unchecked expansion of suburbs, abandonment of efforts to improve central cities, use of open space and prime agricultural lands at the edge of suburbs, destruction of local amenities and habitats, and pollution of air and water resources.

Economists traditionally consider land to be a factor of production, along with capital and labor. Even though land has been considered in this manner, mainstream economics has in recent years for the most part ignored the contribution of land to economic growth. One reason for this is that economies have become increasingly dependent on services over time. Interest in this topic has now reemerged, and we treat the role of land in economic growth in a separate section in the literature synopsis below. Lately, economists have also started to collaborate with other disciplines in studying land use patterns, and increasingly also view land as a consumption good with an amenity value.

Land use patterns in the United States are the result of sustained economic growth coupled with improvements in transportation infrastructure, advances in the automobile industry and other types of technological change. Expanded road networks and affordable automobiles complemented with supportive policies (incentives) have encouraged suburban expansion. Today, many Americans live and work in the suburbs. Suburban areas provide more space, bigger and better housing, good schools, better recreational opportunities and amenities, and more convenient shopping. As a result, central city centers have become less attractive for businesses and residents. Residents who still hold jobs in central cities also choose to live in the suburbs and commute daily, benefiting from improved transportation networks and affordable automobiles.

However, uncontrolled land use in the suburbs is facing growing opposition because of the associated problems. Increasing traffic congestion is directly connected with sprawl, raising pressure on transportation needs and infrastructure development. Researchers are only beginning to understand potential effects on human health of the resulting air pollution. The decline and degradation of city centers is a direct result of residents' and businesses' preference for locating in the suburbs. A related phenomenon is the spatial mismatch problem, whereby sub-urbanization of low-skill jobs and housing market discrimination are primarily responsible for growing employment problems in the inner cities where most minorities live. Opponents of sprawl also claim that unchecked development has significant adverse effects on environmental quality, including habitat and biodiversity. Another argument is that the supply of farmland is declining due to sprawl, and farmland preservation programs have been implemented to protect farmland from being converted to non-agricultural uses.

Rules and regulations in the form of housing caps, zoning restrictions, limitations on the amount of developable land, and other forms of growth controls have been introduced to contain some of these problems. These growth controls may reduce adverse externalities associated with growth. On the other hand, restrictions on the development of land, along with improved environmental conditions and limited supplies drive up land prices and housing costs, putting the "American Dream" out of reach of lower-income families. The catchword of "smart growth" has come to the fore as a solution to the problems arising from urban sprawl. However, this concept has also been referred to as "unconstitutional and un-American".¹ The objective of smart growth is to minimize the adverse effects of population flight on older downtowns and neighborhoods, preserve the community character and the countryside, and mitigate the high concentration of poverty and social problems in inner cities.

In summary, current land use issues involve consumers' trade-off between the benefits of living in low-density housing developments and the costs associated with sprawl such as increasing traffic congestion (Goetz 2001).² Often, the decision that is rational for individuals has consequences in the aggregate that are undesirable to society. The problems associated with housing sprawl are not new (for a historical perspective, see Rome 2001).³

This preamble only scratches the surface of how land use affects and is affected by various aspects of human activity and environment. Yet, comprehensive compilations of literature related to this important subject are relatively rare, perhaps because the subject is vast and multi-dimensional. This evolving bibliography is one step towards rectifying this situation.

¹ Mary Meehan, *Lexington Herald Leader*, August 13, 2001.

² Goetz, Stephan J. "Land Use Issues and Research Opportunities in the US." Paper presented at the second annual conference on European and U.S. Partnerships in Food and Agriculture Education and Research, April 4 and 5, 2001, Freising-Weihenstephan, Technical University of Munich, Germany.

³ Rome, Adam. *The Bulldozer in the Countryside: Suburban Sprawl and the Rise of American Environmentalism*. Cambridge, UK; Cambridge University Press, 2001.

ORGANIZATION OF THE BIBLIOGRAPHY

We have selected the following categories to group the various studies in this report:

1. Sprawl
2. Smart Growth
3. Transportation and Congestion
4. Regulation and Zoning
5. Transferable Development Rights
6. Agricultural Land Use and Farmland Preservation
7. Conservation Reserve Program (CRP)
8. Environment and Sustainability
9. Biodiversity
10. Housing
11. Recreation
12. Economic Growth
13. General (not elsewhere classified) and Methodology

These categories are not necessarily mutually exclusive. Studies that clearly do not fall into any of these categories have been grouped into the last section as *General*. Readers who are looking for a particular author may use the list of references at the end of the report. A brief summary of the various sections is presented below.

1. Sprawl

Sprawl causes or contributes to traffic congestion, air pollution, large-scale absorption of open space, infrastructure and facility problems, shortages of affordable housing near where new jobs are being created, and suburban labor shortages. Urban sprawl has been encouraged by subsidized development of the highway transportation system as well as other types of technological change. Policies such as mortgage interest rate deductions are also argued to contribute to sprawl. Migration of shopping complexes, jobs and industries, and entertainment industry from the central cities to suburbia is a major force creating this land use pattern. Residential patterns have also been transformed with this land use pattern. Residents' preference for single-family detached housing and their desire to live closer to shopping complexes, jobs, and schools define the other aspects of sprawl. As this transformation continues, conditions in city centers deteriorate further.

Sprawl also has many benefits, which include low-density residential lifestyles, easy access to open space at home and in the country, relatively short commuting times for those who both live and work in the suburbs, ease of movement, and the ability to separate oneself spatially from problems associated with poverty and the inner city. Newer homes also require less maintenance, at least initially; as the opportunity cost of time increases, this may be an increasingly important consideration. A recently released study points out

that the homes built in the first wave of suburbanization are starting to deteriorate and become less desirable (Lucy and Phillips 2001).⁴

On the other hand, some argue that the benefits of sprawl to society outweigh the costs. Sprawl at the fringe of urban centers has become a major cause of environmental pollution, and sprawl reduces quality of life by contributing to congestion and raising pollution levels. The result of this may be that residents move out and fewer new residents move in. Other disadvantages include traffic congestion, loss of open space and agricultural land, deterioration of urban centers, and social impacts such as spatial mismatch of workers and jobs.



Most of the studies conducted over the last fifteen years focus on causes or determinants of sprawl, measurement and modeling of environmental impacts of sprawl, managing of urban growth and curbing sprawl, effects of sprawl on social and civic ties, impacts of sprawl on housing prices and affordability, sprawl and traffic congestion, federal role in sprawl, and impacts of sprawl on human geography. Studies

that focus on the consequences of sprawl find that sprawl leads to higher monetary, social, and environmental costs. For a comprehensive recent review, see Heimlich and Anderson (2001).⁵

One issue that has been discussed at length is that sprawl generates poverty in inner cities and concentrates the poor or poor minorities in city centers. Sprawl is also criticized as weakening neighborhood social bonds and the literature points to the heavy dependence on automobiles resulting from sprawl as a major cause of this deterioration, because it reduces contact with neighbors. The policy prescriptions that have been proposed to deal with problems related to sprawl are to shift more resources, including investment, toward solving poverty and housing problem in central cities, and creation of more opportunities and affordable housing in the suburbs for low income minorities. A few studies point to the positive aspects of sprawl. One reports that sprawl has increased the affordability of housing and narrowed the homeownership gap between Blacks and Whites.

Maps showing rates of land conversion over various time periods are available at:

⁴ Lucy, W.H. and D.L. Phillips, "Suburban Decline: The Next Urban Crisis." <http://bob.nap.edu/issues/17.1/lucy.htm>

⁵ Heimlich, Ralph E. and William D. Anderson, *Development at the Urban Fringe and Beyond*. USDA, ERS Agricultural Economic Report No. 803, June 2001.

<http://www.nhq.nrcs.usda.gov/land/index/nri97maps.html> (from the 1997 National Resource Inventory).

2. Smart Growth

Smart growth has come to the fore as a solution to the problems arising from sprawl. Smart growth seeks to create vibrant, sustainable and livable communities through intelligent planning and effective use of resources. The objectives of smart growth are to minimize the adverse effects of sprawl on older downtowns and neighborhoods, preserve community character and the countryside, and reduce the high concentration of poverty and social problems in inner cities. The literature on smart growth explains what smart growth is, its effect on housing and property prices, and how it relates to federal and local government policy on smart growth.

The literature also focuses on ways in which housing development can be used to implement better smart growth policies. The most widely discussed smart growth issues, especially in the popular press, include market issues such as financial barriers, government subsidies, and consumer preferences for low-density housing. Some studies solely focus on the benefits of smart growth while others focus on barriers to smart growth including commitment from policy makers. Studies also propose strategies for smart growth based on “planning for sustainability.” As suggested in the introduction, opponents of smart growth are as vociferous as the proponents, and a considerable need exists for precise definitions, measurement and information in this area.

3. Transportation and Congestion

Transportation planning and growth management have become priorities for many state and local officials. It has been argued that sprawl is an unwanted byproduct of the Interstate Highway System. There is growing recognition that land use and transportation planning policies must be closely coordinated in order to adapt transportation networks to changing patterns of development in a region. Most studies in this area develop models of land use and transport interaction. Other studies consider alternative transport systems to overcome land use problems, transportation as a constraint to land development, relationship between land use and non-work related travel, impact of rail-transit on land market, and transit-focused land development. However, researchers point out that the political will is rarely strong enough to implement such policies.

A topic related to transportation is that of congestion. Increasing traffic congestion is also directly connected with sprawl. The literature includes models that deal with congestion and land use planning, issues related to congestion, employment and land use, policy analyses, congestion in suburbs, and effects of congestion tolls. Some studies focus on modeling ways to reduce traffic congestion in urban areas.

Related websites, data sets and studies are available from the Texas Transportation Institute (2001 Urban Mobility Study: <http://mobility.tamu.edu/>) and the Federal Highway Administration. Office of Highway Policy Information: <http://www.fhwa.dot.gov/ohim/>

4. Regulation and Zoning

Land use regulation and zoning are among the most acrimonious and contentious areas of local government policy. On the one hand, housing caps, zoning restrictions, limitations on the amount of developable land, and other forms of growth controls restrict the supply of housing and land over time and cause shifts in the housing and land supply curves, and housing cost increases. At the same time, growth controls reduce negative externalities associated with growth, and shift the demand curve outward, also driving up prices. Economic theory therefore predicts that regulations affect housing market outcomes both by constraining supply and increasing demand.



There is a considerable body of research on the theoretical and empirical effects of land use regulations on urban form, development patterns and the price of housing. Most of the existing empirical studies have investigated the impact of regulation on house prices, with the majority finding that regulation leads to higher house prices.

Zoning has been credited as being an effective way of overcoming some of the negative externalities associated with having commercial and manufacturing establishments in residential areas. Most of the studies investigate the effect of suburban zoning on land and housing prices and find that zoning restrictions significantly increase the value of existing homes. A few studies find that restrictive agricultural zoning increases the value of agricultural land. Others find that the value of undeveloped land falls when stricter zoning ordinances are implemented.

5. Transferable Development Rights

Transferable Development Rights (TDRs) allow land planners to overcome many of the shortcomings associated with traditional zoning practices. These rights work by designating a *sending* zone in which development is restricted, and the development right is “transferred” to a *receiving* zone. Receiving zones are areas in which development is permitted with the purchase of development rights (TDRs) from a sending zone.

The value of TDRs is market-determined. TDRs can have many positive land management impacts, but must be developed within the constitutional constraints of the Fifth Amendment's takings clause. Issues examined in the literature include TDRs' effectiveness in preserving agricultural land, importance of municipal monopoly power on deci-

sions about TDRs, public support for TDRs, and effectiveness of the TDR program in comparison to zoning and other regulations.

6. Agricultural Land Use and Farmland Preservation

The literature on agricultural land use is multifaceted. In earlier studies (late 1980s), conversion of land for crop production in the presence of crop surpluses was of particular interest. Sections of the literature in this area discuss impacts of agricultural price supports and other production control programs on agricultural land values and prices. The literature also focuses on conservation and land prices, effects of urbanization on agricultural land, diversification of agricultural land use, determinants of agricultural land use, conversion of farmland to rural residences, determinants of conversion of crop production to pasture, and the influence of future land development on current agricultural land values.

Farmland preservation is aimed at protecting farmland from conversion to nonagricultural uses. Most of the literature in the area of farmland preservation is based on adverse effects that a declining

amount of farmland may have on the nation's capacity to produce food and fiber. The underlying theme is that the supply of farmland is declining at the same time that the demand for agricultural products is increasing. However, studies generally conclude that the nation's food supply is not at risk from

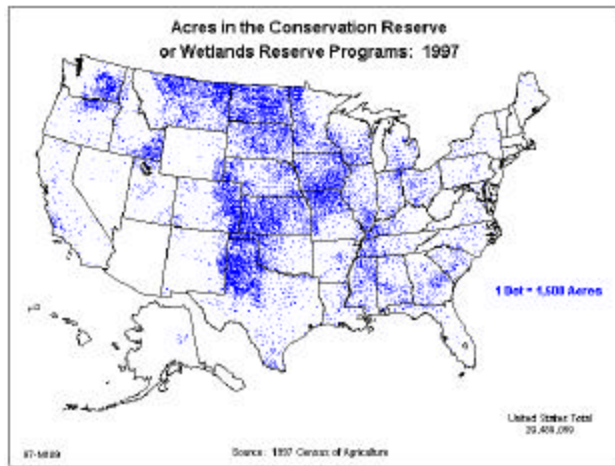


land conversion, although the production of some crops may be affected. Another argument is that conversion threatens the rural way of life, open space, and environmental quality. Other reasons for farmland preservation, especially at the urban fringe, include protecting land for specialty crops and providing certain public goods, such as flood absorption, air cleansing and water filtration. Scholars have also developed tools to forecast conversion rates and amounts of farmlands subject to the influences of sprawl.

7. The Conservation Reserve Program (CRP)

The CRP is a federal program that was designed to control the supply of agricultural production, conserve land and boost commodity prices by limiting the supply of land available for production. The CRP gives farmers who agree to retire their highly erodible land for 10 years an annual rental payment and half the cost of establishing a permanent cover. It is also considered to be one of the largest environmental improvement programs by the

federal government because it helps prevent soil erosion, increases wildlife habitat, and protects ground and surface water.



Agricultural economists and environmental economists have conducted various studies of the CRP. Researchers have argued that the value of enrolled land would increase because farmers would receive a CRP rent that is considerably higher than could otherwise be earned. The value of the non-enrolled land may also go up due to improvements in water quality associated with the CRP. Another area of research is the economic impact of the program on rural agricultural

communities. Studies have found that some agriculturally-dependent communities have been adversely affected. Among other studies, the impact of CRP on non-point source pollution, its impact on the structure of farming, and factors affecting landowners' post-contract use of CRP lands are important.

URL for map: <http://www.nass.usda.gov/census/census97/atlas97/map109.htm>

8. Environment and Sustainability; Valuation of Land

Land use planning and decisions have enormous impacts on the environment. At the same time, the quality of the environment has a substantial impact on the (amenity) value of land. Issues addressed in the literature are diverse in this area. Among them are: the effects of integrating federal environmental programs with local land use planning entities to improve environmental decision making, effects of water quality on residential land prices, attitudinal studies of land use and environmental quality, development, and environmental issues in communities, valuing wetlands, land use planning and ground and surface water quality, land use planning and waste management, impacts of land use regulatory policy on environmental quality, impacts of agricultural pollution on land values, superfund sites and land values, effects of environmental regulation on land prices, and use of improved production practices to improve the quality of land and environment. [Discussion in WTO]

9. Biodiversity

Land use decisions have become controversial mainly because their prospective impact on biodiversity. Sustainable development and smart growth call for greater respect for natural systems. Although it is an important aspect in land use planning, the relationship between land use planning and biodiversity has not received much attention in the litera-

ture. We were able to locate only a handful of studies from the major databases. Most of these studies focus on modeling ecosystem and landscape structures. One study model the regenerative capacity of forests as a function of the own forest stock, deforestation for agricultural purposes, and habitat size and develop a biodiversity sustainability index. Other literature focus on biodiversity as a primary land use pattern and its economic benefits, wetlands and land use, and practices of biodiversity management among various social groups.

10. Housing

Rapid growth patterns over the years have had enormous impacts on affordable housing in inner cities and suburbs for low-income families. Home ownership is still a dream for many low-to-middle-income families and minorities, however. The relationship between housing and land use is a relatively under-researched area. Most of the papers that deal with housing and land use examine the effect of land use regulations and restrictions on housing prices, and these papers are listed in the section on regulations and zoning.

Several papers discuss the relationship between land-use planning and the supply and price of housing. Among the other issues that have received attention in this area are: demographic and socio-economic impact of free-standing new settlements; physical decay of housing stocks in urban areas and their impact on housing markets; changing land and housing market in East European countries; controlling land prices and housing market in the United Kingdom; new communities and land usage in Florida; and suburban clusters and medium-density residential development.

11. Recreation

Recreation-oriented tourism is viewed in many nations as an environmentally friendly way to revitalize distressed rural economies and communities. Nature-based tourism has been considered as a sustainable rural development strategy in regions where most land is held privately. Efforts have been made to increase the quantity and quality of wildlife habitat associated with U.S. agricultural lands implying that society would benefit if farmers and ranchers allocated more land and water resources to wild species.

Existing papers on this subject discuss various issues including recreational hunting leases to agricultural land investors, comparisons of various user groups about recreational rates and future land use preferences for a particular site, policy considerations for increasing compatibilities between agricultural land use and wildlife, and potentials and pitfalls of nature tourism.

12. Economic Growth

As indicated earlier, the relationship between land as a factor of production and its relationship to economic growth has not received much attention in the economic growth literature until very recently. Instead, the mainstream economic growth literature focuses mainly on physical (man-made) capital, human capital and their relationship to economic growth. This is changing as scholars increasingly concentrate on the effect of *natural capital* on economic growth.

13. General and Methodology

Studies that deal with developing various research tools and models to study and evaluate land use issues are included in this category. These studies include: the use of GIS to model land use allocation and spatial forecasts for various types of land use; econometric models to study the impact of land use changes on environment, use of satellite images in econometric analysis of land use, spatial interaction land-use modeling, and other econometric issues in land use models; use of referendum methods to decide best land use patterns; and development of planning models to help planners, policy makers, and citizen groups compare alternative land-use policies.

1. SPRAWL

Johnson, M.P. "Environmental Impacts of Urban Sprawl: A Survey of the Literature and Proposed Research Agenda." *Environment and Planning A* 33(2001):717-35.

AB. 'Urban sprawl' has recently become a subject of popular debate and policy initiatives from governmental bodies and nonprofit organizations. However, there is little agreement on many aspects of this phenomenon: its definition, its impacts-both nonmonetary acid monetary-economic and policy models that predict the presence of sprawl, and decision-support models that could assist policymakers in evaluating alternative development schemes that may have characteristics of sprawl. In particular, there is relatively little research on urban sprawl that focuses specifically on measurement and modeling of environmental impacts. The purpose of this paper is twofold: to survey the literature on urban sprawl, with a focus on environmental aspects and to identify a research agenda that might result in a greater number of analytical tools for academics and practitioners to characterize, monetize, model, and make planning decisions about sprawl.

Kahn, M.E. "City Quality-of Life Dynamics: Measuring the Costs of Growth." *Journal of Real Estate Finance and Economics* 22(2001):339-52.

AB. Two continuing California trends are population growth and improving air quality. Sprawl at the fringe of metropolitan areas may lower quality of life by contributing to congestion, reducing open space and raising pollution levels. This article studies this claim by estimating hedonic wage and rental regressions using California 1980 and 1990 micro census data. Real rents have fallen in faster-growing areas, suggesting that the "growth causes degradation" hypothesis has some merit. Sprawl's damage to local quality of life would be higher if fringe growth degrades air quality and households greatly value avoiding polluted areas. The relative importance of air quality as an urban amenity is tested using data from Los Angeles county, an area where dramatic improvements in smog have taken place. While high-ozone areas feature lower rents, the ozone's capitalization suggests that it is not a key urban disamenity.

Kahn, M.E. "Does Sprawl Reduce the Black/White. Housing Consumption Gap?" *Housing Policy Debate* 12(2001):77-86.

AB. Because unplanned suburban growth imposes social costs such as congestion, pollution, and reduction of open space, antisprawl policies are being adopted in fast-growing metropolitan areas. This article explores one potential benefit of sprawl: It increases housing affordability, which may contribute to reducing the black/white housing consumption gap. The article uses 1997 American Housing Survey data to measure housing consumption for blacks and whites in metropolitan areas characterized by more and less sprawl. In sprawled areas, black households consume larger units and are more likely to own their homes than black households living in less sprawled areas.

Daniels, T.L. "Coordinating Opposite Approaches to Managing Urban Growth and Curbing Sprawl: A Synthesis." *American Journal of Economics and Sociology* 60(2001):229-43.

AB. The purchase of development rights to farmland and open space has recently gained in popularity as a growth management tool. A purchase of development rights program pays the landowner for the unearned increment in exchange for strong deed restrictions. limiting the use of the property. On the other hand, land value taxation, a modification of Henry George's Single Tax, would tax land more heavily than improvements, thus encouraging the development of land. While land value taxation and the purchase of development rights appear to be opposing fiscal policies, they could be employed together as part of a regional planning strategy to encourage in-fill development within and near cities and to curb sprawl by retaining farm, forest, and ranch lands

Heim, C.E. "Leapfrogging, Urban Sprawl, and Growth Management - Phoenix, 1950-2000." *American Journal of Economics and Sociology* 60(2001):245-83.

AB. Through a case study of Phoenix, Arizona, this paper examines how urban sprawl is linked to opportunities for capital gains. It focuses on "leapfrogging," in which developers skip over properties to obtain land at a lower price further out despite the existence of utilities and other infrastructure that could serve the bypassed parcels. The paper examines patterns of growth since 1950 and planners' efforts to structure that growth. It discusses two programs that addressed consequences of leapfrogging: development impact fees to help pay for infrastructure costs of new development and an Infill Housing Program to encourage residential development on vacant land. It concludes with a brief discussion of the future of growth management in Phoenix.

Filion, P. "Suburban Mixed-Use Centres and Urban Dispersion: What Difference Do They Make?" *Environment and Planning A* 33(2001):141-60.

AB. In a context of growing car dependency and suburban sprawl, planners search for ways of intensifying urban development and reducing reliance on the automobile. The creation of planned mixed-use centres intended to become hubs of transit and pedestrian movement within the dispersed suburban environment represents one such intensification strategy. I investigate three suburban mixed-use centres in the Greater Toronto Area, selected for their advanced level of development, and identify the planning rationales and objectives that have led to their creation. To verify the extent to which they meet their intensification goal, I monitor the three selected centres' level of development, modal split, land-use pattern, inner synergy, and inner movements. Findings are mixed. If the suburban centres have been successful in attracting development and attaining levels of transit use, pedestrian movement and inner synergy exceeding those of the typical suburban area, they are not as distinct from the remainder of the suburb as intended and thus fall short from their planning objectives. I conclude that a strategy combining the creation of nodes (such as suburban mixed-use centres) with high-density, transit-oriented corridors within the suburban environment would be more effective in bringing intensification to this portion of the metropolitan region.

Freeman, L. "The Effects of Sprawl on Neighborhood Social Ties - An Explanatory Analysis." *Journal of the American Planning Association* 67(2001):69-77.

AB. The notion that sprawl, in the form of low-density, auto-dependent neighborhoods, is inimical to neighborhood social bonds is a recurrent theme in the planning literature. Although this seems like common sense, relatively little empirical evidence exists to support this notion. This article tests this thesis using data from a cross-sectional survey of adults in Atlanta, Boston, and Los Angeles and from the 1990 decennial census. Although residential density was found to be unrelated to the formation of neighborhood social ties, it was significantly and substantially related to the degree to which residents of a neighborhood relied on their automobiles.

Daniels, T., and M.B. Lapping. "When City and Country Collide: Managing Growth in the Metropolitan Fringe." *Journal of Rural Studies* 16(July 2000):397-8.

Newman, K. "When City and Country Collide: Managing Growth in the Metropolitan Fringe." *Professional Geographer* 52(2000):569-70.

Phillips, J., and E. Goodstein. "Growth Management and Housing Prices: The Case of Portland, Oregon." *Contemporary Economic Policy* 18(2000):334-44.

AB. Portland, Oregon, is well known for its relatively unique urban growth boundary (UGB), a very tight form of zoning designed to control sprawl. The UGB has recently been criticized for raising housing prices. From a theoretical perspective, the UGB will put upward pressure on land and thus housing prices, but the magnitude of this effect is uncertain. Increasing density should substitute for higher land prices, partially offsetting any reduction in the supply of housing. In addition, at any given moment, speculative factors influence housing price levels in bull markets such as the one Portland has been experiencing. This article presents an econometric analysis assessing these conflicting effects. We find the UGB has created upward pressure on housing prices, but the effect is relatively small in magnitude.

Katz, B. "The Federal Role in Curbing Sprawl." *Annals of the American Academy of Political and Social-Science* 572(November 2000):66-77.

Abstract: This article contends that the federal government has a significant role to play in curbing metropolitan sprawl and promoting reinvestment in cities and older suburbs. It outlines the dominant growth trends under way in U.S. metropolitan areas (that is, the rapid decentralization of employment centers and residential areas) and discusses the implications of these trends for the economy, the environment, social welfare, and general quality of life. It also shows how a new metropolitan agenda is emerging in the states to address such issues as metropolitan governance, land use, infrastructure spending, and job access. Finally, the article calls on the presidential candidates to discuss ways in which federal action can help metropolitan areas grow differently -by providing directives and incentives for metropolitan governance, enacting policies that facilitate **smart growth**, and helping regions understand their challenges.

Sherman, L.W. "The Hole in the Doughnut: Center Cities and Sprawl." *Annals of the American Academy of Political and Social Science* 572(November 2000):50-2.

Brueckner, J.K. "Urban Sprawl: Diagnosis and Remedies." *International Regional Science Review* 23(April 2000):160-71.

AB: This article argues that spatial expansion results mainly from three powerful forces: a growing population, rising incomes, and falling commuting costs. Urban growth occurring purely in response to these fundamental forces cannot be faulted as socially undesirable, but three market failures may distort their operation, upsetting the allocation of land between agricultural and urban uses and justifying criticism of urban sprawl. These are the failure to account for the benefits of open space, excessive commuting because of a failure to account for the social costs of congestion, and failure to make new development pay for the infrastructure costs it generates. Precise remedies for these market failures are two types of development taxes and congestion tolls levied on commuters. Each of these remedies leads to a reduction in the spatial size of the city.

Adrangi, B., and N. Higgins. "Effects of Urban Growth Boundaries on Regional Housing Prices." *Real Estate Review* 29(Summer 1999):80-6.

Abstract: Urban growth boundaries have been implemented to control urban sprawl and protect quality of life in some US metropolitan areas. An important rationale for preserving undeveloped lands and interfering with the market process is embedded in the argument that farmland and open space provide positive externalities such as wild life, aesthetic values, and other cultural benefits. Conversely, premature urban growth is seen as a source of negative externalities: pollution, traffic congestion, and overcrowding. The Portland, Oregon/Vancouver, Washington metropolitan area provides an opportunity to assess the impact of land use planning on home prices. The Portland portion of the metro area has had an urban growth boundary since 1979, while Vancouver did not establish similar growth management policies until December 1994. This study investigates the effect of the UGB on lot/home prices in the area.

Downs, A. "Some Realities about Sprawl and Urban Decline." *Housing Policy Debate* 10(1999):955-74.

AB: Many urban analysts believe suburban sprawl has become an important issue because it helps generate two types of problems: growth-related difficulties like rising traffic congestion, and high concentrations of poor minority households in core-area neighborhoods. However, a careful regression analysis of measures of both sprawl and urban decline shows no statistically significant relation between these two conditions. The basic nature of the American urban development process would cause core-area poverty concentrations even if sprawl were replaced by more compact growth forms. But sprawl does aggravate growth-related problems. Those problems could be attacked through either alternative overall growth strategies--such as high-density, tightly bounded growth--or specific anti-sprawl tactics, such as regional tax-base sharing and regional coordination of land uses. But no feasible policies are likely either to alleviate traffic congestion much or cause most American regions to abandon sprawl.

Powell, J.A. "Race, Poverty, and Urban Sprawl: Access to Opportunities through Regional Strategies." *Forum for Social Economics* 28(Spring 1999):1-20.

AB: This article attempts to demonstrate the need for social justice and urban civil rights advocates to focus on sprawl as well as concentrated poverty. The article posits that these are as much civil rights issues as environmental or land use issues and that sprawl has frustrated civil rights efforts. Indeed, there is strong evidence that racialized concentrated poverty is both a cause and product of sprawl and that, due to this interrelationship, concentrated poverty cannot be addressed without addressing sprawl. To examine this relationship, the author explores how the phenomena of gentrification and the revitalization strategy of in-fill operate differently in rich, middle-class, and poor cities. Finally, the author argues that concentrated poverty and sprawl are regional issues that can only be addressed on a regional level; therefore, it is a mistake for social justice and urban civil rights advocates to leave the regional discussion to environmentalists and land use planners.

Rusk, D. "Saving Neighborhoods by Saving Farms: Metropolitan Congregations United for St. Louis Challenges Urban Sprawl." *Forum for Social Economics* 28(Spring 1999):21-31.

AB: Critics usually decry urban sprawl's impact on the natural geography--polluted air and water, vanishing farmlands, forests and open spaces. However, urban sprawl's effect on human geography has been even greater as exemplified by metro St. Louis. With the region's urbanized land growing at seven times the rate of urbanized population, sprawl accelerated the decline of the central city and older, built-out suburbs (St. Louis lost over half its population since mid-century), increased economic segregation and stagnation (10 percent in 20 years by one measure) even as racial barriers were slowly lowered, and widened fiscal disparities among local governments (St. Louis City's property evaluation shrank by over 70 percent in 35 years). Inner-city and older-suburb coalitions, like Metropolitan Congregations United for St. Louis, are now joining environmental advocates to lobby for new state growth management laws. "We cannot win the 'inside game' without winning the 'outside game,'" church leader explained.

Gottlieb, P.D. "Do Economists Have Anything to Contribute to the Debate on Urban Sprawl? (And Would Anybody Listen to Them If They Did?)." *Forum for Social Economics* 28(Spring 1999):51-64.

AB: This essay explores reasons for the relative shortage of work by economists on the subject of urban sprawl. I argue that a correct economic understanding of the sprawl issue is difficult to communicate. Meanwhile, a simplified caricature of economic thinking on sprawl has emerged. It argues that decentralized, low-density development has been chosen by the "free market," therefore the problem signified by the word sprawl does not exist. This argument, made in the name of economics but not always by economists, has served to polarize the debate as much as to enlighten it. I propose an alternative understanding of the economics of sprawl that provides common ground for debate among economists, planners, and politicians.

Atkinson, G., and T. Oleson. "Urban Sprawl as a Path Dependent Process." *Journal of Economic Issues* 30(June 1996):609-15.

AB. Urban sprawl is a process driven by cumulative, positive feedback loops that overpower the self-correcting, negative feedback loops or urban land markets. Although the problems associated with sprawl are exacerbated by growth, sprawl has its own internal dynamic especially in metropolitan areas with fragmented local governmental institutions. Consequently, sprawl needs to be studied in site specific cases in order to isolate the dynamics of sprawl from other influences such as population and employment growth. In metropolitan areas, the fiscal system can induce sprawl by spatially separating the locus of benefits and costs associated with growth.

Flippen, J.B. "Containing the Urban Sprawl: The Nixon Administration's Land Use Policy." *Presidential Studies Quarterly* 26(Winter 1996):197-207.

AB. Part of a special issue on the Nixon presidency, 1969-74. Richard Nixon's record in encouraging private land use reform constitutes his greatest failure. Nixon promised reform in light of the momentum for land use legislation, but his administration did not keep this promise as Nixon grew more and more suspicious of the growing environmental movement. The failure to exert federal control over land use planning did not prove detrimental to the environment because developers failed to pass broad federal land use legislation and many states have their own strong environmental restrictions. However, Nixon's administration, the first to propose federal environmental legislation, could have provided the assurance that states have adequate land use plans to resist pressure to build. The battle to ensure sufficient environmental protection for land in the face of relentless urban sprawl has become more difficult to achieve because of the lost opportunity during Nixon's presidency.

Peng, S.K. "The Economic Effect of Urban Expansion and Capital Inflow on the Housing Market and Urban Land Use." *Academia Economic Papers* 21(September 1993):305-29.

AB: In the real world, urban land use is closely regulated and the regulation process is dominated by political committees. This paper examines the economic effect of urban land expansion and capital inflow on the housing market and the allocation of urban land use with the two-sector model of a small open economic system. It shows that these economic effects are dominated by the type of housing structures, the kinds of exogenous endowment changes and the relative elasticities of substitution between the demand side and supply side.

Peiser, R.B. "Density and Urban Sprawl." *Land Economics* 65(August 1989):193-204.

AB: A criticism of urban sprawl is that it is inefficient because it generates low-density development. This paper argues that an unconstrained urban land market with discontinuous development promotes higher-density development. The relationship between discontinuous development and density is tested on data from Dallas, Texas, and Montgomery and Fairfax Counties outside Washington, D.C. Regression results indicate all increasing in density over time. The relationship between density and accessibility, however, is more ambiguous. The results indicate that in Fairfax County, which imposes fewer density constraints on developers than Montgomery County, land initially skipped over is ultimately developed at higher density.

Alig, R.J., and R.G. Healy. "Urban and Built-Up Land Area Changes in the United States: An Empirical Investigation of Determinants." *Land Economics* 63(Aug 1987):215-26.

Abstract Regional and national empirical research efforts have rarely examined the determinants of area changes for urban and built-up uses or supported long-range area projections of such uses. This study has examined alternative measures of built-up areas and made long-term national projections of built-up areas under alternative assumptions. According to data from the US Census of Population, US urban land area grew by 22 million acres from 1960 to 1980, and mean urban acreage per capita urban acreage rose from 0.20 to 0.28 during the same period. However, physical occupation of built-up land is predicted to remain below 4% over the next 2 decades. Besides converting land from rural uses, expansion of built-up uses into rural areas has other significant impacts: 1. Rural land prices usually rise. 2. Property taxes on the land usually increase. 3. A greater proportion of landowners tends to become nonfarmers. 4. Land is generally divided into smaller tracts. An understanding of how built-up area is determined may make it possible to project and even influence the future level of land consumption for built-up uses.

2. SMART GROWTH

Burchell, R.W., D. Listokin, and C.C. Galley. "Smart Growth: More than a Ghost of Urban Policy Past, Less than a Bold New Horizon." *Housing Policy Debate* 11(2000):821-79.

Abstract Proponents of smart growth tout its more compact, less automobile-dependent development as a superior alternative to the prevailing pattern of sprawl. Admittedly, smart growth is characterized by the ghost of urban policy past, ranging from inner-area revitalization to growth management. Yet smart growth incorporates leading-edge, contemporary components (e.g., encouraging multimodal transportation,

strategically locating public employment), and its timing is propitious-as aging baby boomers, rising immigration, and other forces support core-area revitalization and other smart growth themes. The future of smart growth is promising, but its success is far from assured. Multiple factors, such as the lack of adoption across governments, market support for sprawl, the automobile's clinging dominance, and a paucity of techniques, could impair broad implementation. However, smart growth is sensible, broadly recognized, and fortuitously timed, and its proponents have learned from the miscues of its historical antecedents.

Nelson, A.C. "Smart Growth: Urban Containment and Housing Prices." *Journal of Housing and Community Development* 57(Sept/Oct 2000):45-9.

AB: The policy of smart growth in relation to urban containment has moved from the domain of policy analysts into more general acceptance, and the broad-based popular support for smart-growth policies is likely to increase as long as economic expansion continues. Urban containment planning has the dual purpose of promoting compact, contiguous, and accessible development provided with efficient public services; and preserving open space, agricultural land, and environmentally sensitive areas that are unsuitable for development. Containment has an effect on land prices because land prices alter when supply is changed; and if urban containment increases the value of the amenity package of a house, then this will also cause a change in house prices. An urban containment strategy creates a new regime in urban planning and development decision making; but it also offers research challenges as a result of the difficulties in developing methodologies that can explain complex interactions and frame the results in a way that can advance public and private interests.

Katz, B. "The Federal Role in Curbing Sprawl." *Annals of the American Academy of Political and Social-Science* 572(November 2000):66-77.

Abstract. This article contends that the federal government has a significant role to play in curbing metropolitan sprawl & promoting reinvestment in cities & older suburbs. It outlines the dominant **growth** trends under way in US metropolitan areas (ie, the rapid decentralization of employment centers & residential areas) & discusses the implications of these trends for the economy, the environment, social welfare, & general quality of life. It also shows how a new metropolitan agenda is emerging in the states to address such issues as metropolitan governance, land use, infrastructure spending, & job access. Finally, the article calls on the presidential candidates to discuss ways in which federal action can help metropolitan areas grow differently - by providing directives & incentives for metropolitan governance, enacting policies that facilitate **smart growth**, & helping regions understand their challenges. 12 References. Adapted from the source document.

Danielsen, K.A., R.E.Lang, and W. Fulton. "Retracting Suburbia: Smart Growth and the Future of Housing." *Housing Policy Debate* 10(1999):513-40.

AB: Metropolitan areas throughout the United States increasingly experience sprawl development. States such as Oregon and Maryland have enacted land use legislation that curbs sprawl by promoting denser urban growth. Smart growth, a new method of metropolitan development leading to more compact regions, offers an alternative to sprawl. Given that housing comprises a major share of the built environment, policies that promote denser residential development form a key component of smart growth. This article provides an analytic review of the ways housing can be used to support successful smart growth policies. It focuses on three areas: the market for higher density housing, land use issues associated with denser housing development, and methods for financing higher density and mixed-use housing. The literature on the link between smart growth and housing remains underdeveloped. We offer this synthesis as a way to advance the state of knowledge on smart growth's housing dimension.

Easterbrook, Gregg. "Suburban Myth." *The New Republic*; 220 (Mar 15, 1999):18-21

Abstract "Livability" is the hot new pre-presidential campaign issue. Easterbrook examines whether this issue is a genuine campaign for environmental preservation or just the latest excuse for prosperous folks to keep aspiring homeowners out of their neighborhoods.

Goodman, J. "The Changing Demography of Multifamily Rental Housing." *Housing Policy Debate* 10(1999):31-57.

Abstract: The residents of multifamily rental housing are different from both homeowners and single-family home renters, and these differences have implications for the housing market and for public policy. This article describes apartment residents today, discusses recent changes in their number and characteristics, projects their future growth and composition, and highlights business and policy implications of future changes. For purposes of business and public policy, a segmentation of apartment residents into three submarkets is useful: the "affordable" market serving low- and moderate-income households, some of which receive government housing assistance; the "lifestyle apartment market" serving higher-income adult households; and the substantial "middle market." The number of apartment renters is likely to grow moderately over time. The combination of multifamily structure type and rental tenure form offers unique opportunities not only for provision of affordable housing but also for revitalization of downtown areas and balanced "smart" growth in suburban areas.

Easterbrook, G. Comment on Karen A. Danielsen, Robert E. Lang, and William Fulton's "Retracting Suburbia: Smart Growth and the Future of Housing." *Housing-Policy-Debate* 10(1999):541-47.

AB: Hypocrisy abounds in the smart growth movement. Many of its biggest advocates maintain the sprawling suburban lifestyle that the movement seeks to curtail. Smart growth is just the latest label for an exclusionary impulse that divides those Americans who already are enjoying the good life from those seeking to obtain it. Furthermore, smart growth threatens to derail one of the key engines of the national economy: suburban sprawl. Despite its negative image, sprawl is efficient and reflects consumer preference. In a nation where so much developable land remains, sprawl is hardly the environmental threat it is made out to be. The real threat is that the nation might adopt policies that halt development and frustrate the millions of people who seek their share of the suburban dream.

English, M.R. "A Guide for Smart Growth." *Forum for Applied Research and Public Policy* 14(Fall 1999):35-9.

Part of a special section on curbing sprawl. Smart growth focuses in seeking ways to manage sprawl and improve quality of life. Smart growth involves planning for sustainability, public participation, land-use controls, and planning ahead. This is an approach that has been implemented in the state of Tennessee, where recent legislation will result in the designation of urban growth boundaries, planned areas of growth, and rural areas within the state's counties. The approach to planning of a community will depend on its individual needs. However, there are a number of areas that will need attention in all communities. These are politics, decision making, the perception of all issues as part of a wider pattern of potential change, long-range thinking, the need for a core group, outreach, early basic information, computer-based tools, indicators, and local resources.

O'Toole, R. "Dense Thinkers." *Reason* 30 (Jan 1999):44-52

Abstract "New urbanism," the latest fad in urban planning, promises less traffic, better air and lower taxes. Critics say it brings other, less desirable, things.

Froehlich, M. "Smart Growth: Why Local Governments are Taking a New Approach to Managing Growth in Their Communities." *Public Management* 80(May 1998):5-9.

AB: To avoid the pitfalls of development and to capture its benefits, local governments are increasingly turning to a policy of "smart growth," which invests time, attention, and resources in restoring community and vitality to center cities and older suburbs. Although smart growth is not the answer in every locality, more and more local governments are using it to create good neighborhoods, reduce traffic, and preserve open space. Moreover, by encouraging development that serves the economy, the community, and the environment, local governments are assisting in building consensus and broad support among key community constituents.

Katz, Bruce and S. Bernstein. "The New Metropolitan Agenda: Connecting Cities & Suburbs." *The Brookings Review* 16(Fall 1998):4-7

Abstract: Since the mid-1960s, a lonely chorus of scholars and travelers has contended that many of the US's challenges need to be discussed in a metropolitan context. Metropolitan areas now contain close to 80% of the total US population; half the people in the country now live in just 39 metro areas. These areas are the engines of the US economy, competing with other regions around the world as the global economy evolves. They are complex organisms, each growing around several nodes of economic activities - central business districts, edge cities, industrial areas, services clusters, and high-tech or commercial corridors. Metropolitanism has now reemerged as a notable political force in dozens of major metropolitan regions - and it is even beginning to alter market practices. This sudden reemergence has been caused by the growing unease that many Americans feel about how communities are developing. They are appalled by explosive sprawl into peripheral farmlands and open space, rising suburban traffic congestion, and slower growth or absolute decline in many central cities and older suburbs.

Leinberger, C. "The Market and Metropolitanism." *The Brookings Review* Washington 16(Fall 1998):35-36

Abstract From the developer's perspective, the key to profitable activity under currently dominant conditions is simplicity. An overall metropolitan system whose goals include maximizing privacy and the almost exclusive use of personal transportation permits individual developers to virtually ignore the complex urban fabric and context. For developers, it is easier and most profitable to build single, standard product types, with which the financial institutions and local governments are familiar, on greenfield sites on the fringe. It is also simpler to market and manage modular, single-use developments. For nearly all income-producing real estate, the most critical locational criteria are visibility from the highway and accessibility to the relevant user population by car. The unintended negative consequences of current real estate development patterns are many.

Rusk, D. "Exploding Metropolis: Why Growth Management Makes Sense." *The Brookings Review* 16(Fall 1998):13-15

Abstract The US is more than ever a land of metropolitan regions. Today, those regions are home to five-sixths of the country's population and economic activity. However, accompanying the explosive growth of US metropolitan regions in the second half of the 20th century, driven by the federal interstate highway system, has been the demise of the central city and the balkanization of local governance. Annexations and mergers are the traditional tools of municipal expansion, used by even the oldest US cities in their youth. Though even most highly annexation-oriented cities are slowly losing ground in the face of accelerating urban sprawl, there are strong reasons for continued annexation. Growth management is rapidly emerging as the top regional issue of the next decade. Their key center of activity will be state legislatures, where land use rules are controlled.

Nivola, P.S. "Fat city: Understanding American Urban Form from a Transatlantic Perspective." *The Brookings Review* 16(Fall 1998):17-19

Abstract Urban settlements grow in three directions: 1. up into high-rise buildings, 2. in by crowding, or 3. or out into the suburbs. Although cities everywhere have developed in each of these ways at various times, nowhere in Europe has the outward dispersal of people and jobs matched the scope of suburbanization in the metropolitan areas of the US. In the US, less than a quarter of the nation's population lived in suburbia in 1950. Now more than 60% does. A wide range of public policies in Europe has helped curb suburban sprawl, but not all of these policies have enhanced the welfare of the Europeans. Most households are not better off when farmers are heavily subsidized, or when anticompetitive practices protect micro-businesses at the expense of larger, more efficient firms. Nor would most consumers gain greater satisfaction from housing strategies that assist renter occupancy but not home ownership. The economics of some nations in Western Europe have faltered in recent years amid these sorts of public biases.

Gordon, Peter, and Richardson, Harry W. "Are Compact Cities a Desirable Planning Goal?"
Journal of the American Planning Association 63(Winter 1997):95-106

Abstract Some key issues are considered that help to evaluate whether or not the promotion of compact cities is a worthwhile planning goal. These are: 1. the pressures on prime agricultural land, 2. residential density preferences, 3. energy resource savings, 4. the potential for expanding transit use and promoting TODs, 5. the costs and benefits of suburbanization, 6. the efficiency gains from compactness, 7. the impact of telecommunications on the density of development, 8. the prospects for downtowns, 9. influence of rent-seeking on the promotion of downtown projects, 10. the social equity of compactness, and 11. the effects of competition among cities. An evaluation of these issues does not support the case for promoting compact cities.

Ladd, H.F. "Population Growth, Density and the Cost of Providing Public Services." *Urban Studies* 29(Apr 1992):273

Abstract Data for 247 large county areas are examined to determine the separate impacts on local government spending of two dimensions of residential development patterns, the rapidity of population growth and the intensity of land use as measured by gross residential densities.

3. TRANSPORTATION AND CONGESTION

Martinez, F., and C. Araya. "Transport and Land-Use Benefits under Location Externalities." *Environment-and-Planning-A* 32(September 2000):1611-24.

AB: Transport projects are economically assessed partly by estimating users' benefits in the transport system and by ignoring impacts on land use under the argument that these benefits are already incorporated into transport users' benefits. In this paper we discuss this argument from two main viewpoints: the level of percolation of transport benefits into land values and the presence of external economies in urban systems. We first propose and discuss measures of benefits in the transport system and in the land-use system. Then we analyze to what extent transport users' benefits percolate into land rents, showing empirical evidence that it may be limited. We then focus on the less-studied effect of three types of technological externalities: direct effects associated with traffic nuisance; location externalities, associated with economies of agglomeration of households and firms, which in some cities may be a dominant location choice factor; and land-use-transport interaction. We conclude by specifying in more detail the conditions under which the classical argument and current project appraisal methods are valid.

Jun, M. "An Integrated Metropolitan Model Incorporating Demographic-Economic, Land-Use and Transport Models." *Urban-Studies* 36(July 1999):1399-1408.

AB: This paper formulates an integrated metropolitan model which captures full intersectoral and interspatial relations as well as impacts on transport networks within a metropolitan area. To achieve this, the proposed model consists of three components: multizonal input-output linkages; land forecast models; and transport demand forecast models. Given the model structure, the proposed model can estimate economic impacts by type of secondary repercussions (indirect, and induced spillovers), by industry type and by zone. In addition, the proposed model will forecast the size of land by land-use type and by zone and estimate changes in traffic volumes on transport networks due to an urban policy. Moreover, the three components of the proposed model can be easily linked with GIS, presenting all the zone-specific information generated from the model on maps.

Anas, A., and R. Xu. "Congestion, Land Use, and Job Dispersion: A General Equilibrium Model." *Journal-of-Urban-Economics* 45(May 1999):451-73.

AB: In dispersed cities, congestion tolls would drive up central wages and rents and would induce centrally located producers to want to disperse closer to their workers and their customers, paying lower

rents and realizing productivity gains from land to labor substitution. But the tolls would also induce residents to want to locate more centrally in order to economize on commuting and shopping travel. In a computable general equilibrium model, the authors find that the centralizing effect of tolls on residences dominates on the decentralizing effect of tolls on firms, causing the dispersed city to have more centralized job and population densities. Under stylized parameters, they find that efficiency gains from levying congestion tolls on work and shopping travel are 3.0 percent of average income. About 80 percent of such gains come from road planning and 20 percent from tolls. (c) 1999 Academic Press

Steiner, R.L. "Transportation and Land Use Innovations: When You Can't Pave Your Way Out of Congestion." *Journal of the American Planning Association* 65(1999):346-346.

AB. A computable general equilibrium model of urban land use is developed with land allocated to houses, production, and roads. Traffic congestion and employment location are endogenous. Consumers choose job and home locations and want to shop everywhere. Without scale economies in shopping, production is dispersed with rent, wage, commodity price, and net density gradients all peaking at the center of the space. When scale economies in shopping are strong relative to the cost of traffic congestion, dispersion becomes unstable. Multiple equilibria emerge as production agglomerates into a number of centers. Our algorithm tests the stability of equilibria and finds perturbations that set off transitions to other equilibria. The number of centers trades off the benefits from agglomeration against those from access. With stronger agglomeration, there are fewer and bigger centers and utility is higher with fewer centers. With higher congestion, the number of centers increases and utility is higher with more centers. (C) 1996 Academic Press, Inc.

Boarnet, M.G., and S. Sarmiento. "Can Land-use Policy Really Affect Travel Behaviour?" A Study of the Link between Non-work Travel and Land-use Characteristics. *Urban Studies* 35(1998):1155-69.

Abstract: Planners are increasingly viewing land-use policy as a way to manage transport demand. Yet the evidence on the link between land use and travel behaviour is inconclusive. This paper uses travel diary data for southern California residents to examine the link between land-use patterns at the neighbourhood level and non-work trip generation for a sample of 769 individuals. The number of non-work automobile trips that an individual makes in a two-day period is modelled as a function of socio-demographic variables and land-use characteristics near the person's place of residence. The land-use variables are statistically insignificant in all but one of the specifications. The results suggest that choices about how to measure the variables and how to specify the regressions can influence the conclusions from these studies in potentially important ways. This underscores the need for continued careful attention to these research issues.

Wilson, A.G. "Land-Use/Transport Interaction Models: Past and Future." *Journal-of-Transport-Economics-and-Policy* 32(January 1998):3-26.

AB: This paper focuses on the second half of the twentieth century, when the need for adequate models to understand transport/land-use interactions has become important because of the twin problems of traffic congestion and pressures for land development. The author traces the development and use of various types of models to achieve this, examines the enabling technologies and their applications, and gives pointers for their future use.

Porter, D.R. "Transit-focused Development: A Progress Report." *Journal of the American Planning Association* 64(Autumn 1998):475-88.

Abstract The wave of rail transit construction across North America in recent decades has renewed interest in promoting transit-related development. Many older cities and suburbs developed land use patterns integrated with transit service, but many newer communities have developed in ways that cater to automobiles and make transit service infeasible or costly. Concentrations of development in downtown areas have benefited from and provided support to the existing transit systems and the initial phases of new systems; as transit lines extend into suburban areas, however, transit-supportive development around stations became more problematical in terms of marketability and political acceptance. Experience with

transit-focused development (TFD) in 19 communities is explored, describing transit-related development characteristics, discussing the significance of market forces in achieving TFD, identifying public policies, regulations, and programs that encourage TFD, and providing a synoptic chart of experience with station-area development.

Wheatan, W.C. "Land Use and Density in Cities with Congestion." *Journal-of-Urban-Economics* 43(March 1998):258-72.

AB: It was well documented that monocentric spatial models with congestion require driving tolls to generate market efficiency. Because driving and location are equivalent, tolling congestion is the same as regulating density. This paper shows that internalizing the congestion externality always requires upward adjustments to market density--which are greatest at the urban center. This holds whether or not transportation capacity is optimally provided. Simulations suggest optimal cities should have central densities that are orders of magnitude greater than market cities. (c) 1998 Academic Press

Johnson, C. "Land Use, Transportation, and the Sustainable Region." *National Civic Review* 85(Spring/Summer 1996):31-4.

AB. Part of a special issue on the future of regional governance. The writer examines the growing rate of car usage in the U.S. and argues for the development of public transport infrastructure. Automotive travel is heavily subsidized because car owners do not pay for the pollution that they generate, the consequences of road congestion, emergency services, or even all road repairs. Car owners should be made to pay their way by introducing toll roads, mounting demonstrations of congestion pricing for high-demand corridors and peak times, and demanding realistic impact fees for new growth. However, the political will is rarely strong enough to implement such policies. In conclusion, the writer discusses strategies for connecting land use, transportation, and effective communities.

Crane, R. "Cars and Drivers in the New Suburbs." *Journal of the American Planning Association* 62(Winter 1996):51-65.

Abstract Various new suburb land-use designs have recently been proposed to address a number of social and environmental problems, including the dominance of automobile travel. Transportation benefits are expected from reducing the surface street distance between locations, mixing land uses, calming traffic, and promoting walking, bicycling, and transit via redesigned streets and streetscapes. That auto travel will fall is a largely unchallenged premise of these designs. Yet what little evidence exists is either weak or contrary. A simple behavioral argument to explain why is presented. Generally speaking, driving is both discouraged and facilitated in the new suburbs, with the net effect being an empirical matter.

Anas, A., and I. Kim. "General Equilibrium Models of Polycentric Urban Land Use with Endogenous Congestion and Job Agglomeration." *Journal of Urban Economics* 40(1996):232-56.

AB. A computable general equilibrium model of urban land use is developed with land allocated to houses, production, and roads. Traffic congestion and employment location are endogenous. Consumers choose job and home locations and want to shop everywhere. Without scale economies in shopping, production is dispersed with rent, wage, commodity price, and net density gradients all peaking at the center of the space. When scale economies in shopping are strong relative to the cost of traffic congestion, dispersion becomes unstable. Multiple equilibria emerge as production agglomerates into a number of centers. Our algorithm tests the stability of equilibria and finds perturbations that set off transitions to other equilibria. The number of centers trades off the benefits from agglomeration against those from access. With stronger agglomeration, there are fewer and bigger centers and utility is higher with fewer centers. With higher congestion, the number of centers increases and utility is higher with more centers.

Gur, Y.J., D. Shefer, and D. Magid. "Road Capacity Driven Land Use Model (CADLUM)." *Environment-and-Planning-A* 28(December 1996):2227-40.

AB: In this paper we examine the major effects of road network attributes in a metropolitan area on the spatial distribution and intensity of activities, and suggest a model to describe these effects. The model is based on the hypothesis that the transportation system affects land development primarily as a constraint: the intensity of land use in an area cannot exceed the capacity of the road network that serves the traffic it generates. With the model we examine the feasibility of a proposed land-use plan (or prediction) for an urban area, given a proposed transportation plan. If road-capacity constraints are violated, the model employs an optimization procedure to identify a feasible spatial distribution of the activities. In this paper we describe the conceptual basis for the model and its formulation as a distance-minimizing optimization problem, a heuristic solution method, and a simple application.

Cervero, R. "Rail Transit and Joint Development: Land Market Impacts in Washington, D.C. and Atlanta." *Journal of the American Planning Association* 60(Winter 1994):83

Abstract An analysis of data for five rail stations in the Washington DC and Atlanta areas over the 1978-89 period shows that office vacancy rates were lower, average building densities were higher and shares of regional growth were larger in station areas with joint public-private development projects.

Southworth, M., and P.M. Owens. "The Evolving Metropolis: Studies of Community, Neighborhood, and Street Form at the Urban Edge." *Journal of the American Planning Association* 59(Summer 1993):271-87

Abstract The form of the evolving metropolitan fringe by means of comparative case studies of fringe development in the San Francisco Bay area at three scales--the community, the neighborhood and the street and house lot--are examined. As the scale of development has grown, there has been a parallel growth of self-contained, single-use developments.

Arnott, R., A. DePalma, and R. Lindsey. "A Structural Model of Peak-Period Congestion: A Traffic Bottleneck with Elastic Demand." *The American Economic Review* 83(Mar 1993):161-180

Abstract The standard model of peak-period traffic congestion is poorly specified because it fails to model commuters' departure-time decisions and the congestion technology. Vickrey (1969) was the first to address these deficiencies. Some of the economic implications of Vickrey's model are examined, and the model is extended to treat elastic demand and optimal capacity under a variety of pricing regimes. The results show that, with identical individuals, the degree of self-financing of congestible facilities with optimal capacity and optimal tolls apply regardless of the tolling regime. The results also suggest that the gains from efficient pricing are considerably greater than those given in the empirical literature on urban auto congestion. The reason is that previous empirical estimates are based on a model that ignores the efficiency gain that results from a toll's ability to redistribute travelers over the rush hour.

Horowitz, A.J. "Convergence of Certain Traffic and Land-Use Equilibrium Assignment Models." *Environment and Planning-A* 23(March 1991):371-83.

AB: In this paper are described and tested three heuristic algorithms for finding the solution to highly complex land-use models that incorporate the effects of traffic congestion. Two of the algorithms are modifications of Evans's algorithm for elastic-demand traffic assignment. The third algorithm is a variation of incremental assignment that is closely related to Frank-Wolfe decomposition. These algorithms are applied to an elaborate implementation of the Lowry-Garin model of land use. Tests of these algorithms show that they all converge toward a predetermined, precise solution, and they do so at a rate that is similar to Frank-Wolfe decomposition.

Cervero, R. "Land Uses and Travel at Suburban Activity Centers." *Transportation Quarterly* 45(Oct 1991):479

Abstract A study on the relationship between land use and travel demand in six different suburban activity centers in the US is offered. Research suggests that suburban workers will use mass transit if the

service is efficient, limits are placed on automobile usage and a supportive land-use environment is provided.

White, M.J. "Commuting and Congestion: A Simulation Model of a Decentralized Metropolitan Area." *AREUEA Journal* 18(Fall 1990):335-368

Abstract A simulation model of commuting behavior in a metropolitan area with decentralized employment and congestion is developed. The model is used to explore the linkage between the dispersed land use patterns in US cities and long commuting journeys that cause congestion and air pollution. The results show that increasing the number of suburban subcenters in a metropolitan area could reduce commuting by 15% to 50%. However, only about 1/4 of total urban travel is for commuting. Therefore, the reduction in total urban travel that could be expected to result from even drastic policy measures to decentralize employment would probably be low - perhaps as small as 5%. The main results of the simulations include: 1. The symmetry or asymmetry of the employment pattern is an important determinant of the average commuting journey length and the proportion of jobs at the central business district (CBD). 2. The spatial distribution of employment is very sensitive to the pattern of relative wages at the CBD versus the suburbs. 3. Congestion reduces the attractiveness of CBD jobs and jobs at the near subcenters.

Holcombe, Randall G. "Growth Management in Florida: Lessons for the National Economy." *Cato Journal* 10(Spring/Summer 1990):109-125.

Abstract: The object of Florida's Growth Management Act of 1985 is to take some of the rights to determine the use of land away from the property owner and to have the use of the land determined politically. It also transfers to the state government some land use decisions that previously were made by local governments through zoning. An analysis of the Florida experience shows that making the right to develop land a political decision tends to increase the possibility of inefficient development patterns because market signals are absent or distorted. The standard plan for development in Florida will produce suboptimal land use patterns and will result in more traffic congestion than if the market were allowed to dictate land use patterns. Although getting people to use their property in a publicly responsible way rather than for purely private gain sounds acceptable, with growth management legislation, this means appropriating people's property and overriding the market in a way that is both unfair and inefficient.

Mackett, R.L. "Comparative Analysis of Modeling Land-Use Transport Interaction at the Micro and Macro Levels." *Environment and Planning-A* 22(April 1990):459-75.

Rho, J.H., and T.J. Kim. "Solving a Three-Dimensional Urban Activity Model of Land Use Intensity and Transport Congestion." *Journal of Regional-Science* 29(November 1989):595-613.

AB: Recent developments in combining input-output and transportation planning models have made it possible to construct realistic comprehensive urban and regional activity models of land use intensity. These models form the basis for a rigorous approach to studying the interactions among urban activities. However, efficient computational solution methods for implementing such comprehensive models are still not available. In this paper, an efficient solution method for a nonlinear programming urban systems model is developed by combining Suzanne P. Evans's partial linearization technique with M. J. D. Powell's hybrid method. The solutions algorithm is applied to a small, but realistic, urban area with a detailed transportation network.

Deakin, Elizabeth. "Traffic Jams on Main Street." *Civil Engineering* 58(Apr 1988):45-47.

Abstract In the 1980s, traffic congestion in the suburbs is a major public concern, prompting a renewed search for transportation and land-use strategies to relieve the problem. Besides living there, people now work, shop, and seek entertainment in the suburbs. According to the 1980 Census, over 40% of all commute trips started and ended in the suburbs. Numerous solutions for the suburban traffic problem have been proposed, such as: 1. increasing funding for plans to alleviate congestion, 2. devising commute alternatives, such as carpooling and alternative work hours, 3. building new streets and highways in the suburbs, and 4. controlling suburban land use in order to match employment growth with housing

development. Local governments should be encouraged to take more responsibility for planning needed transportation facilities. It should be remembered that congestion is inevitable when new development occurs in areas where transportation services already are running at capacity.

Cervero, Robert. "Unlocking Suburban Gridlock." *Journal of the American Planning Association* 52(Autumn 1986):389-306

Abstract The physical layout and land use composition of suburban employment settings define traffic conditions there, and many suburban workplaces are preordained for automobile usage. About 40% of all office parks offer inducements for carpooling and vanpooling, but these measures have produced few dividends. Jobs and housing are in a state of disequilibrium in many suburban settings, largely because of a lack of strategic siting. Lasting solutions to mobility problems in the suburbs must begin with land use considerations. Traffic management is also an option for reducing congestion. Potential methods to achieve this include: 1. management associations, 2. ridesharing coordination, 3. mass transit, and 4. modified work schedules. Planners will have to consider a variety of alternatives in addressing suburban problems, such as: 1. redesigning suburban workplaces, 2. using strategic siting, and 3. implementing trip-reduction measures.

Mogridge, M.J.H. "Transport, Land Use and Energy Interaction." *Urban-Studies* 22(December 1985):481-92.

4. LAND USE REGULATION AND ZONING

Pendall, R. "Local Land Use Regulation and the Chain of Exclusion." *Journal of the American Planning Association* 66(Spring 2000):125-42.

Abstract The study reported in this article tested connections between five land use controls and the racial composition of the communities that use them. A survey of localities in the 25 largest U.S. metropolitan areas showed that low-density-only zoning, which restricts residential densities to fewer than eight dwelling units per acre, consistently reduced rental housing; this, in turn, limited the number of Black and Hispanic residents. Building permit caps were also associated with lowered proportions of Hispanic residents. Other controls tested--urban growth boundaries, adequate public facilities ordinances, and moratoria--had limited effects on either housing types or racial distribution. Reprinted by permission of the publisher.

Mayer, C.J., and C.T. Somerville. "Land Use Regulation and New Construction." *Regional Science and Urban Economics* 30(December 2000):639-62.

AB: This paper describes the relationship between land use regulation and residential construction. We characterize regulations as either adding explicit costs, uncertainty, or delays to the development process. The theoretical framework suggests that the effects on new construction vary by the type of regulation. Using quarterly data from a panel of 44 U.S. metropolitan areas between 1985 and 1996, we find that land use regulation lowers the level of the steady-state of new construction. Our estimates suggest that metropolitan areas with more extensive regulation can have up to 45 percent fewer starts and price elasticities that are more than 20 percent lower than those in less-regulated markets. One implication of regulations that lengthen the development process is that the short- and long-run effects of demand shocks will vary relative to conditions in markets without such delays. We find support for this observation in the data. As well, we find other differences by type of regulation: development or impact fees have relatively little impact on new construction, but regulations that lengthen the development process or otherwise constrain new development have larger and more significant effects.

Green, R.K. "Land Use Regulation and the Price of Housing in a Suburban Wisconsin County." *Journal of Housing Economics* 8(June 1999):144-59.

Land use regulation generally increases the cost of housing. This should not be a controversial statement: land use regulation limits the supply of a commodity and therefore increases its price. Empirical work by Malpezzi (1996), Malpezzi and Green (1996), Malpezzi *et al.* (1998), and Bertaud and Renault (1997), among others, has confirmed this unsurprising fact. Still, it may be useful to describe the mechanism by which land use regulations affect housing costs, the distributional impacts of land use regulations, and the magnitude by which land use regulation affects prices in a particular market: Waukesha County, Wisconsin.

Guidry, K., J.D. Shilling, and C.F. Sirmans. "Land-Use Controls, Natural Restrictions, and Urban Residential Land Prices." *Review of Regional Studies* 29(Fall 1999):105-13.

AB: Research has focused on how variations in land-use controls explain interurban variations in prices. With the notable exception of the work by Rose (1989), virtually no attention has been focused on how natural restrictions (bodies of water, mountains, etc.) impact land prices. The purpose of this paper is to examine the impact of both land-use controls and natural restrictions on interurban variation in residential land prices. Our results indicate that, as expected, land prices are significantly higher as the land supply decreases both as a result of natural and man-made restrictions.

Webster, C.J., and F. Wu. "Regulation, Land-Use Mix, and Urban Performance. Part 1: Theory." *Environment and Planning A* 31(August 1999):1433-42.

AB: In this paper we present the theoretical model underlying a series of experiments that use cellular automata (CA) simulations to explore the impact of alternative systems of pollution property rights on urban morphology and performance. It is a partial equilibrium model of developer and community behaviour which allows a formal expression of the urban development processes under alternative regulative regimes. These include pure markets; impure markets without government; voluntary agreements on externality solutions; clubs and other near-market mechanisms of supplying quasi-public goods; and rigid zone-planning. In a second paper we describe how the model is embedded in a nondeterministic CA algorithm that yields simulated land-use patterns. Because the simulations are based on behavioural theory rather than ad hoc cell-transitions rules, they also yield meaningful urban performance indicators such as total, average, and marginal private profits and social costs. These permit tests of conventional urban economic theory within an explicit spatial framework.

Webster, C.J., and F. Wu. "Regulation, Land-Use Mix, and Urban Performance. Part 2: Simulation." *Environment and Planning A* 31(September 1999):1529-45.

AB: Part 1 of this two-part paper presented a spatial economic model of the urban development process which captures developers' profit-seeking behaviour, communities' welfare-seeking behaviour, and the mediating effects of alternative systems of land-use rights. Different systems of rights were shown to result in different land-use and density outcomes. In part 2 we describe the simulation model used to implement the theoretical model. The emphasis is on explaining the cellular automata methodology, but we also go on to illustrate the model output by comparing the structure and economic performance of two simulations. One simulates a free-market city in which developers have full property rights over land use. The other simulates a city in which the community has land-use rights and uses these to regulate development densities at socially optimal levels.

Levine, N. "The Effects of Local Growth Controls on Regional Housing Production and Population Redistribution in California." *Urban Studies* 36(November 1999):2047-68

AB: Based on two surveys of 490 Californian cities and counties, the study examines the effects of local growth-control enactment between 1979 and 1988 on net housing construction between 1980 and 1990. It is shown that local growth-management measures significantly displaced new construction, particularly rental housing, possibly exacerbating the expansion of the metropolitan areas into the interiors of the state. Further, the measures impacted low-income households and minorities particularly. Not all growth-control measures were associated with this change. Measures which limited available land or which downsized existing zoning had stronger effects.

McMillen, D.P., and J.F. McDonald. "Land Use before Zoning: The Case of 1920's Chicago." *Regional Science and Urban Economics* 29(July 1999):473-89.

AB: Attempting to mitigate the negative externalities associated with mixed land use, most major US cities passed comprehensive zoning ordinances in the 1920's. Modern analysts suggest that more exclusionary motives account for zoning's widespread popularity. We document the extent to which land use was mixed before Chicago adopted its first zoning ordinance. We find numerous instances where manufacturing and commercial lots were present on residential blocks. Mixed land use was most prevalent in older areas of the city and in areas where it caused little harm--along major streets and near public transportation.

Brueckner, J.K. "Testing for Strategic Interaction among Local Governments: The Case of Growth Controls." *Journal of Urban Economics* 44(November 1998):438-67.

AB: This paper helps to fill a gap in the public economics literature by providing empirical evidence on strategic interaction among local governments. Using the methodology of A. C. Case, H. S. Rosen, and J. R. Hines (1993), the paper focuses on the adoption of growth-control measures by cities in California and looks for evidence of policy interdependence in these choices. The data are drawn from an elaborate survey of growth control practices in California cities conducted by M. Glickfeld and N. Levine (1992). The survey results are used to compute an index of the stringency of growth controls in each city, which serves as the dependent variable for the study. (c) 1998 Academic Press

Sasaki, K. "Optimal Urban Growth Controls." *Regional Science and Urban Economics* 28(July 1998):475-96.

AB: Urban growth controls are analyzed from the standpoint of owner-residents to maximize their utility level. The basic framework follows the Brueckner-Lai model (Brueckner, J.K., Lai, F.-C., 1996), but effects of production activity, congestion externality, and public good provision, each of which affects actual urban growth control, are incorporated into the models.

Skidmore, M. and M. Peddle. "Do Development Impact Fees Reduce the Rate of Residential Development?" *Growth and Change* Lexington (Fall 1998).

Abstract:

Over the last 25 years, local governments in the US and Canada have increasingly used impact fees and other development exactions as methods of financing capital and infrastructure requirements mandated by residential growth. While several studies have examined the effects of impact fees on housing and land prices, rigorous empirical analysis of their effects on residential development is lacking. A sample of all municipalities in DuPage County, Illinois, from 1977 through 1992 is used to examine the effects of impact fees on the rate of residential development. The empirical results show that impact fees reduce rates of residential development by more than 25%.

Black, R.A. "State Control of Mining on Federal Land: Environmental or Land Use Regulation?" *Natural Resources Journal* 28(Fall 1998):873-81.

Colwell, P.F. "Tender Mercies: Efficient and Equitable Land Use Change." *Real Estate Economics* 25(Winter 1997):525-37.

AB: A two-tiered, front-end-loaded tender offer system is shown to catalyze a market for partial property rights. This market would obviate any legitimate need for governmental zoning, and thus would put an end to zoning's inefficiency and inequity. The proposed system would facilitate development and redevelopment, cause nuisance producing zones to become more compact, stop the subversion of zoning for fiscal and exclusionary purposes, reduce the opportunities for corruption and end rent seeking as well as "not in my backyard" activities. The proposed tender offer system would fully compensate those who are injured by negative externalities, thereby eliminating adverse distributional effects.

Thorson, J.A. "The Effect of Zoning of Housing Construction." *Journal of Housing Economics* 6(March 1997):81-91.

This paper examines whether a more restrictive zoning ordinance actually reduces construction of new housing. This may seem at first to be a trivial issue, since why else would a zoning board make the ordinance more restrictive. However, it is possible for landowners to circumvent the zoning law. For example, they can subdivide their land before the zoning change occurs. In addition, they can bargain with the local zoning officials and offer side payments, also known as exactions, for the right to develop their land. This paper examines a famous case of agricultural downzoning in McHenry County, Illinois. It finds that although the number of building permits issued did not fall immediately, in the long run the number of permits issued by the county was significantly reduced. This suggests that developers were able to anticipate the zoning change and subdivide their land before it occurred.

Asabere, P.K., and F.E. Huffman. "Hierarchical Zoning, Incompatible Uses and Price Discounts." *Real Estate Economics* 25(Fall 1997):439-51.

AB: This study examines an aspect of hierarchical zoning. Hierarchical zoning, unlike mutually exclusive zoning, is unidirectional in that it protects upper-level residential uses from nonconforming, non-residential uses but not vice versa. The result is that the lower-level zones can be a mixture of several nonconforming incompatible uses. This unique attribute of hierarchical zoning offers a window of opportunity for choices for affordable housing at affordable locations. Using hedonic analysis, empirical evidence shows that huge price discounts (over 15%) are associated with apartments that are situated in nonconforming zones. Arguments here support more flexible zoning.

Malpezzi, S. "Housing Prices, Externalities, and Regulation in U.S. Metropolitan Areas." *Journal of Housing Research* 7(1996).

Abstract Housing prices vary widely from market to market in the United States. The purpose of this study is to analyze the determinants of housing prices, with a particular focus on the effects of regulations in land and housing markets. The basic unit of observation for this study is the city or metropolitan area. The basic method is to model house prices and rents in a simple supply-and-demand framework focusing on incomes, population changes, "noneconomic" determinants (such as topographical features), and other supply conditions (notably measures of the regulatory environment). The innovative part of the empirical analysis is constructing indices that reflect regulatory regimes in different markets.

Alavalapati, J., B. White, P. Jagger, and A. Wellstead. "Effect of Land Use Restrictions on the Economy of Alberta: A Computable General Equilibrium Analysis." *Canadian Journal of Regional Science* 19(Autumn 1996):349-65.

AB: This paper investigates the socio-economic impacts of hypothetical reductions in the use of land in the agriculture, forestry, and energy sectors in the province of Alberta. A five sector computable general equilibrium is developed to simulate the impacts of land use reductions. Simulations are conducted under two scenarios. First, wages are assumed to be rigid in the economy. Second, wages are assumed to be responsive to changes in the demand for labour. Results indicate that the negative impacts of land use reduction are higher when wages are rigid than those of wage flexible scenario. If wages are flexible, a contraction in a trading sector is shown to cause an expansion in other trading sectors. However, adjustment in the non-trading sector depends on relative magnitudes of contraction and expansion of trading sectors.

Shoup, D.C. "Regulating Land Use at Sale: Public Improvement From Private Investment." *Journal of the American Planning Association* 62(Summer 1996):354-72.

AB. Coordinated private investments create many neighborhood public improvements. This paper proposes regulating land use at sale as a way to coordinate private investments that create public improvements. The proposal is illustrated by a requirement that landowners plant street trees before they sell their properties. Census data and the Los Angeles County Assessor's records show that about half of all

properties are sold within ten years, so regulation at sale should affect about half of a city per decade. Regulation at sale offers a pragmatic, low-cost method to improve older neighborhoods and stimulate local economic development. Reprinted by permission of the publisher.

Miceli, T.J., and K. Segerson. "Compensation for Regulatory Takings: An Economic Analysis with Applications." *Economics of Legal Relationships* 1(1996):12-257.

AB. Examines the distinction between compensable and noncompensable government actions. Develops a simple model of government regulation of land use, focusing on the incentives of landowners while assuming that the regulator acts in an efficient manner. Relaxes the assumption of the socially efficient regulator and assumes that the regulator makes his decision by comparing the benefit of regulation to the dollar cost of compensation that must be paid in the event of regulation. Derives two compensation rules that are capable of resolving the trade-off between the moral hazard problem associated with full compensation and the threat of overregulation associated with zero compensation. Examines whether these rules are reflected in actual takings doctrines. Reevaluates the argument that compensation for regulation is unnecessary if anticipated regulation has already been capitalized into the price of land. Explores how the existence of an "investment-backed expectation" on the part of the landowner should affect compensation and considers issues of the timing of development and compensation. Applies the regulatory takings principles developed to issues of mining regulation, zoning, the designation of historical landmarks, the Endangered Species Act, wetlands protection, and water rights.

Pasha, H.A. "Suburban Minimum Lot Zoning and Spatial Equilibrium." *Journal of Urban Economics* 40(July 1996):1-12.

AB: This paper sets up a spatial, general equilibrium model of the residential economy in a semiclosed city with two income groups. The rich live in the suburbs and the poor in the central city. It appears that suburban minimum lot size zoning raises the utility level of the poor, a distributional consequence which has perhaps not been highlighted before. It also reduces land values (except at the periphery) and increases the size both of the central city and metropolitan area, implying that this form of zoning may be one of the major factors contributing to urban sprawl. (c) 1996 Academic Press, Inc.

Lenon, M., S.K. Chattopadhyay, and D.R. Heffley. "Zoning and Fiscal Interdependencies." *Journal of Real Estate Finance and Economics* 12(March 1996):221-34.

AB: Although there are strong theoretical reasons to regard optimal zoning and fiscal policies as simultaneous decisions, most empirical studies have focused on one type of decision or the other. Even fewer attempts have been made to study interdependencies between competing towns in their selection of zoning and fiscal policies. If these interdependencies are prevalent, autonomous local governments may pursue zoning, taxing and spending policies that are locally rational but socially inefficient. In this study, an optimization model of the local economy is used to illustrate the nature of these interdependencies and to specify an appropriate empirical test. Data from 164 Connecticut townships are used to estimate the empirical model.

Thorson, J.A. "An Examination of the Monopoly Zoning Hypothesis." *Land Economics* 72(February 1996):43-55.

AB: There have been several studies that have investigated the effect of zoning on housing prices. One hypothesis is that the restrictiveness of zoning laws will vary with the monopoly power of a town. The degree of monopoly power varies with the number of towns in the urban area. Urban areas with few zoning jurisdictions are likely to have higher housing prices than more fragmented urban areas. Previous research on this topic has shown mixed results. The results in this article suggest that towns with more monopoly power do tend to have significantly higher housing prices than more fragmented urban areas.

Brueckner, J.K. "Strategic Control of Growth in a System of Cities." *Journal of Public Economics* 57(1995).

Abstract. This paper provides an analysis of the supply-restriction model of growth controls. Growth controls in such a model harm consumers while enriching landowners, and they will only be adopted if landowners have political power. In the model, this power is manifested in the city government's use of a social welfare that takes both landlord and consumer welfare into account. Since cities cannot be small if the supply restriction inherent in growth controls is to have an impact, strategic interactions must be considered in the analysis of city choices. A general model is presented, and an extended example based on Leontief preferences is then considered. Comparative-static analysis of Nash equilibria in the Leontief case shows that perturbations of preferences or other characteristics of a single city can have important spillover effects that alter the choices of all cities in the region.

Sakashita, N. "An Economic Theory of Urban Growth Control." *Regional Science and Urban Economics* 25(1995):427-34.

Abstract. Economic theory of urban growth controls by Engle et al. (*Journal of Urban Economics*, 1992, 32, 269--283) is extended to the direction of endogenous residents' utility in a closed two-city economy. It is shown that the growth control policy is justified strictly only in the case in which there exist some size-related externalities in the process of urban growth. It is also shown that if the growth control policy is needed anyway, it is necessary to have an intervening policy concerning the population allocation among cities even before growth.

Miceli, T.J., and A.P. Minkler. "Willingness-to-Accept versus Willingness-to-Pay Measures of Value: Implications for Rent Control, Eminent Domain, and Zoning." *Public Finance Review* 23(April 1995):255-70.

Abstract: Recent work suggests that individuals' willingness-to-accept (WA) measures of value differ from their willingness-to-pay (WP) measures of value. This divergence has been attributed to some combination of wealth and "endowment" effects. Because WA is always higher than WP, market-supported distributions across individuals that are efficient based on the WP criterion may not be efficient when using a WA criterion. A positive explanation is offered, based on a WA measure of value, for government intervention in land-use situations. The simple analysis looks at both the divergences between a given individual's WA and WP measure of value and the different WA valuations across individuals. Instances are found in which government intervention with no efficiency basis under a WP efficiency criterion may be efficient if the standard is changed to a WA-based efficiency criterion instead.

Gin, A., and J. Sandy. "Evaluating the Demand for Residential Growth Controls." *Journal of Housing Economics* 3(June 1994):109-20.

AB. This paper estimates the demand for residential growth controls using voting results for the November 1988 election in San Diego County. An empirical model is estimated to determine the effect of various factors on the support for limiting residential growth in the county. The results indicate that higher rates of homeownership, and population growth increase the demand for growth controls. Greater employment in development-related fields decreases the demand for controls. Minorities and those with higher incomes are also found to oppose growth controls.

Karkkainen, B.C. "Zoning: A Reply to the Critics." *Journal of Land Use Environmental Law* 10(1994):1-45.

Karkkainen (1994) divides the arguments of the supporters of zoning into two types, and the arguments of zoning's detractors into four. Zoning's supporters cite two justifications for its existence: to preserve home values and to prevent undue burden on a community's tax base. Its detractors suggest: (1) that zoning benefits some households at the expense of others, and is therefore unfair; (2) that zoning introduces large transaction costs into the land use succession process; (3) that zoning is often used to exclude households from certain income and ethnic categories from living in the zoned communities; and (4) that zoning leads to allocative inefficiency in land use. Let us investigate each of these statements in turn.

Thorson, J.A. "Zoning Policy Changes and the Urban Fringe Land Market." *Journal of the American Real Estate and Urban Economics Association* 22(Fall 1994):527-38.

AB: This paper examines the effect of a zoning change on the land market in McHenry County, Illinois. One question addressed is whether zoning "follows the market." It is found that, for agricultural land, zoning does tend to follow the market. In addition, the effect of land prices on land use is examined. The results here, however, are mixed. In the initial years after the zoning change, a high relative price of residential land increases the probability that a parcel will be zoned residential. However, several years later, a high relative price of residential land decreases the probability that a parcel is zoned residential. This result suggests that it may take some time for a zoning change to have a significant impact on the local land market.

Pogodzinski, J.M., and T.R. Sass. "The Theory and Estimation of Endogenous Zoning." *Regional Science and Urban Economics* 24(October 1994):601-30.

AB: In this paper we develop and test a political theory of zoning. In our model, jurisdictions compete through their choice of tax-expenditure packages and zoning regulations. Voters choose among jurisdictions via the Tiebout mechanism. Thus local fiscal variables, zoning, and the demographic makeup of communities are all simultaneously determined. Our empirical estimates indicate that zoning decisions are consistent with externality, fiscal, and exclusionary motives. After controlling for selection bias we find that land-use regulations appear to 'follow the market' and do not appreciably affect housing values. In contrast, we show that characteristics-zoning regulations have significant effects on housing values.

Bates, L.J., and R.E. Santerre. "The Determinants of Restrictive Residential Zoning: Some Empirical Findings." *Journal of Regional Science* 34(May 1994):253-63.

AB: This study proposes, and finds evidence supporting, the hypothesis that restrictive residential land-use and minimum lot-size zoning are substitute ways of controlling the population intensity of future residential development. In addition, evidence is found linking externality, fiscal, and exclusionary objectives to restrictive residential zoning.

Cho, M., and P.Linneman. "Interjurisdictional Spillover Effects of Land Use Regulations." *Journal of Housing Research* 4(1993):131-63.

AB: This article analyzes the nature of the interjurisdictional spillover effect and empirically investigates the existence and magnitude of estimation bias incurred by the spillover effect of multiple local land use constraints. Five types of land use constraints are analyzed: the use restrictions of zoning; the residential use controls of zoning; the minimum lot-size requirements; and two spatially designated planned development controls.

Clingermayer, J. "Distributive Politics, Ward Representation, and the Spread of Zoning." *Public Choice* 77(December 1993):725-38.

AB: This analysis examines two alternative explanations for the adoption of comprehensive zoning ordinances in the years immediately following its initial adoption in New York City. The market failure explanation predicts zoning adoption in cities where externality problems (represented by heavy incidence of manufacturing) exist. The distributive policy-making model treats zoning as a form of regulation that is most likely to be found in cities where local legislators are elected from geographically-concentrated constituencies (e.g., wards) and therefore try to target policy benefits to their own constituencies while spreading the policy costs over all constituencies. Some support is found for each model. Especially striking is the interactive effect of ward representation and of economic interest (i.e., levels of home ownership).

Colwell, P.F., and C.F. Sirmans. "A Comment on Zoning, Returns to Scale, and the Value of Undeveloped Land." *Review of Economics and Statistics* 75(November 1993):783-86.

AB: This paper revisits the relationship between land value and parcel size. The authors demonstrate that, using a simple arbitrage equilibrium argument, the value-size relationship is convex (concave) whenever land assembly (subdivision) is possible. They also explore further the impact of zoning on market outcomes.

Bogart, W.T. "What Big Teeth You Have!: Identifying the Motivations for Exclusionary Zoning." *Urban Studies* 30(December 1993):1669-81.

AB: This paper considers whether a number of the motivations for exclusionary zoning usually examined by economists are distinguishable from one another in a general theoretical model. The four motivations identified are: fiscal zoning, public goods zoning, consumption zoning and political economic zoning. It is demonstrated in a general setting that the motivations are observationally equivalent if the only available information is community composition. The most important implication of this finding is that a policy directed at alleviating one motive for zoning inevitably affects other motives. The existence of exclusionary zoning does not constitute a prima facie case for any particular intervention. Rather, the true motivations behind the observed pattern of land use and land-use controls must be identified.

Wheaton, W.C. "Land Capitalization, Tiebout Mobility, and the Role of Zoning Regulations." *Journal of Urban Economics* 34(September 1993):102-17.

Abs: The paper analyzes whether Tiebout type income sorting will occur with land capitalization and how this is affected by zoning constraints.

Bollens, Scott A. "State Growth Management: Intergovernmental Frameworks and Policy Objectives." *Journal of the American Planning Association* 58(Autumn 1992):454-468

Abstract An examination of the diversity and evolution of state government interventions in local growth control processes seeks to identify the divergent policy paths of centralization and to illustrate the degree to which state interventions can, over time, broaden in scope and mature in structure. The intergovernmental structures and development goals of state growth programs initiated since 1970 in 13 states are contrasted. Many of these state and nonlocal growth management strategies seek to restrict growth having regionally detrimental effects. A growing number of strategies also attempt to facilitate regionally beneficial growth often opposed by local governments. The evolution of state growth policy has shifted from state preemptive regulatory interventions to conjoint and cooperative state-local planning frameworks and the incorporation of growth-accommodating economic policies into programs that were previously environmentally oriented. Such evolution indicates the maturation of state growth management and the increasing convergence of the diverse policy paths taken by state government.

Parsons, G.R., and Y. Wu. "The Opportunity Cost of Coastal Land-Use Controls: An Empirical Analysis." *Land Economics* 67(August 1991):308-16.

AB: Coastal land-use controls that limit new residential development on land adjacent to water have three principle efficiency effects: gain in aesthetics and clean water, loss of residential proximity to the coast, and loss of amenities at inland locations. Using hedonic price analysis of housing with data from a county on the Chesapeake Bay where controls were introduced, the authors estimate the opportunity cost of the second efficiency effect--displaced residential development. They predict the number of houses displaced due to controls and multiply that by the implicit value of coastal access amenities from the hedonic to estimate the loss.

Shilling, J.D., C.F. Sirmans, and K.A. Guidry. "The Impact of State Land-Use Controls on Residential Land Values." *Journal of Regional Science* 31(February 1991):83-92.

AB: In this paper, the authors examine the effects of state land-use control on the aggregate demand and supply of residential land. Previous studies have examined the effect of land-use regulation on housing prices using single-equation estimation. The authors estimate a three-equation interjurisdictional supply-

demand model of land-use controls. The authors' results suggest that land-use regulations have a significant impact on both the demand and supply of residential land as expected.

Beaton, W.P. "The Impact of Regional Land-Use Controls on Property Values: The Case of the New Jersey Pinelands." *Land Economics* 67(May 1991):172-94.

AB: This research reports a case study into the impacts that the New Jersey Pinelands Protection Act placed upon real estate values. The study ranges over a twenty-year period. An analysis of parcel resale values finds that markets must be partitioned into short-term and long-term resales. Residential parcels have capitalized the growth management policies into increased market values. Similarly, up to the time of adoption of the land-use controls, vacant land values have risen. Following adoption, vacant land values in the most restrictive zones have begun to fall.

Pogodzinski, J.M., and T.R. Sass. "Zoning and Hedonic Housing Price Models." *Journal of Housing Economics* 1(September 1991):271-92.

Pollakowski, H.O., and S.M. Wachter. "The Effects of Land-Use Constraints on Housing Prices." *Land Economics* 66(August 1990):315-24.

AB: This paper estimates the direct and spillover effects of zoning controls and other growth restrictions on housing prices. The authors show that specific growth controls must be examined in the overall context of local land-use policy, and that interjurisdictional, as well as intrajurisdictional, effects must be considered. Using pooled cross-section, time-series data from Montgomery County, Maryland, a reduced-form equation is estimated with housing prices measured by a double-sale index. Variables describing land availability and land-use restrictiveness include the percent of land vacant, development ceilings, a zoning restrictiveness index, and the relative restrictiveness of adjacent zones.

Siegan, B.H. "Land Use Regulations Should Preserve Only Vital and Pressing Governmental Interests." *Cato Journal* 10(Spring-Summer 1990):127-58.

Abstract Zoning practices seriously burden the use and development of land. The outcome of the typical debate over the best use of a tract of land will depend on who or what is best able to influence or pressure or even pay for the vote of city council members. That there may be an enormous demand for apartments in the community is likely to be a less important factor than the opposition to such use by certain politicians, homeowners, civic groups, or the media. The answer where there is no zoning is relatively clear. The property will, in all likelihood, be developed for the most valuable use, the one that society values the greatest. The land will satisfy the predominant consumer demand. A comparison of Houston, Texas, the only major US city without zoning, and Dallas, Texas, which has zoning, shows that a high demand for apartments is much more likely to be satisfied in the absence than in the presence of zoning. The most socially rewarding use of the land will then be determined by the least fallible of city planners - the marketplace.

Hanushek, E.A., and J.M. Quigley. "Commercial Land Use Regulation and Local Government Finance." *American Economic Review* 80(May 1990):176-80.

Abstract: A form of land use control is investigated - limitations on the growth of commercial property. A movement to limit nonresidential development has been especially strong in California, where additional growth is perceived to entail high environmental costs, average incomes and the demand for urban amenity are high, ad valorem tax rates are low, and the demand for location by firms is perceived as inelastic. The fiscal effects of limitations on commercial development adopted by initiative in San Francisco are examined. This initiative established an annual limit (950,000 sq. ft.) on new office space and regulated its distribution among buildings of varying sizes. Projections of differences in employment growth and commercial rent increases over the first 10 years of growth controls indicate that the growth limitation measure will have a negative effect on employment, reducing the growth of office employment by about 1% per year. On the fiscal side, the analysis questions the rational basis for such policies.

Brueckner, J.K. "Growth Controls and Land Values in an Open City." *Land Economics* 66(1990):237–248.

Abstract: In the face of rapid regional population growth, many localities in the US have turned to growth controls in an attempt to divert unwanted extra residents to other communities. A large empirical literature documents the effects of growth controls on housing and land markets. However, this literature offers no formal dynamic model that illustrates the positive growth controls on housing prices. Building on the framework of Capozza and Helsley (1989), a model is presented that focuses on the land development decision (conversion from rural to urban use) of a landowner operating with perfect foresight in a dynamic open-city environment. After deriving the optimal date of urban-rural conversion, the analysis considers the effect of an unanticipated growth control regulation, which delays conversion at each location. Results show that growth controls in an amenity-based model may raise rather than lower the value of undeveloped land in certain locations. Total property value is identified as the appropriate welfare measure in an open-city context.

Pollakowski, H.O., and S.M. Wachter. "The Effects of Land-Use Constraints on Housing Prices." *Land Economics* 66(August 1990):315-24.

Abstract: A study estimates the direct and spillover effects of zoning controls, along with other growth restrictions on housing prices. Theory leads to the expectation of a positive effect of land-use restrictions on the price of developed land and a negative effect on the price of undeveloped land. To focus on small areas within a county, a pooled cross-section times series data set is employed, constructed from the files of the Montgomery County (Maryland) Planning Board. These data follow 17 planning area groups within the county for the 6-year period 1982-1987. The study focuses on the owner-occupied single-family housing market. Results indicate that land-use regulations raise housing and developed land prices within a locality and demonstrate that spillover effects exist across localities. They also indicate that the effects of zoning and growth management controls taken together exceed their impact when separately measured. Even if there was no spillover impact on land prices, restrictions could cause development to be inefficiently dispersed.

Mills, D.E. "Zoning Rights and Land Development Timing." *Land Economics* (Aug 1990).

Abstract: The analysis of development timing and zoning rights in a growing city is straightforward where technology permits development to proceed continuously. However, when scale economies and indivisibilities prevail in construction, land development is lumpy and does not proceed continuously. In examining land development, a model of a growing office market in a city with mixed land uses is presented. The timing of commercial office development projects in response to growing demand is governed by preemptive competition among landowners. Results show that none of the property rights regimes examined are uniformly superior in terms of land market performance. Under some conditions of technology and demand, the land market performs better when the community holds property rights to the most intensive land uses. Still, there is no clear rule regarding the optimal impact fee to extract from landowners in exchange for development rights. The optimal fee generally is not equal to damages because of the perversities of development timing with preemptive competition.

McMillen, D.P., and J.F. McDonald. "A Two-Limit Tobit Model of Suburban Land-Use Zoning." *Land Economics* 66(August 1990):272-82.

AB: The land-use zoning of tracts of suburban land in metropolitan Chicago is considered to be a function of measures of access to transportation systems or general measures of location. A two-limit Tobit model is estimated for four categories of land use—single-family residential, apartment, business/commercial, and manufacturing. The results show that zoning is systematically related to various features of the transportation system—commuter and freight rail lines, limited-access highways, and the major airport. The patterns of zoning change over the periods 1961-71 and 1971-81 are also examined.

Holway, J.M., and R.J. Burby. "The Effects of Floodplain Development Controls on Residential Land Values." *Land Economics* (Aug 1990).

Abstract: Current land-use regulations in the US are being applied in various different ways, one of which is to protect environmentally critical areas, such as floodplains. The use of floodplains directly affects protection of the environment and public safety. The effects of the National Flood Insurance Program (NFIP), a federal effort that requires local governments to regulate floodplain land use in order to reduce the exposure of property to flood damages and resulting insurance losses, are examined. Using the hedonic method to examine land-use policy effects on land as a factor in the production of housing, results show that zoning floodplains for lower density development, implementing building regulations more stringent than the minimum required by the NFIP, and providing clear local leadership of programs contribute to lowering floodplain land values. From these findings, it is concluded that, while the NFIP is having an effect on land use in localities across the US, its effect can be amplified or subverted by local land-use policy decisions.

Henneberry, D.M., and R.L. Barrows. "Capitalization of Exclusive Agricultural Zoning into Farmland Prices." *Land Economics* 66(1990):249–258.

Abstract: A number of states and countries have adopted exclusive agricultural zoning to control the location or amount of nonfarm development in agricultural areas. This exclusive agricultural zoning differs from traditional rural zoning in that it limits development and often is strictly enforced. While economists have argued that conceptually, agricultural zoning lowers land values by restricting nonfarm development, in fact, economic theory predicts both positive and negative price effects, distributed differentially among farmland parcels depending on parcel characteristics. Recent research tests the hypothesis that the price effect of exclusive agricultural zoning varies with the characteristics of the parcel subject to the regulations. Regression analysis is used to analyze the price effects of exclusive agricultural zoning. A total of 120 parcels were used in the analysis. Results suggest that economists investigating the land price effects of zoning should use methodologies that distinguish between positive and negative price effects derived from parcel characteristics.

Mills, David E. "Is Zoning A Negative Sum Game?" *Land Economics* 65(Feb 1989):1-12

Abstract The economic purpose of zoning is to remedy market failure arising from externalities among urban land uses. By separating, excluding, and limiting dissimilar land uses, zoning should improve resource allocation and generate net social benefits. However, zoning is suboptimal. It suppresses gains from trade by restricting land uses that would generate net gains. Furthermore, even where zoning upholds an efficient land use pattern, large social costs can be imposed in implementation. These arise from rent-seeking efforts by landowners who try to capture the rents created by zoning. In the extreme, and sufficient conditions demonstrated are not very stringent, rent seeking dissipates so many of zoning's benefits that no zoning is shown to be more efficient. Where this occurs, zoning is a negative-sum game. Localities have policy options that would diminish the improvidence of zoning without leading to excessive congestion. These options are based on the notion that zoning rights are salable.

Speyrer, J.F. "The Effect of Land-Use Restrictions on Market Values of Single-Family Homes in Houston." *Journal of Real Estate Finance and Economics* 2(June 1989):117-30.

Daniels, T.L., and D.E. Reed. "Agricultural Zoning in a Metropolitan County. An Evaluation of the Black Hawk County Iowa, Program." *Landscape and Urban Planning* 16(1988):303-10.

Epple, D., T. Romer, and R. Filimon. "Community Development with Endogenous Land Use Controls." *Journal of Public Economics* 35(March 1988):133-62.

AB: When competitive landowners/developers control incorporation and zoning decisions, efficient patterns of development emerge. When, by contrast, early arrivals control policy, they may impose zoning restrictions that force later entrants to pay, via the property tax, a disproportionate share of the cost of providing public services. If new arrivals are sufficiently poor, they may choose to reside outside the community while higher quality land within the community remains unoccupied. This inefficient and

exclusionary outcome can be an equilibrium. If boundaries, once drawn, are irreversible, the ex ante introduction of a seemingly natural compensation scheme may not remedy the problem.

Knaap, G.J., and A.C. Nelson. "The Effects of Regional Land Use Control in Oregon: A Theoretical and Empirical Review." *Review of Regional Studies* 18(Spring 1988):37-46.

Wallace, N.E. "The Market Effects of Zoning Undeveloped Land: Does Zoning Follow the Market?" *Journal of Urban Economics* 23(1988):307-26.

White, J.R. "Large Lot Zoning and Subdivision Costs: A Test." *Journal of Urban Economics* 23(1988):370-84.

Katz, L., and K.T. Rosen. "The Interjurisdictional Effects of Growth Controls on Housing Prices." *Journal of Law Economics* 30(1987):149-60.

Abstract: The effects of local land-use regulations on house prices in the San Francisco Bay Area in California are examined. The interjurisdictional effect of land-use and growth controls in this area is analyzed within the context of a cross-sectional hedonic house price model. The sample consists of 1,673 single-family dwelling units from 63 suburban communities within the San Francisco metropolitan area. The data are based on records of house sales obtained from the Society of Real Estate Appraisers for the period January-June 1979. The model hypothesizes that the price of an individual house is a function of: 1. its structural characteristics, 2. neighborhood characteristics, 3. local fiscal characteristics, and 4. the land-use and/or growth-management policies of the jurisdiction in which it is located. It is demonstrated that land-use regulations appear to have a substantial effect on house prices. The regression analysis indicates that house prices are 17% to 38% higher in those communities having growth moratoria and/or growth control plans.

Daniels, T.L. "Oregon Land Use Controls." *Journal of the American Planning Association* 53(1987):391-391.

Parsons, G.R. "The Opportunity Costs of Residential Displacement Due to Coastal Land Use Restrictions: A Conceptual Framework." *Marine Resource Economics* 4(1987):111-22.

Buresh, J.C. "State and Federal Land Use Regulation: An Application to Groundwater and Nonpoint Source Pollution Control." *Yale Law Journal* 95(June 1986):1433-58.

Abstract: The reluctance of federal and state governments to regulate groundwater contamination and nonpoint-source pollution of ground and surface waters is no longer justified, even though both types of pollution are intimately related to land use (commonly considered a purely local concern). Many states have recognized the inadequacies of local land use regulation, and the legal doctrines and policy approaches they have developed to deal with resulting problems can and should be applied to groundwater and nonpoint-source pollution control. Federal water pollution control legislation must encourage and direct state regulation of defects in the local land use decision-making process if control of water pollution is to be effective. Federally mandated state land use regulation is ideal for the narrow, relatively objective goal of controlling these types of pollution. A proposed program relies largely on local preparation of control plans pursuant to state guidelines. This allows local governments to reconcile pollution control with other land use considerations while ensuring that pollution is adequately addressed.

Schwartz, S., P.M. Zorn, and D.E. Hansen. "Research Design Issues and Pitfalls in Growth Control Studies." *Land Economics* 65(1986):223-33.

Abstract: Because the scientific ideal of a true experiment is impossible in studies measuring the effects of growth control (GC) on house prices, alternative research designs must be used, such as quasiexperimental methods, which rely on a nonrandomly selected control group, or nonexperimental methods, which use statistical controls. A review of the existing studies suggests that researchers often are

unaware of the methodological problems associated with these alternative designs. The research design methods that can be used to control for factors that could cause errors in measuring the effect of GC are examined. It is shown that the choice of research methodology depends upon an understanding of the operation of housing markets and the particular characteristics of the measurement task. An empirical test of the theoretical criticisms is conducted by applying different models for measuring the GC effect to data from the University of California, Davis GC program. The main objective is to show how the familiar hedonic price method should be applied in a conceptual experiment to obtain valid results.

5. DEVELOPMENT RIGHTS

Miller, A.J. "Transferable Development Rights in the Constitutional Landscape: Has Penn Central Failed to Weather the Storm?" *Natural Resources Journal* 39(Summer 1999):459-516.

AB: Transferable Development Rights (TDRs) are a flexible market-based tool that allows land planners to overcome many of the shortcomings associated with traditional zoning practices. A TDR program works by designating a "sending" zone where development is restricted in exchange for the right to "transfer" that development to a "receiving" zone. Receiving zones are areas where development is permitted with the purchase of development rights (TDRs) from a sending zone. The value of TDRs is decided by the market. TDRs can have many positive land management impacts, but must be developed within the constitutional constraints of the Fifth Amendment's takings clause. This article argues that TDRs may be attacked under the Fifth Amendment in two ways. First, developers required to purchase TDRs may challenge them as unconstitutional exactions. Such challenges are rare but pose potentially serious threats to TDR programs, especially in light of recent Supreme Court decisions limiting the government's power to impose exactions. This article constructs a framework under which land managers may avoid such challenges. Second, landowners who have development restricted in exchange for TDRs may challenge the restrictions as a regulatory taking. These challenges are more common and courts have used two very different types of analysis in dealing with them. One approach treats TDRs as an economic use of the land and factors their value into the takings calculus. A second approach performs the takings calculus independent of TDRs and only considers TDRs as a form of just compensation where a taking has occurred. This article argues that the latter approach is more convincing theoretically and will better protect environmental resources, maximize TDR values, and assure fair and equitable treatment of landowners. As a result, market participants will have increased confidence in TDR market integrity. Finally, this article briefly addresses the outdated nature of Supreme Court precedent on TDR constitutionality and suggests that the Court revisit the issue to clarify its approach and provide analysis that is more consistent with modern takings jurisprudence and land management practices.

Thorsnes, P., and G.P.W. Simons. "Letting the Market Preserve Land: The Case for a Market-Driven Transfer of Development Rights Program." *Contemporary Economic Policy* 17(April 1999):256-66.

AB: The inequities inherent in conventional zoning-based policies leave urban-fringe jurisdictions unable to meet the growing demand for permanently preserved open space. Allocating marketable development rights (MDR) among all landowners treats this problem directly. It also leaves open the option of allowing the market to allocate land to undeveloped uses. This paper uses a simple market model to develop a framework that describes the mechanics of such a program and allows comparison with other commonly considered policies. The paper then addresses several concerns policy makers have raised about a market in development rights. Finally, the paper looks at alternative regulatory responses to perceived market failures. The analysis suggests that an MDR program offers significant advantages over existing preservation efforts.

Danner, J.C. "TDRs -- Great Idea but Questionable Value." *The Appraisal Journal* 65(Apr 1997):133-142

Abstract: A relatively new government land planning tool, transferable development rights (TDR) is described. TDR can preserve historic buildings or environmentally sensitive land and still allow the

property owner to maintain his ownership right of use. TDR are property use rights that can be transferred from one property to another by government-created programs. Many existing TDR programs have resulted in a potentially worthless property right because of the program's inefficiency. A TDR program must be designed with basic economic principles of supply and demand in mind. For valuation of TDRs in a new or existing program, an appraiser must understand the 4 economic factors - utility, scarcity, desire, and effective purchasing power - in order for anything to be of value. Research in Florida indicates that the market value of TDRs does not necessarily reflect prevailing land value in either the sending or receiving area. A case study is presented.

Levinson, A. "Why Oppose TDRs?: Transferable Development Rights Can Increase Overall Development." *Regional Science and Urban Economics* 27(June 1997):283-96.

AB: Economists have long argued that systems of marketable permits are a cost-effective means of regulating externalities. Though these ideas have only recently been implemented in the field of pollution control, transferable development rights (TDRs) have been used for decades by city planners in many locales. Most opponents of permit trading contest the granting of property rights to the originators of harmful effects on ethical grounds, and rarely argue that such schemes increase the total external harm. This paper formalizes the second argument by showing that in a partial equilibrium model of urban zoning, replacing a uniform height zoning rule with a TDR system can lead to greater overall development.

Pfeffer, M.J., and M.B. Lapping. "Public and Farmer Support for Purchase of Development Rights in the Metropolitan Northeast." *Journal of Soil and Water Conservation* 50(1995):30-3

Abstract: Purchase of development rights (PDR) programs have become popular farmland preservation tools in the Northeast. How public support of PDR programs compares with farmer support in the context of changes due to urbanization is discussed.

Panayotou, T. "Conservation of Biodiversity and Economic Development: The Concept of Transferable Development Rights." *Environmental and Resource Economics* 4(February 1994):91-110.

Kline, J., and D. Wichelns. "Using Referendum Data to Characterize Public Support for Purchasing Development Rights to Farmland." *Land Economics* 70(May 1994):223-33.

AB: An econometric model that describes public support for farmland preservation programs as a function of local land use patterns and socioeconomic data is developed. Two versions of the model are estimated using data from referenda conducted in Pennsylvania and Rhode Island during 1982 through 1990. Results suggest that support for referenda that purchase development rights is stronger in counties and towns with both rapidly increasing population and where land and house values have increased at higher rates. Environmental factors such as the prevalence of resource-sensitive lands are also significant in describing the public's motivation to preserve farmland.

Bates, L.J. "Municipal Monopoly Power and the Supply of Residential Development Rights." *Eastern Economic Journal* 19(Spring 1993):173-84.

AB: This study provides a theoretical and empirical framework that emphasizes the importance of municipal monopoly power on decisions about such land use controls as lot-size requirements and allowable use. The main hypothesis is that the quantity of the residential development rights supplied depends on the monopoly power or unique characteristics of a community. Indices of demographic, spatial and geographic uniqueness are developed for a sample of Connecticut communities. The empirical results suggest that unique communities tend to restrict residential development rights, as exemplified by larger lot sizes and smaller numbers of zoned residential parcels.

Daniels, T.L. "The Purchase of Developmental Rights: Preserving Agricultural Land and Open Space." *Journal of the American Planning Association* 57(1991):421-31.

Abstract The use of public money to purchase development rights to privately held land has become increasingly popular in recent years as a way to preserve agricultural land and open space. Several states and counties have devoted substantial dollars toward the purchase of development rights (PDR). The majority of PDR programs are found in the Northeast, and are particularly popular in urban fringe areas where farmland and open space are under intense pressure for conversion to urban or suburban uses. It is unlikely, however, that PDR programs alone can preserve a critical mass of farmland. Indeed, a number of states have chosen not to use PDRs among their growth management techniques. Although PDR programs are likely to remain controversial because of the sizable costs involved, they do offer more permanent farmland protection than zoning or property tax breaks and provide private landowners with compensation in return for restrictions on development.

Daniels, T. "Using LESA in a Purchase of Developmental Rights Program." *Journal of Soil and Water Conservation* 45(1990):617-21.

Blewett, R.A., and J.I. Lane. "Development Rights and the Differential Assessment of Agricultural Land: Fractional Valuation of Farmland Is Ineffective for Preserving Open Space and Subsidizes Speculation." *American Journal of Economics and Sociology* 47(April 1988):195-205.

Abstract: The relative fiscal effectiveness of using differential assessment as a means of preserving agricultural land is analyzed. A simple model of land use and land rent determination is developed and tested using data from Indiana, which has mandated statewide differential assessment of farmland based on current-use value. It is implied that differential assessment only slows down, but does not stop, the changing of land to developed uses. Differential assessment is seen as a tax expenditure, or a special tax reduction, that essentially leases development rights. Landowners also are shown to be overpaid for the development rights implicitly obtained by the public sector. Farmland can be preserved at a lower fiscal cost by using the fee simple purchase of development rights or regulatory control over the use of development rights.

6. AGRICULTURAL LAND USE

Plantinga, A.J., and D.J. Miller. "Agricultural Land Values and the Value of Rights to Future Land Development." *Land Economics* 77(Feb 2001):56-67.

Abstract: We investigate the influence of future land development on current agricultural land values. From a theoretical model of land markets, we derive a reduced-form expression for agricultural land values in terms of observable variables. This result dictates the specification of our econometric model and we find strong support for the model in an application to New York State. The estimated model, together with a spatial interpolation algorithm, is used to generate a surface of estimated development rights values for Orange County. This approach overcomes several problems that arise with the use of standard appraisal methods to value conservation easements.

Nickerson, C.J., and L. Lynch. "The Effect of Farmland Preservation Programs on Farmland Prices." *American Journal of Agricultural Economics* 83(2001):341-51.

AB. Government agencies in urbanizing areas are increasingly utilizing purchase and transfer of development rights programs to preserve farmland and protect local farm economies. This article tests the effect of development restrictions imposed by permanent easement sales on farmland sales prices, using Maryland data. We correct for selectivity bias due to the voluntary nature of these programs in estimating hedonic sales equations. Although preserved parcels' actual land values are lower, the effect of the restrictions is not statistically significant. These findings may encourage additional participation in preservation programs or justify reductions in the easement prices paid by agencies.

Vukina, T. and A. Wossink. "Environmental Policies and Agricultural Land Values." *Land Economics* 76(Aug 2000):413-29.

Abstract: The paper analyzes the impact of the phosphate-based animal production rights on agricultural land values in the Netherlands. We claim that the existence of mandatory production control program with regional restriction on trading causes a disproportional increase in land prices in the surplus region where the quota is binding, relative to the deficit region where the quota is not binding, and that the increase in the cost of environmental compliance should generate an eroding effect on the existing gap in land prices. The parameters of an inverse land demand model estimated with panel data support both hypotheses.

Korfmacher, K.S. "Farmland Preservation and Sustainable Agriculture: Grassroots and Policy Connections." *American Journal of Alternative Agriculture* 15(2000):37-43.

AB. Over the long run, a sustainable food production system requires both a sufficient base of agricultural land and agricultural practices that do not degrade the land. However, current policies and programs for protecting agricultural land are not systematically integrated with those promoting sustainable agriculture. There are various ways that policymakers, agricultural support organizations, and researchers could better integrate farmland preservation and sustainable agriculture efforts. This paper suggests several approaches for developing such connections including: coordinating local, state, and federal policies, conducting related research, and developing integrated outreach and education programs.

Centner, T.J. "Agricultural Nuisance: Curbing the Right-to-Farm." *Choices (First Quarter 2000):41-45.*

Claassen, R. and A. Tegene. "Agricultural Land Use Choice: A Discrete Choice Approach." *Agricultural and Resource Economics Review* 28(April 1999):26-36.

AB: A discrete choice model and site-specific data are used to analyze land use choices between **crop production** and pasture in the Corn Belt. The results show that conversion probabilities depend on relative returns, land quality, and government policy. In general it is found that landowners are less inclined to remove land from crop production than to convert land to crop production.

McLeod D.M., J. Woirhaye, and D.J. Menkhous. "Factors Influencing Support for Rural Land Use Control: A Case Study." *Agricultural and Resource Economics Review* 28(April 1999):44-56.

AB: **Agricultural land** is being converted into rural residences at an unprecedented rate in the Inter-mountain West. Survey data have been collected for Sublette County, Wyoming concerning preferences for private land use and land use controls. Selected land use controls include zoning, purchase of development rights and cluster development. Local in-migration appears to be driven by the pursuit of open space and environmental amenities. Logit models are estimated for public and private choice co-variables. Private concerns about land use are the chief determinants of land use control approval.

Weersink, A., and S. Clark, C.G. Turvey, and R. Sarker. "The Effect of Agricultural Policy on Farmland Values." *Land Economics* 75(Aug 1999):425-39

Abstract The extent to which agricultural support programs have been capitalized into farmland prices is examined. A present value land price model was developed which decomposes returns to the land base into its 2 possible sources (farm production and government subsidies) and allows the discount rates associated with these two income sources to vary. The empirical results indicate that government payments are discounted less than market-based returns in Ontario. Thus, government payments have been viewed as a more stable source of income to Ontario farm operators during the last half century than market-based returns.

Kline, J.D., and R.J. Alig. "Does Land Use Planning Slow the Conversion of Forest and Farm Lands?" *Growth and Change* 30(Winter 1999):3-22.

AB: Land use planning often is implemented to control development on forests and farmland, but its impact on land use remains untested. Previous studies evaluating such programs have relied on anecdotal evidence rather than on data describing actual land use change. A model of land use is specified as a

function of socioeconomic factors, land rent, and landowners' characteristics, to examine how well Oregon's land use planning program has protected forests and farmland from development. The empirical model describes the probability that forests and farmland in western Oregon and western Washington were developed to residential, commercial, or industrial uses, before and after Oregon's land use planning program took effect. Land use data are provided by the USDA Forest Service's Forest Inventory and Analysis program. Results suggest that Oregon's land use planning program has concentrated development within urban growth boundaries since its implementation, but its success at reducing the likelihood of development on resource lands located within forest use and exclusive farm use zones remains uncertain.

Ackerman, W.V. "Growth Control Versus the Growth Machine in Redlands, California: Conflict in Urban Land Use." *Urban Geography* 20(1999):46-167.

AB. In the United States, we have failed to control urban sprawl. Ultimately the pattern of urban growth is dictated by a complex interaction of place-specific factors in individual communities. These factors include geography, history, lifestyle, politics, and economics. This paper documents the conflict between development and slow-growth interests in the San Bernardino-Redlands area of southern California. Research presented focuses on the history and viability of agriculture, the origin of and forces behind the slow-growth movement, and the economic and social impact of growth-limiting policies. The conflict between developers and slow-growth proponents in Redlands demonstrates the inability of current land-use planning to deal effectively with a number of serious problems, including urban sprawl, the protection of valuable agricultural resources, and the provision of adequate and reasonably priced housing.

Nickerson, C.J., and L. Lynch. "Capitalization of Farmland Preservation Programs into Farmland Prices." *American Journal of Agricultural Economics* 80(1998):1205-1205.

Bradshaw, T.K., and B. Muller. "Impacts of Rapid Urban Growth on Farmland Conversion: Application of New Regional Land Use Policy Models and Geographical Information Systems." *Rural Sociology* 63(Mar 1998):1-25.

AB. Geographical Information Systems (GIS) computer mapping programs and new land use policy models are shown to be useful in understanding the dynamics of rural land conversion to urban uses. The California Central Valley Alternative Futures Model was constructed to evaluate patterns of growth that are forecasted to triple the population of the California Central Valley by 2040. The GIS sub-divided the Valley into over 750,000 land units, and a logit analysis evaluated factors leading to actual patterns of recent growth. Undeveloped land units were assigned a probability of future development, and expected population increases were allocated to those land units with the highest probability of future growth under two growth scenarios: low density and compact growth. The model shows that low density growth would convert over 1,035,000 acres of farmland to urban uses, including over 600,000 acres of prime or statewide important quality land. Compact growth would convert only 474,000 acres total, of which only 266,000 would be on prime soils. This paper shows how new land use models and GIS programs enable rural sociologists to better understand how rural communities and their spatial environment interact--in particular, how these tools enable researchers to explore the forces and consequences of rural and exurban growth. Reprinted by permission of the publisher.

Bunce, M. "Thirty Years of Farmland Preservation in North America: Discourses and Ideologies of a Movement." *Journal of Rural Studies* 14(1998):233-47.

AB. Thirty years after it first captured public attention, farmland preservation in North America remains a contentious issue which has failed to mature into an integrated element of rural land use planning. This paper argues that the explanation for this lies in the examination of the public discourses of the farmland preservation movement and the ideologies that underpin them. The evolution of popular and academic discourses and the influence of environmental and agrarian ideology are explored. This reveals an expanding discourse with ideological foundations riven with internal contradictions yet intersecting in different ways. The result has been a policy agenda influenced by a shift to increasingly broader motivations for farmland preservation and controlled by largely non-farm interests. Farmers, however, remain at the centre of the issue, cast in roles ranging from guarantors of food supply to guardians of

nature, open space and rural community. Yet farm voices are barely detectable in the discourse of the farmland preservation movement. This illustrates the representative power of discourse and suggests why farmland preservation remains a contentious policy issue. (C) 1998 Elsevier Science Ltd. All rights reserved.

Kline, J., and D. Wichelns. "Measuring Heterogeneous Preferences for Preserving Farmland and Open Space." *Ecological Economics* 26(August 1998):211-24.

Abstract Public preferences for environmental policies often vary among individual citizens according to their socio-economic characteristics and attitudes toward environmental programs. Most researchers account for socio-economic characteristics when conducting public preference surveys, but do not account for differences in preferences that transcend socio-economic categories. Identifying the public's attitudes regarding environmental programs and the role they play in shaping individuals' preferences for policy alternatives can assist policy makers in developing programs that are consistent with public expectations. This paper uses factor analysis and a discrete choice model to describe differences in public preferences that result from different attitudes regarding the goals of programs designed to preserve farmland and open space. Results describe policy implications that are not apparent when using models that address socio-economic characteristics alone.

Claassen, R. et-al. "Estimating the Effects of Relaxing Agricultural Land Use Restrictions: Wetland Delineation in the Swampbuster Program." *Review of Agricultural Economics* 20(Fall-Winter 1998):390-405.

Rosenberger, R.S. "Public Preferences Regarding the Goals of Farmland Preservation Programs: Comment." *Land Economics* 74(November 1998):557-65.

Abstract: Kline and Wichelns (1996) argued that public (government) farmland preservation programs would be more efficient if broadened to include not only agricultural productive and lifestyle criteria, but also open space criteria as preservation objectives. First, Kline and Wichelns only present part of the land preservation issue by identifying purchase of development rights and use-value tax assessment government-sanctioned preservation programs. Second, additional evidence is provided through factor analysis of qualitative data about natural and artificial assets in a specific county in Colorado collected for three distinct groups - residents of the county, visitors to the county from elsewhere in the state, and visitors to the county from outside the state.

Kline, J., and D. Wichelns. "Public Preferences Regarding the Goals of Farmland Preservation Programs: Reply." *Land-Economics* 74(November 1998):566-69.

Abstract: In Kline and Wichelns' (1996) paper, it is suggested that public farmland preservation programs could be more efficient in providing the benefits desired by the public if program objectives were expanded beyond preserving the most productive farmland to include environmental and aesthetic objectives as well. In his comment on the paper, Rosenberger (1998) suggests that Kline and Wichelns may have oversimplified the land preservation issue by ignoring the role that private institutions play in preserving land in the US. A response to Rosenberger is presented.

Restrictions: Wetland Delineation in the Swampbuster Program." *Review of Agricultural Economics* 20(Fall-Winter 1998):390-405

Daniels, T.L. "Where Does Cluster Zoning Fit in Farmland Protection?" *Journal of The American Planning Association* 63(1997):129-37

Abstract Farmland protection is a complex issue, especially in urban fringe areas. An effective protection program requires an integrated package of techniques along with the commitment of the agricultural community. Three scenarios are presented which illustrate the most common farmland protection situations. For each scenario, a package of solutions is devised to strike a balance between the protection of farmland and accommodating development. A successful farmland protection program in the urban fringe

must include the following elements: 1. property tax breaks for commercial farmers grossing over \$25,000 a year, 2. comprehensive planning together with agricultural zoning that allows only one 2-acre lot per 25 or 50 acres, 3. an option to sell development rights to the county or state, 4. right-to-farm laws to protect farmers against nuisance suits for standard farming practices, 5. urban growth boundaries to curb the extension of sewer and water lines and thus limit urban sprawl, 6. rural residential zones on lower quality soils and in locations that will not interfere with commercial farming, and 7. protection for farmers against government agencies taking their land through eminent domain.

Hardie, I.W., and P.J. Parks. "Land Use with Heterogeneous Land Quality: An Application of an Area Base Model." *American Journal of Agricultural Economics* 79(May 1997):299-310.

AB: Area models are being used in resource assessments to project the availability of farm and forest land. In this paper, the authors introduce a heterogeneous land area base model and apply it to a five-state region in the southeastern United States. Land quality turns out to be an important determinant of land use, suggesting that existing homogeneous land area base models may have an omitted variable problem. Parameter estimates are obtained using a modified multinomial logit model, which allows for error due to the use of county averages and error resulting from the use of sample estimates of land use acreage.

Reynolds, J.E. "New Opportunities for Using Farmland Values in the Analysis of Economic Issues: Discussion." *American Journal of Agricultural Economics* 79(1997):1665-68.

Abstract Reynolds comments on articles by Roka and Palmquist, Barnard et al and Boisvert et al regarding the use of the USDA June Agricultural Survey in hedonic analyses of regional farmland values, the capitalization of government payments into farmland values, and the potential for separating the effects of environmental characteristics from other determinants of farmland values.

Yue, J.S., T.T. Phipps, and D. Colyer. "Agricultural Land Values Under Urbanizing Influences." *Land Economics* 73(Feb 1997):90-100.

Abstract: Agricultural and urban-fringe models are combined, a combination of cross-sectional and time-series data from the Census of Agriculture and other sources is utilized, and a single-equation model for West Virginia farmland prices is estimated. Urban influences on land prices are captured using a gravity model adapted from marketing research. The results indicate that both farm income and urban influences have been important factors affecting the value of the state's farmland. The gravity model is a promising and parsimonious method for capturing urban influences in a single variable that combines size and distance.

Alterman, R. "The Challenge of Farmland Preservation - Lessons from a Six-Nation Comparison." *Journal of the American Planning Association* 63(1997):220-243.

AB. Countries differ significantly in their laws and policies for farmland preservation and in the degree of success achieved. This paper compares the policies of the U.S.A. and Canada-two countries with a high rate of farmland per person-with four other democracies on the other side of the Atlantic-Britain, The Netherlands, France, and Israel. The policies of the European Community are also discussed. The paper develops a framework for cross-national comparison of institutional, policy, and contextual factors. The findings show that stringent legal controls are not enough, nor is there a strong correlation between degree of success in farmland preservation and any particular format for planning. The great successes of the Netherlands and Britain-among Europe's most densely inhabited countries-are attributable to other factors. Since farmland preservation is increasingly being challenged by a declining economic rationale and competing collective goals, and since the countries across the Atlantic have had to face these challenges earlier than North America has, unlocking the secrets of success and failure through cross-national comparisons can help American and Canadian planners prepare effectively to meet future challenges.

Kline, J., and D. Wichelns. "Measuring Public Preferences for the Environmental Amenities Provided by Farmland." *European Review of Agricultural Economics* 23(1996):421-36.

AB. As farmland amenities have become relatively more scarce than food and fibre in developed countries, public concern has shifted away from increasing agricultural production, towards protecting rural environmental quality. Choosing appropriate policies requires accurate information describing public preferences for different amenities. This paper uses qualitative information provided by focus groups and survey data from a sample of Rhode Island (USA) residents, to identify and compare socially valued environmental amenities associated with farmland and open space. Public preferences for preserving farmland compare favourably with preferences for preserving other types of open space. Lands that include endangered species habitats and important groundwater resources are preferred.

Kline, J., and D. Wichelns. "Public Preferences Regarding the Goals of Farmland Preservation Programs." *Land Economics* 72(November 1996):538-49.

AB: Farmland preservation programs exist in all states. Most programs pursue agricultural objectives, such as preserving productive soils and viable farms. However, in some states the public may believe that programs should pursue broader goals often associated with preserving open space. Focus groups and a survey of Rhode Island residents provide information and data for factor analysis of preferences regarding farmland preservation goals. A system of structural equations (LISREL model) is used to examine differences in preferences among residents across socioeconomic categories. Results suggest that broadening the scope of farmland preservation programs to address environmental goals may increase public benefits.

Allanson, P., and A. Moxey. "Agricultural Land Use Change in England and Wales, 1892-1992." *Journal of Environmental Planning and Management* 39(June 1996):243-53.

AB: The paper presents a method for transforming Agricultural Census data on land use from arbitrary administrative reporting units to a set of more environmentally meaningful land classes. The procedure is used to analyse historical patterns of land use in England and Wales. The results demonstrate that cropping patterns are related systematically to land capability and reveal the complex adjustments in the spatial distribution of land uses that have underlain changes in the overall cropping mix over the past century.

Tavernier, E.M., F. Li, and T.T. Temel. "Search Theory Risk Preference and Farmland Preservation." *Agricultural and Resource Economics Review* 25(April 1996):38-45.

AB: This paper uses search theory to examine the role that risk preference (RP) plays in farmland preservation. Assuming that the distribution of the offer price is fixed, the analysis indicates that risk-averse agents have lower reservation prices than risk-neutral agents, and that agricultural land held by the former exits farming at a faster rate. The results also show that farmland preservation policies which increase reservation prices have a greater capitalization effect if agents are risk-loving, and that such policies, while effectively protecting the interest of land speculators, may be less effective in serving the needs of farming and farm-held open space.

Kline, J., and D. Wichelns. "Measuring Public Preferences for the Environmental Amenities Provided by Farmland." *European Review of Agricultural Economics* 23(1996):421-36.

AB. As farmland amenities have become relatively more scarce than food and fibre in developed countries, public concern has shifted away from increasing agricultural production, towards protecting rural environmental quality. Choosing appropriate policies requires accurate information describing public preferences for different amenities. This paper uses qualitative information provided by focus groups and survey data from a sample of Rhode Island (USA) residents, to identify and compare socially valued environmental amenities associated with farmland and open space. Public preferences for preserving farmland compare favourably with preferences for preserving other types of open space. Lands that include endangered species habitats and important groundwater resources are preferred.

Parks, P.J. "Explaining "Irrational" Land Use: Risk Aversion and Marginal Agricultural Land." *Journal of Environmental Economics and Management* 28(January 1995):34-47.

AB: When land users make dynamic land conversion decisions to maximize profits, persistent dedication of marginal land to agricultural uses can be explained as a consequence of risk aversion and expected capital gains. Land conversion increases in response to cost-sharing, rental payments, and technical assistance that reduces uncertainty about land benefits. When correlation between benefits is nonpositive, risk aversion leads the land user to diversify land among uses. Unless subsidy payments outweigh the sum of risk and capital gains costs, payments which appear potentially successful may fail. When payments succeed, the cost of accomplishing acreage targets may be higher than anticipated.

Heimlich, R.E. "Costs of an Agricultural Wetland Reserve." *Land Economics* 70(May 1994):234-46.

Abstract: The Food, Agriculture, Conservation and Trade Act of 1990 included a Wetland Reserve Program. A program for permanent easements on cropland converted from wetland is analyzed. Eligibility and costs for wetland restoration were estimated using data from several large databases. Estimated minimum costs increased from \$286 million for a 1-million-acre reserve to \$3.8 billion for 5 million acres, drawn from 55.2 million acres of eligible cropland. The use of 8 regional bidding pools increased total costs 32% over a single national pool. Proportional enrollment was the most expensive of 3 simulated strategies. Enrollment patterns and costs per acre for the US Department of Agriculture's 9-state pilot program differed from simulated strategies.

Lopez, R.A., F.A. Shah, and M.A. Altobello. "Amenity Benefits and the Optimal Allocation of Land." *Land Economics* 70(Feb 1994):53-62.

Abstract: Agricultural land often yields significant amenity benefits that may not be reflected in the prevailing allocation of land between agricultural and nonagricultural uses. A simple supply-demand model that incorporates these benefits in the determination of optimal land allocation is introduced. Three-stage least squares and county-level data are used to estimate the supply and demand parameters. These estimates confirm the plausibility of the conceptual model. Results from the contingent valuation literature illustrate the extent of underallocation of land to agriculture due to existing institutional conditions. Some corrective measures and their distributional effects are discussed and quantified.

Lopez, R.A., M.A. Altobello, and F.A. Shah. "Amenity Benefits and Public Policy: An Application to the Connecticut Dairy Sector." *Journal of Agricultural and Applied Economics* 26(December 1994):485-96.

AB. This article develops a conceptual framework for analyzing the role of state-level policies toward the dairy sector in the presence of farmland amenity benefits, and applies it to Connecticut. Milk supply, demand and amenity benefit functions are estimated, and three exogenously determined milk prices are considered. The empirical findings show, under each price scenario, the extent to which land is underallocated to the dairy sector if amenity benefits are ignored. Analysis of policy options reveals that a partial production cost subsidy represents the least-cost alternative for attaining the socially optimal solution for the region.

King, D.A., and J.A. Sinden. "Price Formation in Farm Land Markets." *Land Economics* 70(Feb 1994):38-52.

Abstract: Four models of price formation, incorporating search and bargaining concepts, were specified for an Australian farm land market. The models were estimated using primary data obtained from land buyers. A sequential, 4-equation model of buyer/seller behavior was selected as conceptually superior. Substantively, final prices were closer to buyers' bid prices than sellers' offer prices. Buyers valued soil conservation and proximity to town more highly, and property productivity and size less highly, than the sellers. Market information had a positive influence on price. In this area, education may be preferable to subsidies for achieving soil conservation.

Pfeffer, M.J., and M.B. Lapping. "Farmland Preservation, Development Rights and the Theory of the Growth Machine - The Views of the Planners." *Journal of Rural Studies* 10(1994):233-48.

AB. We examine the effectiveness of farmland preservation measures in challenging efforts to convert agricultural land to nonfarm uses in rural/urban fringe areas. Our focus is on programs based on the exchange of development rights in the northeastern United States. We employ theoretical constructs from Logan and Molotch's theory of the urban growth machine. They argue that the commodification of land associated with urbanization is the most important source of wealth and power for land-based elites. Yet, the activities of these elites are sometimes challenged with growth control measures like farmland preservation. To evaluate the effectiveness of these programs to defend farm land-use over purely commercial land exchange for speculative gain, we draw on data from focus group discussions and a survey of planners in metropolitan areas of the region. Our analysis also considers the limitations of such programs in the context of the absence of regional land-use planning. We find that farmland preservation programs based on the exchange of development rights do challenge some aspects of urban growth, but are also the result of those same development dynamics. Thus, they reflect certain class biases associated with the development of rural/urban fringe areas. However, we conclude that these programs could become more effective farmland protection tools with the implementation of comprehensive land-use planning.

Johnson, S.E., and H.M. Jacobs. "Public-Education for Growth Management - Lessons from Wisconsin's Farmland Preservation Program." *Journal of Soil and Water Conservation* 49(1994):333-338.

Abstract: The farmland preservation education initiative set up in Wisconsin is discussed. Successful education efforts in growth management depend upon several factors, including knowing the distinction between educating and advocacy.

Vitaliano, D.F., and C. Hill. "Agricultural Districts and Farmland Prices." *Journal of Real Estate Finance and Economics* 8(1994):213-23.

AB. A hedonic price equation of structureless farmland prices in New York State are fitted to 458 land transactions between 1982-1985. No capitalization is found of the state's Agricultural District farmland preservation program, which combines current-use property taxation with several development-inhibiting features. It is hypothesized that landowners avoid joining the program when it would threaten profits from a development sale, and that those who do participate gain little because agriculture is the highest value use of their land.

Anderson, J.E. "State Tax Credits and Land Use: Policy Analysis of Circuit-Breaker Effects." *Resource and Energy Economics* 15(September 1993):295-312.

AB: This study investigates two issues related to property tax relief and the preservation of prime agricultural land: (a) the extent to which state circuit-breaker tax credits are capitalized into land values and (b) the circuit-breakers' effects in preventing the transition of land from farming to developed uses. Using cross-section data for the years 1980-1983 for the circuit-breaker programs in Michigan, models of land values and participation rates are estimated. The results provide evidence that the property tax credits are partially capitalized into property value and that the circuit-breakers do not effectively retard the flow of land into urban use.

Jones, D.W., and R.V. O'Neill. "Land Use in the Presence of an Atmosphere Externality, with and without Corrective Taxes." *Journal of Regional Science* 33(November 1993):457-80.

AB: Total cleared area in a von Thunen land-use model drives an atmosphere externality that depresses agricultural productivity uniformly throughout the region. Exogenous events that encourage clearance and use of a larger cultivated area (output price or population increase) exacerbate the externality. Imposition of a simple, corrective tax on land rents does not reverse these patterns but does mitigate the increase in the externality and leaves cultivators with higher incomes than they would obtain without the tax. The authors examine an optimal tax on land rents, designed to maximize the social value of land rents in the region, and an output tax.

Nelson, A.C. "Preserving Prime Farmland in the Face of Urbanization - Lessons from Oregon." *Journal of the American Planning Association* 58(1992):467-88.

AB. This article combines theory and a literature review with empirical and descriptive findings to demonstrate that Oregon's mix of policies is effective in preserving prime farmland in the face of urbanization. Exclusive farm use zones preserve farmland for farming; urban growth boundaries limit urban sprawl; exurban districts accommodate the demand for rural residential development without harming commercial farm operations; farm tax deferral and right-to-farm laws create incentives for farmers to keep farming; and comprehensive plans legitimize the entire package. This article proposes a comprehensive scheme for farmland preservation that expands on the experience of Oregon, including its mistakes.

Reynolds, J.E. "Urban Land Conversion in Florida: Will Agriculture Survive." *Soil and Crop Science Society of Florida Proceedings* 52(1991):6-9.

Abstract Florida has experienced rapid population growth. Agricultural and rural land has been converted to urban uses to accommodate this growth. The objective of this study was to estimate the amount of urban land conversion in relation to population growth and examine the implications. Urban land expansion and population growth were analyzed to estimate differential rates of urban land conversion by type of area. The amount of land converted to urban uses was obtained from data interpreted from aerial photography and LANDSAT imagery. Urban land use coefficients varied from .347 acres person⁻¹ in metropolitan counties in Central and South Florida to 2.026 acres person⁻¹ in rural areas in North Florida. Projections to 2000 indicate that in some areas agriculture will be confronted with strong competition by urban uses for land.

Runge, C.F., and D. Halbach. "Export Demand, U.S. Farm Income, and Land Prices: 1949-1985." *Land Economics* 66(May 1990):150-62.

Abstract: The growing openness of the US economy has caused world supply and demand conditions to have significant farm-level impacts, emphasizing the important macroeconomic linkages between capital, goods, and factor markets in agriculture. The linkage from the international grain market to US farm income from 1949 to 1985 suggests that export demand may have played an important role affecting land and other input prices through the derived demand relationship. Empirical evidence from 8 grain-producing states supports the hypothesis that gross farm revenues are very sensitive to foreign demand. In general, export demand contributed substantially to farm income levels and indirectly to farmland values. Policies that reduce the actual or expected value of exports will put downward pressure on farm income unless additional income flows are guaranteed from domestic or government sources.

Daniels, T.L. "Policies to Preserve Prime Farmland in the USA: A Comment." *Journal of Rural Studies* 6(1990):331-6.

Heimlich, R.E. "Productivity of Highly Erodible Cropland." *Journal of Agricultural Economics Research* 41(Summer 1989):17-22.

AB. The notion that highly erodible soils are uniformly unproductive is not supported by empirical evidence. Thus, the presumption that the cost of conservation programs targeted at highly erodible land will be low is erroneous. Average net crop revenue on nonirrigated highly erodible cropland is less than on nonerodible land, but the productivity distributions across these erodibility classes are nearly equal. Significant acreages with all but the highest productivity can be at all levels of erodibility. Retiring highly erodible, physically marginal cropland is not synonymous with retiring less productive, economically marginal cropland.

Lockeretz, W. "Secondary Effects on Midwestern Agriculture of Metropolitan Development and Decreases in Farmland." *Land Economics* 65(Aug 1989):205-16.

Abstract: Although some observers believe that the secondary effects of increased urbanization on farmland may cause a greater decline in farm production than caused by the loss of farmland, there is evidence that this is not so. A study of the Corn Belt and Lake States regions shows that, while the decline increased with increasing metropolitan proximity, there was no evidence that land remaining in farms was more likely to be idled or used less intensively with increasing proximity to the metropolitan center. Between 1949 and 1982, the amount of harvested cropland as a percentage of total farmland and the real value of sales per acre increased at similar rates in metropolitan and rural counties. Within the metropolitan group, a decline in farmland was strongly associated with an increase in the intensiveness of farmland use. The results suggest that the outlook for agriculture in metropolitan areas may not be as bleak as often portrayed.

King, D.A., and J.A. Sinden. "Influence of Soil Conservation on Farm Land Values." *Land Economics* 64(Aug 1988):242-55.

Abstract: Research was presented that investigated the relationship between land condition, expressed as the status of on-farm soil conservation works, and farmland value. The hedonic approach was applied to an Australian farmland market. The objectives were: 1. to determine whether and by how much changes in land condition affect land prices, and 2. to explore whether the benefits of land improvement exceed the costs. The results showed that the market has clearly recognized land condition, with better land selling for higher prices. Condition influenced price in expectations of immediate wheat yields and in other ways. These influences reflected expectations of longer term yields, a desire to obtain and maintain a fully productive soil resource by purchasing better land, and a desire to avoid the unpriced costs of improving land in poor condition. There was no evidence that this market undervalued conserved land, relative to the costs of recommended conservation works and to yield expectations.

Heimlich, R.E. "Agricultural Programs and Cropland Conversion, 1975-1981." *Land Economics* 62(May 1986):174-81.

Abstract

Conversion of land for crop production in the presence of growing crop surpluses was of particular concern in the early 1980s. This process was labeled sodbusting. The implications of sodbuster legislation as it had been adopted in the early 1980s is investigated. The extent and location of cropland conversion are estimated for the periods 1975-1977 and 1979-1981; subsidies from participation in price-support and credit programs also are estimated. The analyses supports 3 major conclusions regarding proposed sodbuster legislation: 1. The total amount of land converted to cropland recently was not large relative to total cropland, and the amount of land subject to sodbuster provisions was even smaller. 2. Although attention has been focused on the Great Plains, conversion to cropland occurred in all regions of the US. 3. Price-support and credit program subsidies would have rendered the operation of some highly erodible new cropland in program crops minimally feasible.

Laband, D.N., and M. Lapping. "Foreign Ownership of United-States Farmland: An Economic Analysis of Regulation." *Journal of Rural Studies* 2(1986):74-5.

7. CONSERVATION RESERVE PROGRAM (CRP)

Plantinga A.J, R. Alig, and H.T. Cheng. "The Supply of Land for Conservation Uses: Evidence from the Conservation Reserve Program." *Resources Conservation and Recycling* 32(2001):199-215.

Abstract From 1987 to 1990, the Conservation Reserve Program (CRP) operated similarly to a competitive market for conservation lands. Using CRP data on counties from this period, we estimate supply functions for conservation lands for nine US regions. The results allow regions to be grouped according to low (Mountain, North Plains), moderate (Cornbelt, Lake States, South Plains), and high (Appalachian, Delta States, Northeast, Southeast) costs based on acreage enrolled. In addition, they identify farmers' perceived opportunity costs of enrolling cropland in a conservation program. The results provide

potentially useful information to CRP administrators following the recent reauthorization of the program and also yield insights into the costs of other land conservation efforts.

Johnson, P.N., S.K. Misra, and T.T. Ervin. "A Qualitative Choice Analysis of Factors Influencing Post-CRP Land Use Decisions." *Journal of Agricultural and Applied Economics* 29(July 1997):163-73.

AB: The future use of Conservation Reserve Program (CRP) lands is an important agricultural policy issue. To examine the effects of factors that influence landowners' post-contract use of CRP lands, a survey of Texas High Plains CRP contract holders was conducted in 1992. This study analyzes the results of the survey using a qualitative choice model. It was found that the presence of a livestock enterprise in the current contract holder's operation increases the probability of these acres remaining in the established cover. Contract holders who value the commodity base have an increased probability of returning their acres to crop production.

Skaggs, R.K., R.E. Kirksey, and W.M. Harper. "Determinants and Implications of Post-CRP Land Use Decisions." *Journal of Agricultural and Resource Economics* 19(December 1994):299-312.

AB: Conservation Reserve Program (CRP) land retirement contracts will begin to expire in late 1995. A multinomial logit model is used to identify characteristics influencing New Mexico CRP participant post-CRP land use plans. Results indicate post-CRP land use intentions will vary with attributes reflecting characteristics of the land enrolled, socioeconomic variables, and participant attitudes. Results point to a CRP-facilitated retreat from crop production to future ranching by many producers. The analysis suggests future changes in the structure and character of southern Great Plains agriculture and surrounding communities.

Ribaudo, M.O., C.T. Osborn, and K. Konyar. "Land Retirement as a Tool for Reducing Agricultural Nonpoint Source Pollution." *Land Economics* 70(Feb 1994):77-87.

Abstract: Cropland retirement is one option for reducing agriculturally generated nonpoint source water pollution. Research estimated the welfare effects of cropland retirement in addressing US surface water pollution problems. The social costs of retirement were evaluated with a programming model of the US agriculture sector and were compared to the water quality benefits from reduced soil erosion. Results indicate that land retirement as a primary pollution control tool is expensive, but if appropriately targeted, could generate sufficient benefits to outweigh social costs. Shifts in production patterns within and across regions caused by land retirement, and the implications for changes in chemical use and government deficiency payments are explored.

Hyberg, B.T., M.R. Dicks, and T. Hebert. "Economic Impacts of the Conservation Reserve Program on Rural Economies." *Review of Regional Studies* 21(Spring 1991):91-105.

AB. The impacts of a substantial program like the CRP, while significant for the nation, are potentially even more important for local farm dependent economies. This paper illustrates the importance of measuring the distributional impacts of national programs. The impacts of the CRP on 5 industrial sectors were investigated at national, regional and local levels using an input/output model. The results indicate that the agricultural production sector is most affected, followed by the agricultural inputs sector. The Total Gross Output (TGO) in the agricultural production sector and the agricultural inputs sector in areas dependent on agricultural production were found to decline up to 7 times the national rate. TGO for agriculturally dependent, rural economies decreased up to 35 times the national rate.

Ribaudo, M.O. "Targeting the Conservation Reserve Program to Maximize Water Quality Benefits." *Land Economics* 65(Nov 1989):320-32.

Abstract: Three plans for targeting a soil conservation program for the purpose of improving water quality are examined, using the Conservation Reserve Program (CRP) as an example. The Water Quality (WQ) scenario assumes that the marginal impact of soil conservation upon water quality differs between regions.

A simple way of identifying regions where a reduction in agricultural pollution is apt to result in noticeable water quality improvements is to compare the percentage share of pollutant loading from agriculture and the percentage reduction in concentrations required to meet water quality goals. Results clearly show that targeting erosion control for the purpose of improving water quality should take into account the potential economic benefits. Large increases in benefits were seen for 2 scenarios that account for damages to water users. The Damage per Acre scenario generated slightly greater benefits than the Damage per Ton scenario because the benefits per acre are not equal to the damages per acre. Results also indicate a need for further research in the area of nonpoint source water quality damages.

Shoemaker, R. "Agricultural Land Values and Rents Under the Conservation Reserve Program." *Land Economics* 65(May 1989):131-37.

Abstract: The objectives of the Conservation Reserve Program (CRP) are to reduce the erosion of fragile land, to decrease surplus production of agricultural commodities, and to provide income support for farmers. The impact of the CRP on land values depends on its net effect on expected farm income and returns to land. The CRP gives farmers who agree to retire their highly erodible land for 10 years an annual rental payment and half the cost of establishing a permanent cover. The primary reason the CRP might increase the value of enrolled land is that the farmer may be able to receive a CRP rent that is considerably higher than could otherwise be received. The CRP can increase land values if producers learn the bid caps and if there is asymmetry of the information. Using a discounting technique, the upper limit of the effect of the CRP on land values is presented.

Reichelderfer, K., and W.G. Boggess. "Government Decision-Making and Program Performance: The Case of the Conservation Reserve Program." *American Journal of Agricultural Economics* 70(February 1988):1-11.

AB. Performance of the Conservation Reserve Program (CRP) in meeting the political preferences of its administrators is highly sensitive to the choice of eligibility, bid solicitation, and bid selection criteria used in making program implementation decisions. Decisions made in the first year of CRP implementation led to suboptimal results; net government cost could have been reduced while simultaneously increasing the extent to which erosion and supply control objectives were met. Simulation of the outcomes for a fully enrolled reserve under alternative implementation schemes indicates that future performance can be improved by manipulating key control variables to directly target preferences.

Ervin, D.E., and M.R. Dicks. "Cropland Diversion For Conservation And Environmental Improvement: An Economic Welfare Analysis." *Land Economics* 64(Aug 1988):256-68.

Abstract: The potential economic welfare consequences of converting cropland to alternative uses to enhance conservation and environmental goals were analyzed. The conceptual benefits and costs of such a cropland diversion program (LDP) were identified and estimated for a hypothetical program. The identification of an LDP's theoretical economic welfare effects yielded important results. The most important result was that commodity program cost savings and land rental payments due to the LDP are flawed measures of program benefits and costs. Major economic welfare changes in restricted agricultural crop markets will only occur if the LDP induces nonmarginal supply shifts. If world prices rise, producers and taxpayers are likely to gain, while domestic and foreign consumers will lose. It was suggested that an LDP may fall short of generating annual benefits greater than annual costs, at least during the 5-year implementation period. Findings highlight the need for proper program design and implementation to enhance the LDP's net benefit potential.

Reichelderfer, K., and W.G. Boggess. "Government Decision Making and Program Performance: The Case of the Conservation Reserve Program." *American Journal of Agricultural Economics* 70(February 1988):1-11.

Daniels, T.L. "Americas Conservation Reserve Program - Rural Planning or Just Another Subsidy." *Journal of Rural Studies* 4(1988):405-11.

8. ENVIRONMENT AND SUSTAINABILITY

Wernstedt, K. "Terra Firma or Terra Incognita? Western Land Use, Hazardous Waste, and the Devolution of U.S. Federal Environmental Programs." *Natural Resources Journal* 40(Winter 2000):157-83..

AB: A diverse group of stakeholders has suggested that U.S. federal environmental programs should be integrated more tightly with local land use planning entities to improve environmental decision making and enhance public involvement. Proponents of this argument have been particularly vocal in the western part of the country. This article uses the example of a Superfund site in California to examine several difficulties with marrying federal protection efforts with local land use. Diverse local interests, the existence of non-local stakeholders, and the absence of strong statutory language and adequate funding all complicate efforts at the local involvement level.

Bruff, G.E., and A.P. Wood. "Local Sustainable Development: Land-Use Planning's Contribution to Modern Local Government." *Journal of Environmental Planning and Management* 43(July 2000):519-39.

AB: This paper assesses the contribution of land-use planning to the objectives of local sustainable development in some of the UK's most urbanized areas. Sustainable development provides the context within which local planning policies are now being prepared, and can be seen to be a potentially important aspect of central government's proposals for modernizing local government. Using the results from a comprehensive survey of development plans in metropolitan authorities, the paper assesses both the strengths and the weaknesses of land-use planning in terms of sustainable development and speculates upon the lessons they may offer to the government's more recent proposals on modernizing local government.

Smith, M.D., and R.S. Krannich. "Culture Clash" Revisited: Newcomer and Long-term Residents' Attitudes Toward Land Use, Development, and Environmental Issues in Rural Communities in the Rocky Mountain West." *Rural Sociology* 65(Sept 2000):396-421.

Abstract Many rural communities in the Rock Mountain West with high amenity values have experienced substantial in-migration in the 1990s. Popular media accounts and some social science literature suggest that newcomers have very different values than longer-term residents regarding environment, growth, and development issues, and that these differences are resulting in widespread social conflict.

Mahan, B.L., S. Polasky, and R.M. Adams. "Valuing Urban Wetlands: A Property Price Approach." *Land Economics* 76(Feb 2000):100-13.

Abstract The value of wetland amenities in the Portland, Oregon, metropolitan area is estimated using the hedonic property price model. Residential housing and wetland data are used to relate the sales price of a property to structural characteristics, neighborhood attributes, and amenities of wetlands and other environmental characteristics. Measures of interest are distance to and size of wetlands, including distance to four different wetland types; open water, emergent vegetation, scrub-shrub, and forested. Other environmental variables include proximity to parks, lakes, streams, and rivers. Results indicate that wetlands influence the value of residential property and that wetlands influence property values differently than other amenities. Increasing the size of the nearest wetland to a residence by one acre increased the residence's value by \$24. Similarly, reducing the distance to the nearest wetland by 1,000 feet increased the value by \$436. Home values were not influenced by wetland type.

Leggett, C.G., and N.E. Bockstael. "Evidence of the Effects of Water Quality on Residential Land Prices." *Journal of Environmental Economics and Management* 39(March 2000):121-44.

AB. We use hedonic techniques to show that water quality has a significant effect on property values along the Chesapeake Bay. We calculate the potential benefits from an illustrative (but limited) water quality improvement, and we calculate an upper bound to the benefits from a more widespread improvement.

Many environmental hedonic studies have almost entirely ignored the potential for omitted variables bias--the possibility that pollution sources, in addition to emitting undesirable substances, are likely to be unpleasant neighbors. We discuss the implications of this oversight, and we provide an application that addresses this potential problem.

Hales, R. "Land Use Development Planning and the Notion of Sustainable Development: Exploring Constraint and Facilitation within the English Planning System." *Journal of Environmental Planning and Management* 43(January 2000):99-121.

AB: This paper explores the English land use planning system's actual and potential abilities to both facilitate and constrain the advancement of sustainable development through the preparation of statutory development plans. The exploration is empirically based, focusing upon the conceptual and procedural issues most pertinent to the incorporation of sustainable development within this sector of public policy making. The findings reveal a lack of unified coherence in approach amongst local planning authorities as they struggle to translate the rhetoric of sustainable development into practice. One can detect, however, areas of difficulty and potential opportunity surfacing in the plan preparation process relating to issues of public participation, Local Agenda 21, environmental appraisal, data gathering, resources and guidance. There is also an indication that the institutional framework for incorporation lacks the facility to adopt a consistent position with regard to what one can consider as sustainability-orientated application principles.

Slater, A., and A. Gemmill. "Land Use Planning and Waste Management in Scotland." *Journal of Environmental Planning and Management* 42(November 1999):861-74.

AB: This study considers the planning system in Scotland as it relates to waste management. It examines local, structure and waste disposal plans in nine areas to identify links between the two systems. Initial findings reveal that statutory plans have limited influence on the location of new waste facilities and the reasons for this are explored. The European Union now requires the preparation of a National Waste Strategy (NWS) based on the principle of the waste hierarchy. The research concludes that effective waste management requires a close relationship between the NWS and development plans.

Murray, K.S., and D.T. Rogers. "Groundwater Vulnerability, Brownfield Redevelopment and Land Use Planning." *Journal of Environmental Planning and Management* 42(November 1999):801-10.

AB: An understanding of groundwater vulnerability in urban watersheds is important for the prevention of both surface water and **groundwater contamination** and can therefore be a useful tool in brownfield redevelopment and land use planning. Although industrial activity in southeastern Michigan has historically been restricted to the urbanized sections of metropolitan Detroit, new industrial development is rapidly taking place in rural and undeveloped areas. Although environmentalists and urban planners agree that industrial site recycling in urban centres (a.k.a. brownfield redevelopment) is preferable to developing green areas, many older sites remain undeveloped due to real and perceived risks. Using a PC-based geographic information system, a conceptual model of solute transport in soil was developed to evaluate potential impacts to both groundwater and surface water quality resulting from industrial development. The model was used to create a map of groundwater vulnerability within the Rouge River watershed of southeastern Michigan. The map has been used to pin-point several rural and undeveloped areas where groundwater quality is threatened by proposed development. It has also clearly demonstrated that many older brownfield sites, within the City of Detroit, are located on materials that have a much lower vulnerability to groundwater contamination and may therefore be far less costly to redevelop than greenfield sites in undeveloped areas of the watershed.

Rydin, Y. "Land Use Planning and Environmental Capacity: Reassessing the Use of Regulatory Policy Tools to Achieve Sustainable Development." *Journal of Environmental Planning and Management* 41(November 1998):749-65.

AB: Just as it is now widely accepted that the planning system has a role to play in achieving sustainable development, so the concept of environmental capacity has achieved increasing prominence as a means of realizing that role. This paper considers the debate on the concept of environmental capacity, reviewing

both the mainstream model and Jacobs' more nuanced social constructionist model. In doing so, it raises concerns about the appropriateness of regulatory policy tools and the implications for the distribution of environmental and other impacts. The discussion highlights the potential for using the planning system to promote change rather than resist it. In doing so, it suggests the need to consider a wider range of policy tools to achieve change at the local level and to clarify the dimensions of sustainable development that local planning can contribute to.

Segerson, K. "Government Regulation and Compensation: Implications for Environmental Quality and Natural Resource Use." *Contemporary Economic Policy* 15(October 1997):28-31.

AB. A collection of papers in this issue of *Contemporary Economic Policy* addresses compensation issues that arise from environmental policies. Goldstein and Waston, Bromley, Stroup, and Polasky et al. discuss whether or not government should compensate private property owners whose property values are reduced by regulatory restrictions. Dunford et al., Randall, Duffield, and Jones and Pease discuss the complexities of determining who should be compensated and by how much when public property is damaged by environmental contamination. This paper provides an overview of these studies and highlights the importance of the ongoing debate over compensation policy.

Segerson, K. "Legal Liability as an Environmental Policy Tool: Some Implications for Land Markets." *Journal of Real Estate Finance and Economics* 15(October 1997):143-58.

AB. This article considers the use of legal liability as a tool for internalizing environmental externalities, considering specifically the implications for land markets. The discussion focuses on liability under CERCLA. A simple model of land markets is used to evaluate alternative assignments of liability in terms of their impact on decisions to buy and sell property and to invest in pollution abatement. The results suggest that the existence of a land market can alter the effect of the liability rule. In some cases the land market can eliminate an inefficiency that would otherwise exist, while in other cases it can create one.

Plantinga, A.J. "The Effect of Agricultural Policies on Land Use and Environmental Quality." *American Journal of Agricultural Economics* 78(November 1996):1082-91.

AB: In this paper, the author considers the environmental quality gains that may be achieved by reducing agricultural income supports. A new methodology is developed to estimate land use shares. In an application to Wisconsin, milk support price reductions result in shifts of marginal agricultural land to forest, reducing soil erosion and providing off-site water quality improvements. The environmental benefits are estimated to be at least as large as the decreased welfare burden on consumers and taxpayers, indicating a central role for environmental quality considerations in motivating policy reforms and a more efficient means of achieving the environmental quality goals of land retirement programs.

Bejanonda, S., F.J. Hitzhusen, and D. Hite. "Agricultural Sedimentation, Impacts on Lakeside Property Values." *Agricultural and Resource Economic Review* (October 1999):1-11

Wernstedt, K., and R. Hersh. "Urban Land Use and Superfund Cleanups." *Journal of Urban Affairs* 20(1998):459-74.

AB. The writers discuss attempts by Congress to address the shortcomings of the federal Superfund program to clean up sites that are contaminated with hazardous substances. The program has long been criticized for the high costs it imposes on urban governments and others responsible for site cleanups. Congress has proposed changes to the Superfund statute that would tie cleanup at a Superfund site to the site's expected future land use. This could result in more efficient cleanups, promote economic development, and improve local public involvement in cleanup activities. However, based on a case study of a Superfund site in Woburn, Massachusetts, and other data, the writers argue that such admirable goals are complicated by the difficulty of combining cleanup and redevelopment objectives; the problem of ensuring representative public involvement; and the ambiguous legal and regulatory responsibilities of institutions charged with long-term management of hazardous substances left on site.

Olah, L. "Can Neighboring Communities be Forced to Accept an Unwanted Land Use?: Dispute Over Reindustrialization Use of Former Badger Army Ammunition Plant." *Public Management* 79(Oct 1997):42.

AB. The defunct 7,400-acre Badger Army Ammunition Plant in Sauk County, Wisconsin, which has been on standby status since 1975, has become the focus of a countywide battle to preserve the area's rural quality of life, endangered natural resources, and local economic health. Controversy has arisen since a September 18, 1996, announcement by the Olin Corp. and the U.S. Army that they were beginning an aggressive marketing scheme to attract the pulp and paper industries; varnish, paint, and lacquer producers; the ethanol and cosmetics industries; and nitrogenous fertilizer plants to the plant site by 1997. The reindustrialization proposal was a consequence of the 1992 Armament Retooling and Support Act, and the targeted industries had been identified in a strategic planning process that did not include nearby communities; local town, village, and county boards; planning and zoning authorities; and other stakeholders.

Wu, J., and K. Segerson. "The Impact of Policies and Land Characteristics on Potential Groundwater Pollution in Wisconsin." *American Journal of Agricultural Economics* 77(November 1995):1033-47.

AB. In this paper, the authors present an empirical framework for quantifying the extensive margin effects of commodity programs and chemical-use taxes on potential groundwater pollution in Wisconsin. The approach emphasizes the role of the joint distribution of crops and site characteristics in determining policy impacts on groundwater contamination. The results indicate that, for a given reduction in total polluting acreage, an increase in the Acreage Reduction Program rate for corn is well targeted and would reduce high-polluting acreage more than a chemical-use tax or a target price policy in the areas where it might be needed most.

Meyer, W.B. "NIMBY Then and Now: Land-use Conflict in Worcester, Massachusetts, 1876-1900." *The Professional Geographer* 47(Aug 1995):298-308.

AB. A study was conducted to examine exclusionary conflict in Worcester, Massachusetts, in the late 19th century to determine its bearing upon the way such conflict in the late 20th century has been and might be characterized and explained. This historically comparative study should help clarify the nature and sources of contemporary NIMBY (not in my back yard) activism. The findings do little to uphold claims that 20th-century affluence, technological change, or decline in public confidence in institutions underlie NIMBY or environmental activism. The existence of activism devoted to environmental and quality-of-life improvements in the late 19th century casts doubt on the notion that a basic modern change in values accounts for a higher level of NIMBY activism today. Furthermore, it is not clear that opportunities for public participation in siting decisions, frequently cited as a cause in the rise of NIMBYism, have increased.

Harbor, J.M. "A Practical Method for Estimating the Impact of Land-use Change on Surface Runoff, Groundwater Recharge and Wetland Hydrology." *Journal of the American Planning Association* 60(Winter 1994):95-108.

AB. Environmental scientists and local planners need a way to estimate initially the impacts of land-use change on groundwater recharge, water supply and wetland hydrology. Using a core component of more complex models, a simple spreadsheet analysis can estimate the change in runoff and recharge from past or proposed land-use changes. This day-to-day tool for planners uses only readily available data. In a sample analysis, conversion of woodland to high-density residential and commercial uses causes an eleven- to nineteen-fold increase in runoff volumes, and loss of 11 to 100 percent of the natural groundwater recharge. A survey of planners found enthusiasm for the model. Potential applications are plan review, raising community awareness of potential problems and support for regulatory action, and as part of local guidelines to minimize disturbance of the hydrologic regime. Reprinted by permission of the publisher.

Pan, J.H., and I.D. Hodge. "Land Use Permits as an Alternative to Fertilizer and Leaching Taxes for the Control of Nitrate Pollution." *Journal of Agricultural Economics* 45(January 1994):102-12.

AB: Legislation emanating from the European Community is establishing pressures to take action to reduce the level of nitrates in water, and the principles established towards environmental management indicate an emphasis on prevention rather than treatment. This paper analyses three possible approaches by means of controls on fertilisers, on nitrate leaching and on land use. These are incorporated into a linear programming model of a catchment in Cambridgeshire. The results indicate the superior cost-effectiveness of controls over leaching and the severe impact which taxes would have on farm incomes. A system of permits on land use is found to be relatively cost-effective and to offer an administratively feasible alternative.

Owens, S. "Environmental Change and Land-Use Planning." *Environment and Planning A* 24(December 1992):1671-75.

Ervin, D.E., and M.R. Dicks. "Cropland Diversion For Conservation And Environmental Improvement: An Economic Welfare Analysis." *Land Economics* 64(Aug 1988):256-68.

AB. Conceptual economic welfare impacts of cropland diversion for conservation and environmental improvement (e.g., Conservation Reserve Program) are identified. The analysis demonstrates the possible incongruities between government cost effects and the program's social benefits and costs. Partial estimates for a hypothetical cropland diversion program reveal that annual program benefits probably fall short of annual costs. However, some important program effects could not be valued. Several design improvements are discussed, which may enhance the net benefit potential of the Conservation Reserve Program or other programs.

9. BIODIVERSITY

Endres, A., and V. Radke. "Land Use, Biodiversity, and Sustainability." *Journal of Economics (Zeitschrift-fur-Nationalokonomie)* 70(1999):1-16.

AB: We focus on the effects of deforestation for agricultural purposes on biodiversity. This topic has been dealt with in the recent literature where "forested land" and "biodiversity" are treated as synonyms. In contrast to that, this paper distinguishes between "forested land" and "forest" itself, the latter being interpreted as a measure of biodiversity. The regenerative capacity of forests is modeled as a function of the own stock and of the habitat size. In particular, the threat of a given minimum viable population to be achieved in the course of the reduction of habitats is taken into account. The corresponding structure of a sustainability indicator is elaborated.

Walker, B. "Maximizing Net Benefits through Biodiversity as a Primary Land Use." *Environment and Development Economics* 4(May 1999):204-14.

Abstract. In many developing regions of the world conventional agriculture is failing to meet the needs of people and at the same time is becoming progressively less ecologically sustainable. It is proposed that in a number of these regions, both overall economic development and the welfare of the inhabitants would improve if the primary form of land use was based on multiple use of those regions' natural biological resources, rather than continuing the practice of replacing or displacing them with marginal forms of agriculture. Testing this proposition, and then (if appropriate) effecting it, requires answers to a number of ecological, economic and management questions, in particular to do with: identifying those regions where biodiversity use has high potential the appropriate spatial scales for planning and management compatible combinations of different types of resource use ecological and economic trade-offs between different resource use enterprises how to arrive at the most efficient form of resource use sustainable levels of biodiversity harvest resource use decisions in relation to ecological drivers (such as climate and fire) institutional and regulatory structures that dictate current resource use. These questions, it is proposed,

should form the basis of an international 'virtual' institute, composed of three Biodiversity Centres, one each in Latin America, southern Africa and Southeast Asia. Examples of multiple use, such as of wildlife in southern Africa, are used to illustrate the potential, and the management scale and other issues involved. If the development of this form of land use is to succeed, it will require technical and management advice and, in many cases, removal of 'perverse incentives' that prevent a change to the more economically and ecologically sustainable form of land use. From the beginning, the emphasis in the proposed centres would be on collaborative work involving governments, landowners and resource-based industries.

Walker, R. "The Structure of Uncultivated Wilderness: Land Use beyond the Extensive Margin." *Journal of Regional Science* 39(May 1999):387-409.

Abstract: This paper presents an agent-based model of shifting cultivation that explains patterns of land use and forest structure beyond the extensive margin of agriculture. The anthropological literature is first examined in order to specify key aspects of farming group preferences vis-a-vis food requirements. Two existing theories of shifting cultivation are then addressed to motivate the present formulation, which integrates household production theory and the concept of optimal rotation originating in the forestry literature. It is argued that the cycling of secondary vegetation by shifting cultivators represents a form of rotation analogous to the foresters' case. The model developed explains the empirical observation that individual agents use multiple rotation ages, and it does so for the nonmarket case, which is consistent with the institutional environment of many indigenous peoples and colonists. The paper concludes with an application to the problem of rural violence in Brazil and with suggestions for extending the framework to the policy arena of global change.

Walker, R.T., and W.D. Solecki. "Managing Land Use and Land-Cover Change: The New Jersey Pinelands Biosphere Reserve." *Annals of the Association of American Geographers* 89(2 June 1999):220-37.

AB. The writers consider the implementation of the biosphere reserve associated with the New Jersey Pinelands Comprehensive Management Plan (PCMP). They discuss the findings of a statistical analysis evaluating claims that the plan has managed to direct growth and land-cover change in a way consistent with environmental aims. They demonstrate that it has had a strong effect in lowering conversion of natural areas in the Pinelands reserve and that the impact observed is consistent with biosphere theory. They point out that conversion is lowest in the protection core and growing in the protective buffers. They assert that multiple jurisdictions can come together to slow the pace of regional ecosystem degradation. In conclusion, they consider the prospects for enacting biosphere planning more broadly, in light of the apparent success of the PCMP.

Prior-Magee, J.S., B.C Thompson, and D. Daniel. "Evaluating Consistency of Categorizing Biodiversity Management Status Relative to Land Stewardship in the Gap Analysis Program." *Journal of Environmental Planning and Management* 41(Mar 1998): 209-216

Abstract The gap analysis process provides an overview of the distribution and conservation status of several components of biodiversity. Lands are categorized relative to the management status, the degree to which an area is managed to maintain biodiversity. This study examines how various socio-political groups interpret and apply the management status codes used to categorize land tracts in gap analysis. A key finding is the considerable variation among individuals in their application of the status codes. This shows a large degree of uncertainty about the land tracts and the status codes. and suggests the need to develop an objective and repeatable management categorization process.

Noble, I.R., and R. Dirzo. "Forests as Human-Dominated Ecosystems." *Science* 277(Jul 25, 1997): 522-525

Abstract Agroforestry reduces biodiversity, but it can also act as an effective buffer to forest clearance and conversion to other land uses which present the greatest threat to forested ecosystems.

Seibel, S., R. Hoffmann-Kroll, and D. Schafer. "Land Use and Biodiversity Indicators from Ecological Area Sampling--Results of a Pilot Study in Germany." *Statistical Journal* 14(1997):379-95.

AB: Ecological Area Sampling (EAS) is a new statistical approach to provide data on the state and development of ecosystem and landscape structures. EAS is a systematically designed and standardized tool of data sampling and analysis to get representative results of physical structures for the whole of Germany. Data are collected periodically in monitoring sites selected at random. The concepts were tested to a limited extent in a pilot study in summer 1995 and summer 1996. In the article the general concepts of EAS will be briefly outlined. The survey contents and the indicators that can be derived will be described, and some first results of the pilot study will be given.

Goldstein, B. "The Struggle over Ecosystem Management at Yellowstone." *Bioscience* 42(Mar 1992):183-87.

Abstract Yellowstone National Park may be recreated in a new image as part of the Greater Yellowstone Ecosystem (GYE). Ecosystem-management advocates believe that managing across a larger patchwork of ownership will better preserve scenic beauty and biodiversity.

Ewel, K.C. "Multiple Demands on Wetlands." *Bioscience* 40(Oct 1990):660

Abstract The cypress swamps of Florida serve as a case study that demonstrates the kinds of land-use conflicts that may arise and outlines considerations that are useful in resolving them. Land use often conflicts with the preservation of biodiversity and watershed protection.

10. HOUSING

Staley, S.R. "Ballot-Box Zoning Transaction Costs, and Urban Growth." *Journal of the American Planning Association* 67(Winter 2001):25-37.

Abstract: Planning through ballot-box zoning is becoming increasingly common across the nation. Unfortunately, little empirical work has been done to assess the consequences of ballot-box zoning on urban growth and development activity. A transaction-cost approach to land use planning is used to assess how public referenda on site-specific rezonings impact development activity in cities. An analysis of housing unit activity from 1980 to 1994 in 63 Ohio cities finds consistent and robust evidence that subjecting rezoning decisions to public referenda created a housing unit growth penalty for cities. Moreover, the empirical results were consistently negative irrespective of whether the city rejected or accommodated the proposed rezoning.

Cladera, J.R., and M.C. Burns. "The Liberalization of the Land Market in Spain: The 1998 Reform of Urban Planning Legislation." *European Planning Studies* 8(Oct 2000):547-64.

Abstract Against a general climate of liberalization, the Spanish Government has made a concerted effort to bring about a reduction in house prices. A legislative reform in April 1998 has sought to liberalize land and planning, through (a) refining the category of land previously excluded from development to enable residential development to take place, (b) allowing for greater flexibility of land uses and building controls, and (c) reducing administrative controls.

Moudon, A.V., and P.M. "Suburban Clusters: The Nucleation of Multifamily Housing in Suburban Areas of the Central Puget Sound." *Journal of the American Planning Association* 66(Summer 2000):243-264.

Abstract Almost 20% of the suburban population in the central Puget Sound lives in 85 small clusters characterized by areas of medium-density residential development in unexpectedly close proximity to retail and office uses and with a high proportion of people of color. These clusters challenge the traditional

depiction of suburban housing as decentralized, with low-density single-family tracts segregated from other land uses. They indicate that residential functions in maturing suburbs not only densify, but also nucleate. At the regional level, these clusters form low-level concentrations of activity that have yet to be acknowledged. At the local level, they contain land uses that approximate those of neighborhood planning models devised since the beginning of the 20th century. Recognizing these clusters opens up important new opportunities for housing and transportation policy in suburban areas.

Turnbull, G.K. "Housing Prices and Residential Land Use under Job Site Uncertainty." *Journal of Housing Economics* 7(March 1998):1-20.

AB. This paper examines the effects of job site uncertainty in a multiple center city. It shows that workers sort themselves spatially according to their job site stability. Risk averse workers also respond to the spatial variation in commuting cost risk which offsets the tendency to sort by job site stability. The theory predicts less spatial sorting by commuting costs than the certainty or risk-neutral models predict. House bid prices capitalize the spatial variations in expected travel cost and its variance, leading a flatter price surface than under certainty. In addition, risk aversion generates price peaks between employment centers.

Knaap, G. "Determinants of Residential Property Values: Implications for Metropolitan Planning." *Journal of Planning Literature* 12(Feb 1998):267-282.

Abstract Knaap suggests that property values provide a sensitive index to the effects of planning and the problems planning is designed to address, and his study reveals that planning can contribute to problems of housing affordability.

Stockdale, A., and G. Lloyd. "Forgotten Needs? The Demographic and Socio-Economic Impact of Free-Standing New Settlements." *Housing Studies* 13(Jan 1998):43-58.

Abstract The changing distribution of national populations and associated housing pressure during recent decades suggest a need for a more appropriate land use planning response, such as the creation of free-standing new settlements. Stockdale and Lloyd assess the impact of such developments on residential mobility patterns and examine the socio-economic characteristics of residents and their level of satisfaction with the provision of services.

Monk, S., B.J. Pearce, and C.M.E. Whitehead. "Land-Use Planning, Land Supply, and House Prices." *Environment and Planning A* 28(March 1996):495-511.

AB. There are clearly significant social benefits to land-use planning, but there may also be significant private and social costs which need to be taken into account. In this paper we explore the relationship between land-use planning, the supply of housing land, and the supply and price of housing. It is based on two pieces of empirical research. In the first study, an investigation was conducted of the extent to which land supply, and particularly the operation of the planning system, had affected house prices in Britain during the 1980s, and how far planning had placed a constraint on land supply or simply reorganised that supply. In the follow-up study a single planning area was looked at to examine the extent to which increased land allocations in one area can compensate for constraints on land supply in another. We conclude that the planning system imposes significant costs, which include the exacerbation of price increases in periods of economic growth, but without being able to generate higher housing output during recession. In addition the planning system tends to foster a narrower range of housing types and densities than would be expected in its absence, and so restricts the choice available to consumers.

Keuschnigg, C., and S.B. Nielsen. "Housing Markets and Vacant Land" *Journal of Economic Dynamics & Control* 20(Sep/Oct 1996):1731-32.

Abstract: Land use in an urban zone is examined. A partial equilibrium model of housing markets with both vacant and built-up land is proposed. The existing literature, precluding physical decay of housing stocks, assumes building decisions to be irreversible and treats any given stock of vacant land as an exhaustible resource. In contrast, it is argued that vacant land is built upon in finite time rather than

asymptotically and reduces to a temporary phenomenon only. When housing stocks depreciate, the continued replacement of existing structures allows to adjust the average structural intensity, even if all land is built upon.

Reiner, T.A. and Strong, A.L. "Formation of Land and Housing Markets in the Czech Republic." *Journal of the American Planning Association* 61(Spring 1995):200-09.

Abstract Czechoslovakia and its successor Czech Republic, after 40 years of Communist rule with state ownership of land and most housing, have been engaged deeply in restoring private ownership and recreating markets. Restitution and privatization return real property to private hands. Restitution, return of property to prior owners, is well on its way. Property not so returned is privatized: by auction, distribution of shares, or by bid. Markets are emerging; so are rent gradients and land use patterns familiar to Westerners. However, paucity of land records and price information, absence of mortgage funds, rent controls, and continued public ownership of much housing and farmland are among the impediments to full market formation. Given the nation's present acute aversion to public planning, the role of land use planning in shaping development remains unclear.

Barlow, J. "Controlling the Housing Land Market: Some Examples from Europe." *Urban Studies* 30(Aug 1993):1129.

Abstract A major problem in producing low-cost housing in the UK is the continued lack of control over the market for housing land, yet there is little debate on ways of controlling land prices. Some alternative approaches to land-use planning are assessed, focusing on high growth sub-regions in the UK, France and Sweden.

Bramley, G. "Land Use Planning and the Housing Market in Britain: The Impact on Housebuilding and House Prices." *Environment and Planning-A* 25(July 1993):1021-51.

AB: The impact of the British style of land-use planning upon the outcomes of private housing development and the housing market is examined. A unique cross-sectional database is constructed, and the medium-term elasticity of new house building supply is estimated as a locally variable function of prices, costs, and land supply, with an explicit planning function. The model developed enables quantified projections to be made of the effect of specified changes in planning policy. The policy changes examined include large-scale increases in the volume of land released, changes in the mix of land released, and the use of planning agreements to pay for infrastructure or social housing.

Bramley, G. "The Impact of Land Use Planning and Tax Subsidies on the Supply and Price of Housing in Britain." *Urban Studies* 30(February 1993):5-30.

AB: This article presents new empirical estimates of the impact of two types of policy intervention, tax subsidies and land use planning, on the housing market in Britain. The estimates are derived from a set of models representing the demand and supply sides of the market for the new private housebuilding which include an explicit land supply element. The models are fitted to cross-sectional data at the inter-urban (local authority) level, and then employed in medium-period simulations of alternative policies. Modeling at this level enables estimates to be made of the extent of variation between local markets in the elasticity of supply and also in the impacts of policy measures, including the capitalization of tax subsidies.

Parsons, G.R. "The Effect of Coastal Land Use Restrictions on Housing Prices: A Repeat Sale Analysis." *Journal of Environmental Economics and Management* 22(January 1992):25-37.

AB: In 1986, the Critical Areas Commission of the state of Maryland established a set of land use restrictions that limit residential development on land abutting the Chesapeake Bay. In this paper the author estimates the effect of these restrictions on housing prices in one county on the Bay. He uses a repeat sale analysis --inferring the effect of restrictions by observing price changes on houses that sold both before and after the restrictions were enacted. Housing prices in the Critical Area with water frontage increased by 46-

62 percent due to restrictions. Housing prices in the Critical Area without frontage increased by 14-27 percent and prices near but not in the Critical Area increased by 13-21 percent.

Smith, H. C., and Wilson, K.H. "New Communities in Florida." *Real Estate Issues* 13(Fall 1988/Winter 1989): 34-40

Abstract The development and occupancy of new communities in Florida were examined. New communities were defined as those whose development: 1. is undertaken by a private developer, 2. consists of at least 750 acres, 3. incorporates mixed land uses, and 4. was started within the last 30 years. Of 32 such communities, 31 contained recreational uses, and 31 have commercial land uses. The trend in new community development has been upward since 1980. Over time, the size of new communities has decreased, and the trend in Florida has been to develop a satellite type of community. There has been no apparent trend in the development of either adult or resort communities. All of the new communities have residential land usage and offer single-family detached housing. Multifamily housing is offered in 29 communities, but only 7 offer rentals. Most of the new communities have been developed in central Florida although some have been developed along the East Coast.

11. RECREATION

Vail, D., and L. Hultkrantz. "Property Rights and Sustainable Nature Tourism: Adaptation and Mal-adaptation in Dalarna (Sweden) and Maine (USA)." *Ecological Economics* (November 2000):223-42.

Abstract Tourism is viewed in many industrial nations as an environmentally friendly way to revitalize distressed rural economies and communities. In the forest regions of Dalarna and interior Maine: hopes are pinned on nature-based tourism, with the presumption that natural capital is underutilized. This paper explores the potential and pitfalls of nature tourism as a basis for sustainable rural development in regions where most land is held privately but quasi-open access for recreation has been either a right (Dalarna) or a customary entitlement (Maine). The paper applies theories of common pool resources and impure public goods to show that both property regimes are mal-adapted for sustainable nature tourism. Limited exclusion combined with rivalness in land uses mis-aligns incentives facing landowners, tourists, and recreation businesses. Short-term effects include congestion, reduced economic opportunity, and depressed production of non-recreational goods. Longer-term effects include environmental degradation and weak incentives for value-added investment. Tourism development is further impeded by a scale mis-match between small ownerships and large efficient recreation management units. The analysis suggests that sustainable nature tourism faces four land use challenges.

Burger, J. "A Comparison of On-Site Hunters, Sportsman and the General Public about Recreational Rates and Future Land Use Preferences for the Savannah River Site." *Journal of Environmental Planning and Management* 43(March 2000):221-33.

ABSTRACT. Management of ecosystems has been improved both by our understanding of how ecosystems function, as well as by what people consider to be suitable future land uses. This is particularly true with contaminated lands where decisions must be made about clean-up and future land use. In this paper I synthesize several surveys of public recreational rates and preferences for future land use of the Savannah River Site (SRS), a Department of Energy (DoE) facility located in South Carolina. Four groups of people were interviewed: on-site hunters; sportsmen; local residents attending an event near Aiken, South Carolina; and the general public attending a festival in Columbia, South Carolina. The general public that engaged in recreational activities averaged 20 days/ year or more for hunting and fishing, while sportsmen averaged over 50 days/year. All four groups rated maintaining SRS as a National Environmental Research Park (NERP) and using it for recreation as the highest preferred land uses. The general public rated hiking and camping higher than hunting and fishing, while sportsmen rated hunting higher than hiking and camping. All groups rated using SRS for homes as the lowest, or second lowest, preferred land use. There was disagreement on the ratings for industrial development, with people living closer to the site rating it higher than the general South Carolina population. These data can be used by local planners and

managers in decision making regarding clean-up levels and future land use. The relative unanimity of views for cleaning up DoE sites, continued use of the site as a NERP and increased recreational use suggests that different groups of people share similar preferences for future use of SRS, and provides a useful paradigm for considering future land use decisions at other DoE sites nationwide. The relatively low ranking for housing and factories suggests that clean-up levels could be geared to future land use, such as recreation, which are less stringent than residential levels.

Lewandrowski, J., and K. Ingram. "Policy Considerations for Increasing Compatibilities Between Agriculture and Wildlife." *Natural Resources Journal* 39(Spring 1999):229-69.

Abstract: Implicit in efforts to increase the quantity and quality of wildlife habitat associated with U.S. agricultural lands is the notion that society would benefit if farmers and ranchers allocated more land and water resources to wild species. Farmers and ranchers, however, generally have a limited ability to capture the economic value of wildlife goods and services produced on agricultural lands. As a result, wildlife impacts are only partially reflected in most farm land-use decisions. Where market conditions and government farm programs do not provide for the socially optimal mix of wildlife goods and services, policy actions aimed at protecting or enhancing wildlife on agricultural lands may be justified. To be successful, such policies must provide for the basic biological requirements of desired species and habitats and account for the economic considerations that affect producers' resource-use decisions.

More, T.A. "A Functionalist Approach to User Fees." *Journal of Leisure Research* 31(Third Quarter 1999):227-244.

Abstract: Few recreation issues are more controversial than imposing fees for access to public lands. Fee proponents argue that user fees: (a) promote equity by charging users directly; (b) increase economic efficiency; and (c) generate needed revenue.

Baen, J.S. "The Growing Importance and Value Implications of Recreational Hunting Leases to Agricultural Land Investors." *The Journal of Real Estate Research* 14(1997):399-414.

Abstract: The evolution and explosive growth of recreational hunting leases in the US are considered. The traditional European practice of leasing rural lands for the exclusive rights of tenants to hunt and fish is now an important revenue source for American agricultural land investors/owners. Hunting lease income can enhance value to the point that recreation becomes the highest and best use of rural land for both the market and income approaches to valuation. New perspectives are offered for valuing the income component from recreational leases as a percentage of market value, and a hunting lease index is proposed for landowners and tenants to consider.

Robertson, R.A., and R.J. Burdge. "The Interface Between Commercial & Industrial Development and Recreational Use in an Urban River Corridor." *Journal of Leisure Research* 25(First Quarter 1993):53

Abstract: Commercial and industrial development adversely affect the quality of the recreation experience for persons using urban river corridors. The effects depend on both the type of recreational activity and the types of commercial and industrial activity present.

Yang, C.H. "The Optimal Provision of a Central Park in a City." *Journal of Regional Science* 30(Feb 1990):15-36

Abstract: The conditions and decision rules pertaining to the efficient provision of a central park in a city are examined. One interesting finding is that an additional opportunity cost that results from competition with residential use must be included to determine the efficient size of a central park. An efficient central park is larger in a city with public land ownership than in a city without it. In a city with either absentee land ownership or one with public land ownership, profit maximization and population maximization can be used as decision rules to determine the efficient provision of a central park. The net benefit of a central park in a closed city with absentee land ownership is reflected in the land rent and profit, as well as in the

utility level, while that of a closed city with public land ownership is completely reflected in the utility level.

12. ECONOMIC GROWTH

Bergstrom, J.C. "The Role and Value of Natural Capital in Regional Landscapes." *Journal of Agricultural and Applied Economics* (forthcoming).

Abstract. The focus of this paper on the contribution of natural capital to quality of life growth in regional landscapes including a discussion of the value and valuation of services provided by natural capital. Based on previous work, author presents a modified growth model that includes constructed capital, financial capital, human capital, social capital, and natural capital.

Gylfason, T. "Natural Resources, Education, and Economic Development" *European Economic Review* 45(May 2001):847-859.

Abstract Economic growth since 1965 has varied inversely with the share of natural capital in national wealth across countries. Four main channels of transmission from abundant natural resources to stunted economic development are discussed: 1. the Dutch disease, 2. rent seeking, 3. overconfidence, and 4. neglect of education. Public expenditure on education relative to national income, expected years of schooling for girls, and gross secondary-school enrollment are all shown to be inversely related to the share of natural capital in national wealth across countries. Natural capital appears to crowd out human capital, thereby slowing down the pace of economic development.

England, R.W. "Natural Capital and the Theory of Economic Growth." *Ecological Economics* 34(2000):425-31.

Abstract During the past half century, theorizing about economic growth has forced economists to reconsider and revise the capital concept a number of times. This paper explores the analytical relationship between capital accumulation and economic growth, on the one hand, and the natural world, on the other. Section 1 sketches modern growth theory with an emphasis on whether or not the economy is seen as facing biophysical 'limits to growth.' Section 2 argues that analysis of the role that 'natural capital' plays in the production process must occur before one can assess the prospects for economic growth. Section 3 inserts natural capital into a simple growth model and discusses the implications that (1) depletion of natural capital, (2) complementarity in production of natural and social forms of capital and (3) accumulation of technical knowledge have for the growth process.

Van-Geldrop, J., and C. Withagen. "Natural Capital and Sustainability." *Ecological Economics* 32(March 2000):445-55.

AB. This paper develops and rigorously analyses a model describing the optimal use of natural capital in a utilitarian framework. Natural capital is treated as an aggregate including exhaustibles, renewables and "environmentals," performing several functions. It is found that it converges to a steady-state in which it is kept constant by simultaneous investments and use.

Collados, C., and Duane, T.P. "Natural Capital and Quality of Life: A Model for Evaluating the Sustainability of Alternative Regional Development Paths." *Ecological-Economics* 30(September 1999):441-60.

AB. Natural capital contributes to the quality of life of a region in two complementary ways: first, by directly providing environmental services that cannot be imported, and second, by supplying the natural resources that, through a human controlled production process, become valuable to humans. The evolution of the combination of these two components of the quality of life determines the path of development a region takes. Environmental services also determine the ability of natural capital to regenerate itself.

Ecosystems and other components of the regional natural capital produce environmental services that provide life-support functions necessary for natural capital reproduction. The destruction of this critical natural capital impairs the internal sources of improvement of the quality of life of a region, leading to a non-sustainable path of development. This article describes a model of the relationship between natural capital and quality of life that provides a stricter definition of sustainable development through explicit characterization and classification of natural capital according to its ability to produce life-supporting environmental services, by its substitutability, and by its possible reconstruction. Application of this model then shows that there are 51 possible regional development paths, only 32 of which are sustainable and only 14 of which are sustainable while also providing improvements in quality of life. Only six of these 14 sustainable development paths are attained with economic growth, however, while the other eight paths increase quality of life by increasing the production of environmental services. The model could help in the development of institutional interventions that would promote regional development paths that are sustainable.

MacDonald, D.V., Hanley, N., and Moffatt, I. “Applying the Concept of Natural Capital Criticality to Regional Resource Management.” *Ecological Economics* 29(April 1999):73-87.

AB. This paper applies the concept of natural capital stock, and identifies its critical elements, in a regional sustainable development context in order to assess its conceptual and practical relevance. Assessment of the physical stock of natural capital was undertaken for Central Region in Scotland. It was found that the concept can be a useful way of assessing, and giving greater recognition to natural resources at a regional or local level. However, identification of critical levels of resources was less straightforward. The lack of clear guidelines relating to criteria of criticality, natural capital category aggregation issues, and conflicts between types of critical natural capital were encountered as major issues. The application of an absolute preservation rule was found to suffer from the same general disadvantages as any absolute rule. Nevertheless, the assessment of natural capital and identification, where possible, of critical elements were thought to be a useful adjunct to sustainable development work.

Wackernagel, M., L. Onisto, P. Bello, A.C. Linares, I.S.L. Falfán, J.M. García, A.I.S. Guerrero, and M.G.S. Guerrero. “National Natural Capital Accounting with the Ecological Footprint Concept.” *Ecological Economics* 29(1999):375-390.

AB. There is a growing consensus among natural and social scientists that sustainability depends on maintaining natural capital. However, progress to put this ecological condition to practice has been slow because of the inability of making these objectives measurable. Therefore, to overcome this obstacle, assessment frameworks for natural capital are needed. This study presents a simple framework for national and global natural capital accounting. It demonstrates, using the example of Italy, an accounting framework which tracks national economies' energy and resource throughput and translates them into biologically productive areas necessary to produce these flows. This calculation has been applied to over 52 countries. With this framework, based on the ecological footprint concept, human consumption can be compared with natural capital production at the global and national level, using existing data.

R.W. England. “Should We Pursue Measurement of the Natural Capital Stock?” *Ecological Economics* 27(1998):257-266.

Abstract This paper critically surveys earlier definitions of the natural capital concept and several preliminary attempts to measure it. Utilizing Georgescu-Roegen's thoughts on funds, flows and stocks, I offer several (hopefully rigorous) definitions of natural capital. I close by arguing that measurement of ISEW, not of total natural capital, should be a priority of ecological economists.

Faucheux, S., E. Muir, and M. O'Connor. “Neoclassical Natural Capital Theory and "Weak" Indicators for Sustainability.” *Land Economics* 73(November 1997):528-52.

AB. The authors appraise neoclassical theory of growth with natural capital for the estimation of indicators for sustainability. Relationships between four theoretically distinct measures are clarified: Hicksian change in capital stock value; the Hartwick net savings, which excludes capital gains; sustainable national income;

and environmentally-adjusted net national product. An overlapping generations general equilibrium model with depletable natural capital demonstrates the significance of model parameters determining technical feasibility and intertemporal distribution of consumption. Irremediable uncertainties in model specification and empirical measurement mean that the neoclassical theory is not robust for defining or estimating indicators for sustainability.

Hinterberger, F., F. Luks, and F. Schmidt-Bleek. "Material Flows vs. "Natural Capital': What Makes an Economy Sustainable?" *Ecological Economics* 23(October 1997):1-14.

AB. In the discourse about sustainable development, 'constant natural capital' is frequently referred to as a criterion for ecological sustainability. But what is 'natural capital'? The concept will be analyzed by presenting arguments in favour of using the term and different versions of sustainability (strong and weak). Subsequently, a critique of the 'natural capital' concept is brought forward, from an ecological as well as from an economic perspective. Following this critique, the use of material inputs and the material input per unit of service (MIPS) as a measure for the environmental impact potential is suggested. Dematerialisation is understood to be an alternative management rule for sustainability. In conclusion, a change of perspective is proposed. Due to the conceptual and measurement problems associated with the 'constant-natural-capital' criterion (which refers to a stock), it seems more reasonable from a scientific as well as from a practical perspective to add flows (i.e. material inputs) to a decision criterion for whether a development is sustainable or not.

Wackernagel, M., and W.E. Rees. "Perceptual and Structural Barriers to Investing in Natural Capital: Economics from an Ecological Footprint Perspective." *Ecological Economics* 20(January 1997):3-24.

AB. This paper argues that perceptual distortions and prevailing economic rationality, far from encouraging investment in natural capital, actually accelerate the depletion of natural capital stocks. Moreover, conventional monetary analyses cannot detect the problem. This paper therefore makes the case for direct biophysical measurement of relevant stocks and flows, and uses for this purpose the ecological footprint concept. To develop the argument, the paper elaborates the natural capital concept and asserts the need of investing in natural capital to compensate for net losses. It shows how the ecological footprint can be used as a biophysical measure for such capital, and applies this concept as an analytical tool for examining the barriers to investing in natural capital. It picks four issues from a rough taxonomy of barriers and discusses them from an ecological footprint perspective: it shows why marginal prices cannot reflect ecological necessities; how interregional risk pooling encourages resource liquidation; how present terms of trade undermine both local and global ecological stability; and how efficiency strategies may actually accelerate resource throughput. Affirming the necessity of biophysical approaches for exploring the sustainability implications of basic ecological and thermodynamic principles, it draws lessons for current development.

Gowdy, J.M. "The Social Context of Natural Capital: The Social Limits to Sustainable Development." *International Journal of Social Economics* 21(1994):43-55.

AB. Examines the impact of humans on the Earth, and how natural resources are related to economic well-being. Links evolution and increases in population to natural causes. Discusses the co-evolution of nature and society, and the unsustainable system that humans have created. Shows how incompatible a market economy is with the preservation of the environment and biodiversity. Concludes that nature will have an impact on policy and cites some examples of this in the United States.

13. METHODOLOGY

Cromley, R.G., and D.M. Hanink. "Coupling Land Use Allocation Models with Raster GIS." *Journal of Geographical Systems* 1(June 1999):137-53.

AB: As geographic information systems (GIS) have moved from information storage and retrieval operations towards more decision support functions, there is a need for more integration of spatial analytical modules that can assist in locational decisions. This paper presents a methodology for coupling land use allocation models with a raster GIS. For raster systems, the integration of any decision module has been limited by the size of raster datasets that may contain hundreds of thousands of pixels. Therefore, decision heuristics have been used rather than exact methods such as mathematical programming models. For the problem of land use allocation, the special structure of the generalized assignment problem is used here to handle large scale datasets. The advantage of the mathematical programming approach is the additional information associated with the dual variables and opportunity costs that can be used in subsequent sensitivity analyses.

Hilferink, M., and P. Rietveld. "Land Use Scanner: An Integrated GIS Based Model for Long Term Projections of Land Use in Urban and Rural Areas." *Journal of Geographical Systems* 1(June 1999):155-77.

AB: This paper describes the structure of the LAND USE SCANNER model, a GIS based model developed to generate spatial forecasts for various types of land use for a large number of grids. The model basically allocates land according to bid prices for various types of land use. The possibility of government intervention in land use is taken into account among others by adding aggregate constraints. The model includes all relevant land use types such as residential, industrial, agricultural, natural areas and water. The model is driven by sectoral models providing forecasts of aggregate land use in various land use categories. An application of the first version of the model is given for the Netherlands with some 200,000 grid cells. Further developments and refinements of the model are planned for the near future.

Miller, D.J., and A.J. Plantinga. "Modeling Land Use Decisions with Aggregate Data." *American Journal of Agricultural Economics* 81(February 1999):180-94.

AB: In this article, the authors develop land use models to study the impact of changes in decision variables on soil erosion or other environmental outcomes. From an underlying behavioral model, they use maximum entropy to recover a parametric model of county-level land use shares as a function of decision variables such as output prices, input costs, and land quality. The statistical model may be extended to estimate subcounty land use shares and to incorporate data from federal land use surveys. The authors use the procedure to analyze the impact of changes in livestock inventories on soil erosion rates in three Iowa counties.

McDaniels, T.L., and K. Thomas. "Eliciting Preferences for Land Use Alternatives: A Structured Value Referendum with Approval Voting." *Journal of Policy Analysis and Management* 18(Spring 1999):264-80.

AB: This article discusses an experimental application of the Structured Value Referendum (SVR) with approval voting. The decision context is selecting the best land use for an undeveloped area of publicly owned suburban land in Richmond, British Columbia. Subjects were a random sample of 200 registered voters, selected in a "mall-intercept" format. Subjects reviewed relevant information, completed a ballot, and then completed a survey about their satisfaction with the approval voting format. The results are of substantive interest for the land use decision, and show a high preference for an approval voting format. The results show ease in understanding the task and information provided, as well as a belief that this approach could be useful in guiding public policy.

Hanink, D.M., and R.G. Cromley. "Land-Use Allocation in the Absence of Complete Market Values." *Journal of Regional Science* 38(August 1998):465-80.

AB: This paper describes a method of land-allocation that can be used by planners and other land managers in the face of market failure. The method integrates the land-allocation approach used in geographic information systems with that used in a generalized assignment problem. Suitability scores, instead of market prices, are used in assigning competing land uses to individual parcels (pixels) of land.

The method is illustrated using a hypothetical example involving three competing land uses within a region.

Nelson, G.C., and D. Hellerstein. "Do Roads Cause Deforestation? Using Satellite Images in Econometric Analysis of Land Use." *American Journal of Agricultural Economics* 79(February 1997):80-8.

AB: In this paper, the authors demonstrate how satellite images and other geographic data can be used to predict land use. A cross-section model of land use is estimated with data for a region in central Mexico. Parameters from the model are used to examine the effects of reduced human activity. If variables that proxy human influence are changed to reflect reduced impact, 'forest' area increases and 'irrigated crop' area is reduced.

Tayman, J. "The Accuracy of Small-area Population Forecasts Based on a Spatial Interaction Land-use Modeling System." *Journal of the American Planning Association* 62(Winter 1996):85-98.

AB. As a result of the ISTEA and Clean Air Act legislation, more agencies are using or will be required to use spatial interaction land-use models to develop small-area (subcounty) population forecasts. Little is known about the magnitude or characteristics of the error generated from these models or in small-area forecasts in general. This case study adds to our knowledge of error in small-area forecasts by evaluating forecasts of census tract population that are developed from a spatial interaction land-use modeling system. The study also illustrates measures that can examine forecast error more comprehensively. Reprinted by permission of the publisher.

Parks, P.J., R.A. Kramer, and R.E. Heimlich. "Simulating Cost-Effective Wetlands Reserves: A Comparison of Positive and Normative Approaches." *Natural Resource Modeling* 9(Winter 1995):81-96.

AB. A conceptual model of farmer behavior is used to develop analytical expressions for the costs of wetland policies in the United States. An empirical study based on the model compares normative and positive cost estimates for accomplishing a specific policy and shows that these two modeling strategies yield very different cost estimates from the same basic data. Because models such as these are frequently used to support budget requests for government programs, the choice of modeling strategy can influence whether program goals can be accomplished with the funds requested.

Landis, J.D. "Imagining Land Use Futures: Applying the California Urban Futures Model." *Journal of the American Planning Association* 61(Autumn 1995):438-57.

AB. The California Urban Futures Model (or CUF Model) is the first of a new generation of metropolitan planning models designed to help planners, elected officials, and citizen groups create and compare alternative land-use policies. This article explains how the CUF Model works and then demonstrates its use in simulating realistic alternatives for regional and subregional growth policy/planning. Part One explains the design principles and logic of the CUF Model. Part Two presents CUF Model simulation results of three alternatives for growth policy/land-use planning alternatives for the San Francisco Bay and Sacramento areas. Part Three demonstrates the use of the CUF Model for evaluating alternative agricultural protection and zoning policies at the county, or subregional, level. Reprinted by permission of the publisher.

Dokko, Y., and R.H. Edelstein. "Towards a Real Estate Land Use Modeling Paradigm." *American Real Estate and Urban Economics Association Journal* 20(Summer 1992):199-209.

AB: This article develops a conceptual research-oriented framework for understanding how land uses are allocated in the marketplace. The analyses highlight the crucial roles that market information and transaction costs play in determining the outcomes of transactions between real estate users and suppliers and the dynamics of real estate land uses and prices.

McMillen, D.P., and J.F. McDonald. "Selectivity Bias in Urban Land Value Functions." *Land Economics* 65(Nov 1989):341-51.

Abstract: Using a 2-stage model of land value and land use, in which land use is determined by zoning practices, an attempt is made to determine whether selectivity bias is a problem in empirical land value functions. Data are taken from Olcott's Land Values Blue Book of Chicago for the years 1961, 1971, and 1981. The model consists of a set of equations that determine the probability that land is zoned for use, with another set of equations for land value. Results show that selectivity bias is a potential problem in residential land value functions. While no evidence is found of selectivity bias in business or manufacturing land value functions, results do suggest that estimates reported in previous research on residential land values may be subject to bias. Selectivity bias is more apt to occur when land use is determined by a free market. However, it is illustrated that bias can occur even when land use is determined by zoning. Mixed evidence indicates that governments do not follow the market perfectly in a given time period.

14. GENERAL

Hardie, I., P. Parks, P. Gottlieb, and D. Wear. "Responses of Rural and Urban Land Uses to Land Rent Determinants in the US South." *Land Economics* 76(Nov 2000):659-73.

Abstract: Ricardian and von Thunen land rent models are combined into a single land share model including farm, forest and urban land uses. The land share model is applied to the Southern United States, and elasticities are extracted that measure land share response to changes in population, income, land values, prices and costs in counties with different degrees of urbanization. The study explores the effect of treating either rural or urban land as a residual use. While this practice is common in existing land use studies, it is found to significantly affect parameter estimates in this county-level analysis.

Tzu, C.L., and A.W. Evans. "The Relationship Between the Price of Land and Size of Plot When Plots are Small." *Land Economics* 76(Aug 2000):386-94.

Abstract: Most research, using American data, has found that the price of land per unit of area decreases with plot size. This seems counterintuitive. A data set of land sales collected in an almost laboratory-like situation is used to examine the relationship. The evidence shows that the price of land per unit of area increases with plot size. The current study looks at smaller sites which are otherwise identical in their characteristics. Most other studies, however, look at sites which vary in size, in location, and, in particular, the extent to which they are serviced with infrastructure.

McDaniels, T.L., and K. Thomas. "Eliciting Preferences for Land Use Alternatives: A Structured Value Referendum with Approval Voting." *Journal of Policy Analysis and Management* 18(Spring 1999):264-80.

AB. This article discusses an experimental application of the Structured Value Referendum (SVR) with approval voting. The decision context is selecting the best land use for an undeveloped area of publicly owned suburban land in Richmond, British Columbia. Subjects were a random sample of 200 registered voters, selected in a "mall-intercept" format. Subjects reviewed relevant information, completed a ballot, and then completed a survey about their satisfaction with the approval voting format. The results are of substantive interest for the land use decision, and show a high preference for an approval voting format. The results show ease in understanding the task and information provided, as well as a belief that this approach could be useful in guiding public policy. Reprinted by permission of the publisher.

Bartholomew, K. "The Evolution of American Nongovernmental Land Use Planning Organizations." *Journal of the American Planning Association* 65(Autumn 1999):357-63.

AB. Over the last few decades of the 20th century, the processes associated with governmental regulation of the use and development of privately held land in the United States have undergone dramatic changes. Where formerly most land use decisions were undocumented, informal understandings involving only the

landowner and a local government official, many are now made in quasi-judicial settings with notice to potentially affected parties, opportunities to call expert witnesses and to cross-examine opposing witnesses, written findings and conclusions, and the ability to appeal the decision to a higher body. Reprinted by permission of the publisher.

Land-use-Planning; Non-governmental-organizations-United-States; Decision-making-in-planning

Kline, J.D., and R.J. Alig. "Does Land Use Planning Slow the Conversion of Forest and Farm Lands?" *Growth and Change* 30(Winter 1999):3-22.

AB: Land use planning often is implemented to control development on forests and farmland, but its impact on land use remains untested. Previous studies evaluating such programs have relied on anecdotal evidence rather than on data describing actual land use change. A model of land use is specified as a function of socioeconomic factors, land rent, and landowners' characteristics, to examine how well Oregon's land use planning program has protected forests and farmland from development. The empirical model describes the probability that forests and farmland in western Oregon and western Washington were developed to residential, commercial, or industrial uses, before and after Oregon's land use planning program took effect. Land use data are provided by the USDA Forest Service's Forest Inventory and Analysis program. Results suggest that Oregon's land use planning program has concentrated development within urban growth boundaries since its implementation, but its success at reducing the likelihood of development on resource lands located within forest use and exclusive farm use zones remains uncertain.

Plantinga, A.J., T.A. Mauldin, and R.J. Alig. "Land Use in Maine: Determinants of Past Trends and Projections of Future Changes." *USDA Forest Service Pacific Northwest Research Station Research Paper* 511(1999):1-

Abstract: About 90 percent of the land in Maine is in forests. We analyzed past land use trends in Maine and developed projections of future land use. Since the 1950s, the area of forest in Maine has increased by almost 400,000 acres; however, the trends differ among ownerships, as the area of nonindustrial private timberland declined by 800,000 acres since 1950, while private industrial area rose by 681,000 acres. We used econometric analyses to identify variables affecting land allocation, such as population density. Estimated equations were used to generate decadal land use projections to 2050. Our projections showed that private timberland area will decline by almost 3 percent by 2050, with urban areas increasing by 56 percent.

Cowell, R., and J. Murdoch. "Land Use and the Limits to (Regional) Governance: Some Lessons from Planning for Housing and Minerals in England." *International Journal of Urban and Regional Research* 23(December 1999):654-69.

AB: This paper examines the supposed shift from government to governance in the context of land-use planning in **England** and indicates some of the problems which surround increased regional autonomy in governmental systems. It is argued that decision-making processes around land use, especially when they concern conflicts between development and **environmental** protection, are not easily rendered into the flexible arrangements deemed characteristic of governance. Two case studies in the housing and minerals sectors--presented to illustrate this general argument--show the existence of strong "strategic lines" which tend to subsume local representations and limit the formation of partnerships. In both cases, the strategic line comes dressed in the language of technical (numerical) forecasts and projections which raises problems for any local opposition to the thrust of the strategy. In conclusion it is argued that although some recasting of the planning regime in each sector is underway this has only served to highlight continuing problems in linking strategy and locality, especially in cases of conflict around land use, which regional governance may not easily alleviate.

Miceli, T.J., C.F. Sirmans, and G.K. Turnbull. "Title Assurance and Incentives for Efficient Land Use." *European Journal of Law and Economics* 6(November 1998):305-23.

AB: This paper develops an economic analysis of a general class of land title systems, focusing specifically on incentives for efficient exchange and investment in land. The analysis abstracts from

certain institutional features of actual title systems, and is therefore largely normative in nature. Nevertheless, the results are relevant for a complete evaluation of alternative systems, especially for countries where land development (or redevelopment) is a primary objective. The results suggest that in most cases, land registration is preferred to the recording system on exchange and investment grounds, holding other factors constant.

Doxford, D, and T. Hill. "Land Use for Military Training in the UK: The Current Situation, Likely Developments and Possible Alternatives." *Journal of Environmental Planning and Management* 41(May 1998):279-97.

AB: This paper describes the current pattern of land ownership for military training in the U.K. The main component--army training areas--is considered in detail. Recent historical trends are reviewed in the context of changes in force size and weapons systems. Problems and benefits arising from the primary use of land for military training are defined. Relevant literature is reviewed. Comparisons are made with training systems in other countries, in particular the USA, the Netherlands, Switzerland, France and Australia. Recent developments in government policy are described and analysed. Possible future requirements are explored. This information is used to construct an argument that the current training system in the UK is outmoded and unsustainable. The authors contend that there is a need for a strategic review of military training, encompassing a thorough assessment of alternatives to traditional live firing on dedicated training areas.

Cullingworth, J.B. "British Land-Use Planning: A Failure to Cope with Change?" *Urban-Studies* 34(May 1997):945-60.

Abstract: UK land-use planning in the postwar era is summarized and analyzed.

Tokunaga, S. "A Residential Land Use Model with a General Landownership: Existence and Uniqueness of Equilibrium." *Papers in Regional Science* 76(July 1997):301-19.

AB: This paper is focused on equilibrium in a spatial model with two income groups. In Fujita and Tokunaga (1993), we have proposed a basic model of residential land use, called an Alpha-landownership model, in which a group of city residents was assumed to own the circular area from the CBD to a radius Alpha. However, the assumption of a circular land area was very restrictive. Therefore in this paper a general model of residential land use called the S-landownership model is presented. This model assumes that a group of city residents jointly owns a part of the city's land, and it includes both the absentee landownership model and the public landownership model as special cases. The existence and uniqueness of the land use equilibrium for this S-landownership model are demonstrated.

Gardner, B.D. "The Political Economy of Public Land Use." *Journal of Agricultural and Resource Economics* 22(July 1997):12-29.

AB: Federal ownership and management of the public lands have created a rent-seeking frenzy, inflated rhetoric, wasted resources, and squandered investment opportunities. The primary commodity user groups, grazers and timber harvesters have declined in importance whereas conservationists and recreationists have gained. Still, historical use preferences and continued rent seeking have produced use entitlements that seem impervious to changing costs and demands and thus result in large wealth losses to consumers and taxpayers. Privatization of the public lands is probably politically infeasible, but simulated market processes can be used to replace political allocations and improve efficiency.

Bhattacharyya, A., R. Narayanan, T.R. MacDiarmid, T.R. Harris, and W.O.Champney. "Demand for Grazing on Public Lands: A Disequilibrium Approach." *Land Economics* 72(Nov 1996):483-99.

Abstract: A demand function for grazing on western public range lands is estimated. Since the federal government sets the grazing fee and rations the quantity of Animal Unit Months (AUM), a disequilibrium market model is developed. The estimate of own-price elasticity of demand (-0.178) suggests a 0.82% revenue gain for a 1% fee increase. Results show that most western states experienced excess supply of

AUMs since the mid 1980s, suggesting a relatively high fee. The levels of demand and effective supply vary substantially across states; this implies that state- or region-specific factors should be incorporated in setting the grazing fee.

Marcouiller, D.W., D.F. Schreiner, and D.K. Lewis. "The Impact of Forest Land Use on Regional Value Added." *Review of Regional Studies* 26(Fall 1996):211-33.

AB: Rural development policies frequently target the enhancement of regional value-added activities. The effectiveness of such policies is typically analyzed in aggregate terms. Aggregate measures include total number of jobs created or total value-added impact. Regional economic development, however, is more complex and includes components such as income distribution, wage/skill levels of jobs created, and impacts on factor ownership. Evidence from other studies suggests that the Southern United States will experience significant increases in timber production intensity during the next 50 years. The connection between raw material production and processing has important effects on the creation and distribution of value added. In this paper, the impact of sustainable timber production on income distribution in a highly timber-dependent region was analyzed, using a social accounting matrix with mixed exogenous/endogenous accounts that specify the forward linkages of raw material production to primary and secondary wood processing.

Green, G.P., D. Marcouiller, and S. Deller. "Local Dependency, Land Use Attitudes, and Economic Development: Comparisons Between Seasonal and Permanent Residents." *Rural Sociology* 61(Fall 1996):427-45.

AB. The writers examine the attitudes toward land use controls and local economic development among seasonal and permanent residents of rural communities in Forest County, Wisconsin. They compare growth machine and local dependency theory explanations for support of land use controls and growth activities and demonstrate that permanent residents are much more supportive of local economic development activities and less likely to favor land use planning than are seasonal residents. In addition, they note that the variation between seasonal and permanent residents in these attitudes cannot be explained by socioeconomic differences between them. Furthermore, they report a decline in support for land use controls among seasonal residents as time spent at their lake homes increases. They conclude that these findings tend to support Kevin R. Cox and Andrew Mair's local dependency theory.

Geltner, D., T.J. Riddiough, and S. Stojanovic. "Insights on the Effect of Land Use Choice: The Perpetual Option on the Best of Two Underlying Assets." *Journal of Urban Economics* 39(January 1996):20-50.

AB: The authors consider the effect of land-use choice on speculative land value and on development timing as reflected in the optimal 'hurdle ratio' that triggers immediate development. They find that land-use choice (i.e., multiple-use zoning) may add over 40 percent to land value under typical economic circumstances. The conditions for optimal development of the land become markedly more difficult to achieve (higher hurdle ratio required) when the two land uses have similar values. Indeed, a 'rational indecision' result obtains in theory; development will never occur when the two land-use choices have equal value. (c) 1996 Academic Press, Inc.

Yamazaki, F. "The Lock-In Effect of Capital Gains Taxation on Land Use." *Journal of Urban Economics* 39(March 1996):216-28.

AB: This paper constructs a simple model of land development to reconsider the lock-in effect of capital gains taxation under perfect foresight. In the case where there is no competitive rental market, as in Japan, a lock-in effect deters the efficient land use. The author distinguishes between the lock-in effect on stock variables and that on flow variables. Although a tax on realized capital gains has an ambiguous effect on allocation of land use, it unambiguously deters land development. (c) 1996 Academic Press, Inc.

Broomhall, D. "Urban Encroachment, Economic Growth, and Land Values in the Urban Fringe." *Growth and Change* 26(Spring 1995):191-203.

Abstract The impact of the local and national economy, and the rate of return on competing assets on land prices in the urban fringe of the Seattle Primary Metropolitan Statistical Area are examined. The data are derived from a set of nearly all land sales in King County Washington between 1969 and 1984. The size of the data set allows for the neutralization of site specific influences by examining the monthly mean price of unimproved land. The results show that, like other traditional investments, land prices are sensitive to factors such as inflation and interest rates. Population pressures and local economic conditions influence urban fringe prices as well. Land further from the urban core is less sensitive to these impacts, presumably because it is too far away from economic activity to be considered for its value in future urban uses.

Taylor, R.B., B.A. Koons, and E.M. Kurtz. "Street Blocks with More Nonresidential Land Use Have More Physical Deterioration: Evidence from Baltimore and Philadelphia." *Urban Affairs Review* 31(Sept 1995):120-36.

AB. A study was conducted to examine whether street blocks with more nonresidential land use have more physical deterioration. Data were collected from 50 neighborhoods in Baltimore and from the large North Philadelphia community of Logan. Findings reveal that there is a positive correlation in both cities between the incidence of nonresidential land uses on a street block and the incidence of physical deterioration there. This finding suggests that resident-based informal control is weaker on blocks that are less homogeneously residential.

Geisler, C.C. "Land and Poverty in the United States: Insights and Oversight." *Land Economics* 71(Feb 1995): 16-34.

Abstract: A departure is made from the conventional treatment of poverty as a function of income and employment. The view is advanced that analyses of poverty cannot be separated from those of wealth and that land influences wealth and poverty in a variety of important ways. This case is supported by revisiting the place of landed property in the distribution of wealth in the US and 3 areas of land policy which redistribute wealth. It is suggested that land is an important fulcrum in the pursuit of happiness, past and present. Its place in production, employment, investment, social security, social status, and emergency relief all nominate it for at least honorable mention as an antipoverty catalyst. The definition of poverty is extended to include land, having established ties between land and income, land and security, and finally land and the sustenance of a healthy environment.

Plantinga, A.J., and R.A. Birdsey. "Optimal Forest Stand Management When Benefits Are Derived from Carbon." *Natural Resource Modeling* 8(Fall 1994):373-87.

AB. The management of second-growth and old-growth forest stands has important implications for the global carbon cycle. This paper considers the optimal forest rotation when flows of CO₂ to carbon have positive value. If benefits are derived only from carbon, then typically it will never be optimal to harvest any forest stands. This result is a formalization and extension of Harmon et al. [1990]. Private forest owners will often maximize net returns to timber, ignoring benefits from carbon sequestration. Thus, the privately and socially optimal rotations will not generally coincide. We show that the socially optimal rotation is always greater than the privately optimal rotation and less than or equal to the rotation when only carbon is valued.

Groznik, F. "Planning, Public Contact Can Reduce Land-use Conflicts." *American City and County* 109(Sept 1994):44-5.

AB. Proper strategic planning and development of land-use proposals can reduce conflicts over land use. Attempts by local administrations to regulate and plan land use can be controversial. A thorough understanding of the perspectives and motivations of the parties involved in a proposed development may help to achieve a consensus and ensure that viable projects are accepted by a majority of the community. Land-use proposals must be comprehensive, clearly-structured, and presented in understandable language and concepts.

Wyatt, M.D. "A Critical View of Land Value Taxation as a Progressive Strategy for Urban Revitalization, Rational Land Use, and Tax Relief." *Review of Radical Political Economics* 26(March 1994):1-25.

AB: This paper reviews arguments for land value taxation (LVT) as a tool to stop urban sprawl, eliminate land speculation, reduce housing costs, and provide tax relief. It is found that LVT would increase, not lower land prices and would provide only a small incentive to building construction. LVT would not favorably affect the distribution of wealth, nor reduce housing costs. It could provide some residential tax relief, but less effectively than other methods such as a progressive property tax.

Hesse, G. "Land Use Systems and Property Rights: Evolutionary versus New Institutional Economics." *Journal of Evolutionary Economics* 2(October 1992):195-210.

AB: Two lines of reasoning on very long-term socio-economic change, which was a basic issue of classical economic thinking, are confronted: New Institutional Economics (NIE) and Evolutionary Economics (EE). It is demonstrated that EE offers an explanation which is both more consistent and more comprehensive. The case in point is the first economic revolution.

Crihfield, J.B. "Modeling Land-Use Decisions in Rural Areas." *Review of Agricultural Economics* 16(January 1994):103-12.

AB: A model of land-use choice in rural areas is developed in this article. The optimization condition from the model is applied to a land-use dispute in West Central Illinois that evaluates corn versus coal, and yields quantitative estimates of alternative land-use values. Several scenarios were analyzed, including those that reflect market distortions caused by both air and water pollution and Federal subsidies to agriculture. Results from these evaluations provide the basis for cost-benefit analysis of rural land-use decisions when distortions cause markets to allocate land inefficiently.

Vincent, J.R., and C.S. Binkley. "Efficient Multiple-Use Forestry May Require Land-Use Specialization." *Land Economics* 69(November 1993):370-76.

AB: Considered at the landscape scale, economically efficient multiple use of forests may require land-use specialization. If managers attempt to satisfy legitimate multiple-use demand from society by managing all lands for all outputs, both commodity and amenity values of the forest may be inappropriately supplied and management inputs may be inefficiently deployed. These results run counter to some of the prescriptions called 'new forestry.'

Zhang, W.B. "Location Choice and Land Use in an Isolated State: Endogenous Capital and Knowledge Accumulation." *Annals of Regional Science* 27(1993):23-39.

AB: The purpose of this study is to develop an urban model describing an economic dynamics of three parts--the CBD, the residential area and the agricultural area--in an isolated urban system. The system consists of three--agricultural, industrial, and service--sectors. The model describes dynamic interactions among capital and knowledge accumulation with endogenous urban structure. The model may be considered, in a broad sense, as a synthesis of new urban economics (Alonso's model), urban economic growth theory with endogenous knowledge and Thunen's economic system. We show that the urban dynamics may have either a unique or multiple equilibria and may be either stable or unstable, depending upon creativity of various economic activities. We also examine effects of changes in some parameters upon the long-run urban structure.

Greenberg, M. et-al. "TOADS Go to New Jersey: Implications for Land Use and Public Health in Mid-sized and Large U.S. Cities." *Urban Studies* 29(February 1992):117-25.

AB: Temporarily obsolete abandoned derelict sites (TOADS) are deserted commercial, industrial, and housing properties and unbuilt sites that become toxic waste dumps, makeshift housing for the homeless and crack houses for drugs. TOADS and their associated problems often spread to adjacent neighborhoods.

Using a sample of 21 mid-sized cities in New Jersey, the authors show that communities with a poor real estate market, many poor, minority residents, and a weak economic base are likely to have serious TOADS-related problems. Appropriate research and civic responses are suggested. Coauthors are Frank Popper, Bernadette West, and Dona Schneider.

Vesterby, M., and R.R. Heimlich. "Land Use and Demographic Change: Results from Fast-Growth Counties." *Land Economics* 67(August 1991):279-91.

AB: Marginal rates of urban land consumption have remained nearly constant at 0.46 acres per household in fast-growth counties since the 1960s. Increases in marginal residential conversion rates were offset by decreases in nonresidential conversion rates. Higher marginal rates occurred in counties with smaller initial populations. Counties that grew most rapidly had the highest marginal land conversion rates, but accounted for little land conversion. Future trends in rates of land conversion are uncertain since past demographic trends that affect land use appear to be changing.

Zinkhan, F.C. "Option Pricing and Timberland's Land-Use Conversion Option." *Land Economics* 67(August 1991):317-25.

Given a bid for a timberland tract, option pricing methodology is used to value the owner's right to convert from timber growing to some alternative land use at some future date. Using a revised form of the Black-Scholes option pricing model, the land-use conversion option is valued in the process of evaluating the attractiveness of the bid. Sensitivity analysis, tailored to a hypothetical southern U.S. pine tract with some potential for conversion to farmland, reveals a land-use conversion option value ranging from 7.6 to 24.6 percent of land expectation value from timber production.

Asami, Y., and M. Fujita, and T.E. Smith. "On the Foundations of Land Use Theory: Discrete versus Continuous Populations." *Regional Science and Urban Economics* 20(February 1991):473-508.

Abstract: Urban economists and location theorists have long employed land use models with a continuum of agents distributed over a continuum of locations. However, these continuous models have been criticized on behavioral grounds in that individual households can consume only zero amounts of land in equilibrium. An alternative interpretation of these continuous models as limiting approximations of discrete population models is proposed that focuses on the simple case of a linear monocentric city in which homogeneous households have the same location-independent utility function. All land in the city is assumed to be owned by absentee landlords. Results show that, under a reasonable set of conditions, the population distributions generated by the continuous population model uniformly approximate the equilibrium population distributions generated by an appropriately defined class of discrete population models (called front location models) as population size becomes large. This result represents only an initial step toward the establishment of a general foundation.

Tideman, T.N. "Integrating Land-Value Taxation with the Internalization of Spatial Externalities." *Land Economics* 66(Aug 1990): 341-57.

Abstract: Procedures are described that might be used to combine the collection of the full rental value of land for public purposes with the assignment of appropriate taxes and subsidies for activities with spatial externalities. The proposed procedures then are compared with zoning. The collection of the full rental value of land for public purposes requires information that is not available from existing markets but can be obtained by the creation of a competitive assessment process. This process automatically would generate a substantial part of the information that is needed to internalize spatial externalities, namely the effects on land rents. However, since other factors also are immobile, they too can be affected by spatial externalities. These effects can be taken into account by further taxes and subsidies. Because of the difficulty in observing or predicting the magnitudes of effects on factors other than land, it is suggested that these effects be dealt with by a collective decision process among the owners of these factors.

Fischel, W.A. "Four Maxims for Research on Land-Use Controls: Introduction." *Land Economics* 66(August 1990):229-36.

Tabuchi, T. "Dynamics of Urban Land Use: Sequential Location of an Office Firm and Residence." *Journal of Urban Economics* 28(July 1990):87-102.

AB: The objective of this paper is to depict the transition in the land use pattern of the suburbanization of workers and the concentration of business firms by considering a sequential entry of a firm and its worker, who minimize the total cost under monopsony in the land market. The equilibrium development process of the urban land use pattern under a height restriction is derived. It is shown that the first replacement of a residence with a firm always takes place at an intermediate location, and successive replacements take place inwardly with alternations of right and left, and then outward replacements begin. When the height regulation is removed, the equilibrium density function of firms is shown to be a duocentric cosine truncated curve symmetrical with respect to the city center, and the equilibrium density function of residence is linear.

McMillen, D.P. "An Empirical Model of Urban Fringe Land Use." *Land Economics* 65(May 1989):138-45.

Abstract: An empirical model of land use in an urban fringe area of Chicago, Illinois, that directly predicts land use is presented. A multinomial logit model is estimated, with the purpose of determining the probability that a property was in a given use at the time of sale. All properties are located in unincorporated areas of McHenry County and were sold during the period 1979-1983. The model fits the data fairly well and identifies residential land accurately. Railroads appear to be a strong disamenity to residential land users. The probability that land is in residential use decreases with distance from the nearest large town as long as a large town is nearby. Residential land use is more centralized than vacant land, but none of the land uses is strongly tied to urban centers in this sample. The results suggest that vacant land is ripe for conversion to residential use in this fringe area of Chicago.

Turnbull, G.K. "Land Markets and Tax Reform: The Effects of Passive Loss Limitations." *Land Economics* 65(May 1989):118-30.

Abstract: An analysis concentrates on the allocation of resources within the real estate sector targeted by the anti-tax-shelter provisions in the Tax Reform Act of 1986. The potential distortions introduced within land markets by the new limitation on loss (LOL) rules are examined using multiperiod models to investigate the impact of these provisions in competitive and monopolistic land markets. The major findings are: 1. LOL provisions penalize land use projects that generate tax losses in early periods relative to those that do not. 2. LOL rules penalize those projects that generate larger initial losses relative to those that generate smaller initial losses. 3. LOL rules create portfolio and scale advantages even in the absence of risk considerations. 4. Resource allocation effects are sensitive to market structure.

Johnson, M.S., and W.R. Ragas. "CBD Land Values And Multiple Externalities." *Land Economics* 63(Nov 1987):337-47.

Abstract: A behavioral model of land values is used to empirically explore the pattern of land values with a major metropolitan central business district (CDB). Several alternative functional forms for the general model are estimated, and these estimates are compared to estimates of a nonbehavioral model that is based on purely spatial relationships, trend surface analysis. The data come from 110 separate transactions for vacant commercial land or land with building improvements subsequently demolished in the New Orleans CBD for the period 1972 through the beginning of 1983. The behavioral model receives support from the estimates. In particular, the importance of the central point of the urban area is seen, even with a data set that is restricted to observations within the narrow confines of the CBD. However, the confounding influence of street externalities may distort exact locational centrality of the dominant point in the CBD. The main finding is the sensitivity of model estimates of multicollinearity in the data.

Fujita, M., and T.E. Smith. "Existence of Continuous Residential Land-Use Equilibria." *Regional Science and Urban Economics* 17(November 1987):549-94.

Abstract: A general result is presented on the existence of competitive equilibria for residential land markets in continuous space. Following standard residential land-use theory, such markets are postulated to involve finitely many kinds of household continua bidding for land within a continuous finite-dimensional space. In contrast to the standard method of defining an excess-demand correspondence on a price space, the problem here is reformulated in terms of a "population excess-supply correspondence" on a utility space. This method permits the analysis to be carried out entirely in terms of finite-dimensional methods and, in particular, permits standard types of fixed-point arguments to be used.

Turnbull, G.K. "Land Taxes, Income Taxes, and Land Use." *National Tax Journal* 40(June 1987):265-69.

Abstract: Attention is focused on how a simultaneous tax system of income, capital gains, and land taxes can affect the market allocation of land between competing projects. The land tax nonneutrality brought to light by Bentick (1979) and others is reexamined. The results show that the complete tax system can affect the market allocation differently than the simple aggregation of each tax separately would imply. While the income tax is neutral when considered by itself, it can be nonneutral when couched within the simultaneous tax system. The results also show that the income tax nonneutrality is not solely attributable to the deductibility of interest on debt and property taxes as business expenses; instead, they reveal that income tax nonneutrality depends upon how the tax law treats any losses generated by the land investment project. Still, although the land tax is nonneutral when considered singly or as a component of the tax system, the effect of the land tax on resource allocation may be diminished in the latter case.

Daniels, T.L., R.H. Daniels, and M.B. Lapping. "The Vermont Land Gains Tax: Experience with It Provides a Useful Lesson in the Design of Modern Land Policy." *American Journal of Economics and Sociology* 45(October 1986):441-55.

Abstract: A useful lesson in the design of modern land policy is provided by a comparison between the Vermont land gains tax and Henry George's Single Tax. The Single Tax attempts to discourage the long-term quasi-monopoly of land ownership, while the Vermont tax seeks to discourage short-run land speculation. The Vermont tax applies only to realized capital gains and tends to reward long-term speculators, while the Single Tax captures unearned increments to land value. The Vermont tax has failed to achieve its anticipated annual revenue of \$3.5 million. Since 1973, the Vermont tax has raised an average of only \$1 million annually. Results of an empirical analysis of the Vermont tax show that the tax has not prevented a rise in land values. The tax may even encourage subdivision activity as land is marketed in smaller parcels with higher per acre prices to increase aftertax profits. The tax is not a substitute for land-use planning and growth-control ordinances and regulations.

Shonkwiler, J.S., and J.E. Reynolds. "A Note on the Use of Hedonic Price Models in the Analysis of Land Prices at the Urban Fringe." *Land Economics* 62(February 1986):58-63.

Abstract: An evaluation is made of the physical and locational characteristics of rural land in an urbanizing area using the hedonic method. Because qualitative variables that reflected the potential for nonagricultural use of the land are subjective, an errors-in-variables model is estimated and compared to a simple least squares model. Since the potential-use variables account for the effect of nonagricultural uses, the instrumental variables coefficients more closely reflect the agricultural values of physical and locational features in the other variables. Analyses of land prices at the urban fringe can help policymakers who must make decisions regarding property valuation, preferential property tax treatment, urban zoning, and programs, such as buying development rights to agricultural lands. Regardless of incentives for agricultural use, if a parcel has development potential, pressures for conversion to urban use will probably succeed.

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