The Political Economy of Downzoning

Paul Gottlieb, Ph. D.
Associate Professor
Department of Agricultural, Food and Resource Economics
Rutgers, the State University of New Jersey
55 Dudley Road
New Brunswick, NJ 08901
Telephone: 732-932-9155 x 223
FAX: 732-932-8887
gottlieb@aesop.rutgers.edu

and

Soji Adelaja, Ph. D.
John A. Hannah Distinguished Professor in Land Policy
Michigan State University
317 Manley Miles Building
1405 South Harrison Road
East Lansing, MI 48823, USA
Telephone: 517-432-8800
Fax: 517-432-8769
adelaja@msu.edu

Selected Paper prepared for presentation at the American Agricultural Economics Association Annual Meeting, Denver, Colorado, August 1-4, 2004

The Political Economy of Downzoning

Abstract

Increasingly, in response to concerns about urban sprawl and environmental protection, local governments are exercising their police power to reduce the legal permitted density on undeveloped land. This controversial practice, known in many parts of the country as "downzoning," is generally opposed by farmers, developers and others whose market opportunities are limited by such action. This paper constructs a theoretical model of the impact of larger minimum lot sizes on the current land prices of farmers and homeowners within the same community. The theoretical model suggests that net losses for farmers and net gains for homeowners from downzoning are a reasonable, if not inevitable, expectation. Following Pelzman, Hahn, and Campos, the paper then develops a model to explain the public choice decision-making process that leads to downzoning by local public officials. This model is tested using data on 214 New Jersey municipalities. The probability of downzoning is found to increase when there is a lot of open space to protect, but only when farmers constitute a small proportion of all voters. The probability of downzoning also increases when a community has experienced rapid population growth and increased land values. It is more likely to be found in municipalities that have enacted right-to-farm ordinances, suggesting an overall preservation focus on the part of the community along with some sensitivity to farmers' concerns.

Key words: Downzoning, local government, takings, land use regulation, open space, fiscal impact, political economy.

Many suburban communities in the US have grown rapidly since World War II, while their nearby central cities have declined in population. The resulting loss of open space and farmland, the perceived higher property taxes due to infrastructure and service costs associated with growth, concerns about traffic congestion, and fears about declining school quality have led to a greater desire to manage growth. Various growth management tools have emerged in the past few decades, including the purchase of development rights (PDR) on agricultural or open land, the transfer of development rights (TDR), infrastructure concurrency requirements, development impact fees, clustering requirements, urban growth boundaries (UGBs) and combinations thereof. In highly urban New Jersey, an increasing number of municipalities are using their police powers to prohibit high density development outright, thus refusing to accommodate at least some demand for housing and related infrastructure.

On the east coast, this practice of increasing the minimum permitted residential lot size is known as "downzoning." The farm community and developers typically oppose the use of this planning instrument. Many farmers see downzoning as a taking, an encroachment on their economic rights and a diminution of their retirement nest egg. Other critics of downzoning cite its exclusionary effects, its troubling implications for affordable housing and racial segregation. On the other hand environmentalists, existing town residents, and community officials concerned about the long-term financial and ecological viability of the town tend to support downzoning, especially when the tax base of the community does not permit a market-based approach to these problems that would leave equity intact, e.g., by purchasing land or development rights directly.

Downzoning laws are similar to other laws designed to preserve agriculture, rural character, or other historical amenities associated with the *status quo.* To the list of growth management (land use) tools described above we may add regulatory approaches (e.g., right-to-farm ordinances) and business incentives (e.g., farmland assessment and technical assistance to agriculture).

Studies have shown that the relative feasibility and choice of each of these approaches depends on a set of socio-political factors (Adelaja and Friedman, 1999; Logan, 1976; Fischel 1982; Furuseth 1985a, 1985b). While the relationship between policy choice and causal factors has been documented in the cases of farmland preservation (Furuseth; Gardner 1977) and right to farm (Adelaja and Friedman 1999), this has not been done in the case of downzoning, easily the most politically contentious preservation tool on the list. Because of its potential welfare effects, landscape effects, and accelerated use in places with strong development pressure and high land values, it is essential that planners nationwide understand why and where this tool is selected by local governments. As with so many other issues related to urban sprawl, New Jersey seems to be several years ahead of other states, providing a glimpse into the future of Smartgrowth that is either a shining example or a cautionary lesson, depending on point of view.

We hypothesize in this paper that downzoning is a choice variable determined by political, economic, social, and environmental concerns. One set of factors determines the decision by a town's political leadership to forestall future growth, while another related — and perhaps overlapping — set of factors determines the choice of policy instrument used. In particular, the choice between buying or taking land for preservation depends on factors such as affordability, the degree of urgency, the importance of timing, and the relative political clout of parties on various sides of the debate. The growing use of downzoning and the associated political turmoil suggests the need to effectively understand the process leading to the choice of this instrument by local decision-makers.

This paper develops a theoretical framework for the motivation to downzone that is based on the optimizing behavior of farmers, homeowners, and local elected officials. The relationship between identified determinants and the probability of adoption is then estimated using an empirical logit model applied to 214 New Jersey municipalities.

Past Literature and Theoretical Frameworks

Our political economy model is based on the work of Pelzman (1976), Hahn (1990) and Campos (1987) on the influence of different interest groups on political or regulatory outcomes. The Pelzman-Hahn-Campos (PHC) model is applied to downzoning In this case, two competing interest groups are assumed, the farm community, who along with developers may be hurt by downzoning, and homeowners, who comprise the majority of non-farm residents who vote. The opposed interests of these groups in restrictive zoning must be balanced by the government (Fischel 1985). The two groups' economic interests are not assumed, but are instead derived using a model of the impact of increased minimum lot size on farmer and homeowner equity, respectively. The two pathways by which changes in zoning are modeled to affect land values (externality control and elimination of a development option) are similar to those discussed in a comprehensive review of the empirical literature by Pogodzinski and Sass (1991).

An economic model of the impact of downzoning on the land values of farmers and homeowners

Why farmers and homeowners?

William Fischel (1985) lays out a Coasian bargaining model in which "landowner-developers" benefit from zoning that is more lenient, while "preexisting residents of the community" benefit from zoning that is more restrictive. Each party faces declining marginal benefits if it succeeds in moving the system of local zoning entitlements in the direction that it prefers. The question is which level of zoning restrictiveness the community will pick, given the possibility of side payments and transaction costs in the market for the collective property right known as zoning.

Fischel's description of the political landscape matches up well with what we observe in New Jersey today. In the local fight over larger minimum lot sizes ("more restrictive zoning" in Fischel's terminology), farmers and developers typically oppose the increased restrictions. Homeowners with little interest in developing their holdings are the main force behind making zoning more restrictive by increasing lot sizes.[1]

As useful as it is for thinking about legal and political approaches to zoning, Fischel's 1985 book does not fully explain why these two ideal groups have such different interests in the first place, and exactly how they can be distinguished from each other on theoretical grounds.[2] That is our goal in this section.

If we construct a formal model of the economic interests of Fischel's two groups, relating net worth or total utility to lot size restrictions, we should have a model we can use for a variety of purposes. We can characterize potential winners and losers from downzoning according to their fundamental economic characteristics and preferences. This should lead to a more nuanced understanding of the political landscape surrounding this issue than can be captured by the all-or-nothing categories of "farmer-landowner" and "homeowner." A careful economic model can also provide a better framework for empirical studies of the welfare impacts of many kinds of land use policies — not just downzoning.

---

[1] From now on, we shall use the phrase "farmer-landowner" in place of Fischel's "landowner-developer," and "homeowner" in place of Fischel's "pre-existing resident." This terminology gives a good description of the main groups lining up for and against downzoning in New Jersey — highlighting the different economic perspectives of two distinct groups of pre-existing residents.

[2] This was not Fischel's purpose. Instead, he inferred from observed political behavior that landowner-developers and existing residents must have diametrically opposed interests in the level of zoning restrictiveness, at least "over the range of restrictiveness that characterizes most zoning disputes" (Fischel, 1985, p. 130, top). This observation was adequate for his purposes, because he was interested in exploring the political and legal behavior that emerges once we *know* that two local groups have conflicting interests in the level of zoning restrictiveness.

By clarifying the personal welfare effects of policy change and the pathways these effects take, we should be able to provide new insights into factors that affect the slope and level of Fischel's "willingness to pay" schedules for zoning restrictiveness on the part of different types of voters. This will automatically provide us with insights we will use to build and test a vote-maximization model driven by what theory predicts will be the economic impact of zoning changes on different groups.

Farmer and homeowner land values under different minimum lot sizes

In this paper, we use per-acre land value as a proxy for each voter's utility. Although land value is clearly a narrower definition of welfare than utility, its use is justifiable in a study of local political economy because it is the most important aspect of economic welfare affected by local political decision-making. Family satisfaction and earnings from a job to which residents commute are obviously outside of local control, while many determinants of local welfare (such as access to a high-quality public school system, amenities, or retail services) will be capitalized into land values. Fischel (1985) proposes that elected officials seek to "maximize the net worth of the median voter." The importance of property value maximization is emphasized further in his recent book, "The Homevoter Hypothesis" (2001).

Our model of the impact of downzoning on farmer and homeowner wealth is based on a capitalization framework for determining the price of land at any initial time t when the community is considering its future zoning. The capitalization model is compelling in its simplicity, at least to those trained in basic finance. In terms of notation, the model presented in this section draws heavily on Schmitz and Just (2003) and Plantinga, Lubowski, and Stavins (2002).

The price of an acre of developable land owned by a farmer is equal to the present value of expected profits from farming until the land is converted to residential use, plus the present value of net residential rents received thereafter. The date of conversion to residential use is a decision variable chosen to maximize the present value of the entire stream of payments. Conversion to residential use takes place as soon as the present value of expected residential profits (net of conversion costs, which may be financed) exceeds the present value of agricultural profits going forward and the option value of waiting to develop at a still later date (Plantinga, Luibowski and Stavins, 2002; Capozza and Helsley, 1990). In other words, conversion occurs as soon as the economic benefits exceed the opportunity costs. We make the usual assumption that residential development is irreversible, and denote the date of conversion as t*. Conversion date t* will be a function of the farm's location within the metropolitan area, the pace and direction of urban development, and unknowable future changes in agricultural markets.

One important insight of our model is that the economic perspective of homeowners is virtually identical to that of the farmer-landowner, with the result that land prices in already-developed residential districts are determined in much the same way as in agricultural districts. All homeowners retain the right to subdivide (develop) their property to the extent permitted by law. Every homeowner is therefore a potential developer, just like farmers and speculators. On the other side of the coin, every farmer derives utility from his homestead as an owner-occupier, cares about the aesthetics of the neighborhood (both before and after the decision to develop), and cares about the net fiscal costs of developments elsewhere in the community.

Formally, we may specify the per-acre price of the farmer's total holdings at time t as

$$P_t^F = \max_{t^*}\left\{ H_{t\to\infty}^F + A_{t\to t^*} + D_{t^*\to\infty}^F \right\} \quad (1)$$

and the per-acre price of the homeowner's total holdings at time t as

$$P_t^H = \max_{t^*}\left\{ H_{t\to\infty}^H + D_{t^*\to\infty}^H \right\} \quad (2)$$

where $H_{t\to\infty}$ is a discounted stream of imputed rent derived by the owner from living on the site, $A_{t\to t^*}$ is a discounted stream of agricultural profits, and $D_{t^*\to\infty}$ is the discounted stream of net profits from future development. The presence of $H_{t\to\infty}$ and $D_{t^*\to\infty}$ in both equations highlights similarities in the incentives facing both types of landowner. Conceptually, one can argue that the only difference between the farmer and the homeowner at time t is that the farmer's 500-acre "backyard" has a feasible economic use beyond the provision of amenity benefits to the farm family, while the homeowner cannot use a ½-acre backyard the same way (which is not to say that she would want to even if she could). This economic use is captured by the term $A_{t\to t^*}$.

Thus farmer-landowners and homeowners are not clear-cut categories, but instead ideal types that sit along a *continuum* that is defined by (1) the amount of open land around their homes, and (2) whether they prefer to use that land for personal benefit or for formal market activities, including subdivision. The latter distinction is a simple microeconomic choice driven by budget constraints and indifference curves in the normal manner.

This discussion has real practical importance in New Jersey, because of the increasing number of so-called "hobby farmers" living on "agricultural estates." Terms like these are more pejorative than they are enlightening. A quick glance at the previous paragraph suggests that hobby farmers will resemble other farmers according to the first criterion (amount of open land they have around their homes), but not according to the second one (the extent to which they wish to use their land for economic exchange).

We can clarify these distinctions by adding detail to the land value model we have started to build. Let α be a zoning restrictiveness parameter that is equal to 0 when the minimum lot size throughout the community is the smallest one consistent with building a single-family dwelling (e.g., a tenth of an acre), and equal to 1 when the minimum lot size corresponds to an estate that is so large that only farmers or very affluent residents could have any use for it (e.g., forty acres). The lot sizes of parcels that have already been subdivided are grandfathered.

Our observation of local political behavior suggests that $\frac{\partial P_t^F}{\partial \alpha} < 0$ and $\frac{\partial P_t^H}{\partial \alpha} > 0$. In disputes over downzoning, advocates of the policy will often concede that $\frac{\partial P_t^F}{\partial \alpha} < 0$ but will argue that this reduction is not large enough to qualify as a "taking." The impact of downzoning on P_t^H is less often talked about.

Assume that $\frac{\partial H}{\partial \alpha}>0$ *for both groups* because large-lot zoning improves neighborhood aesthetics and provides spillover benefits to the current household. It reduces the likelihood that new development will exceed the capacity of municipal infrastructure systems, cause traffic, flooding, or environmental problems. In addition, taxes paid by existing residents tend to be lower under large-lot zoning because new residents will pay more in property taxes for public goods that are consumed equally by all households (the Tiebout-Hamilton effect). We expect, however, that $\frac{\partial H^H}{\partial \alpha} > \frac{\partial H^F}{\partial \alpha}$ because farmers' large landholdings insulate them from the negative amenity effects of neighboring development. Farmers have declining marginal utility for open space, an amenity to which they already have a great deal of access.

It is reasonable to argue that $\frac{\partial A}{\partial \alpha} > 0$ because large-lot zoning in the vicinity of the farm will increase the predictability of farming, reduce right-to-farm conflicts, and help create critical mass in agricultural support services (Libby 2003). Many opponents of downzoning argue that $\frac{\partial A}{\partial \alpha} < 0$ because the reduction in land value makes it more difficult for farmers to use their land as collateral. But this requires us to assume what we seek to explain, namely that $\frac{\partial P_t^F}{\partial \alpha} < 0$. Rather than endogenize $\frac{\partial A}{\partial \alpha}$ to land price changes, we shall assume here that $\frac{\partial A}{\partial \alpha} > 0$ and that the "collateral effect" (if any) simply amplifies the total predicted impact of downzoning on farmland prices *ex post* without changing its sign. This turns a simultaneous model into a recursive one without doing much damage to fundamental assumptions.

It follows that if $\frac{\partial P_t^F}{\partial \alpha}$ is to be less than zero, $\frac{\partial D^F}{\partial \alpha}$ must be negative enough to offset both $\frac{\partial H^F}{\partial \alpha}$ and $\frac{\partial A}{\partial \alpha}$ in equation (1). Similarly, if $\frac{\partial P_t^H}{\partial \alpha}$ is to be greater than zero, $\frac{\partial D^H}{\partial \alpha}$ can be negative but not large enough in magnitude to offset $\frac{\partial H^H}{\partial \alpha}$ in (2).

We must turn, then, to a discussion of the impact of downzoning on the future stream of profits from development for both types of landowner. For either type, the stream of profits from development may be expressed as follows:

$$D_{t^*\to\infty} = \int_{s=t^*}^{\infty} \delta_s \pi_s ds \tag{3}$$

Where δ_s is a discount factor and π_s is expected net profit from development, both calculated at time s. Because π_s is an expected value driven by uncertainties in the housing market, it is actually a sum of payoffs multiplied by probabilities, as follows:

$$\pi_s = \int_{l=l_{\min}}^{l_{\max}} p_l \pi_{sl} \tag{4}$$

where l is a continuous index of lot size, $l_{\min}$ is the marketable minimum lot size (e.g., a tenth of an acre), $l_{\max}$ is the maximum marketable lot size (e.g., forty acres), and p_l is the probability that lot size l will be the most profitable lot size at time t* and will therefore be chosen by the developer. Once a lot size is chosen on this basis, it is assumed that it cannot be changed in the future.

As written, equation (4) describes expected development profits if there is no lot size constraint whatsoever. It can also be used to examine changes in minimum lot sizes relative to the *status quo* (one can simply define $l_{\min}$ as 2 or 3 acres.)

Downzoning can be expected to have two offsetting effects in (4). On the one hand, we may expect that $\frac{\partial \pi_{sl}}{\partial \alpha} > 0$ for precisely the same reason that $\frac{\partial H}{\partial \alpha} > 0$ for existing residents. Future homebuyers or tenants will benefit from the externality control that a higher α brings about, and they should be willing to pay a per-acre premium for access to a community with more restrictive zoning. This assertion holds all else equal, including the size of their own lot.[3]

On the other hand, an increase in α also increases the probability that the most profitable lot size at time t* will turn out to be prohibited by law, so that $\int_{s=t^*}^{\infty} \delta_s \pi_s ds$ will turn out to be the result of a constrained rather than a true optimum. This is the main effect that the opponents of downzoning focus on: *it is the loss of an option.* This option has value today, even if the most profitable future lot size is uncertain and might turn out to be permitted even under more restrictive zoning.

---

[3] We assume for simplicity that downzoning behavior by a single community does not significantly affect supply and demand in the regional housing market.

The constraint imposed by downzoning can be expressed as follows:

For farmers,

$$\pi_s = \int_{l=[l_{\max}-(1-\alpha)(l_{\max}-l_{\min})]}^{l_{\max}} p_l \pi_{sl}(\alpha)\, dl \qquad (5)$$

When α = 0 in this equation, expected profits are calculated over the full range of possible l's that might be chosen at t*. When α = 1, only l_{max} is permitted by law. 40 acres is the residential lot size if development profits exceed agricultural profits, otherwise the land is not developed. This formulation of expected profits under downzoning is mathematically equivalent to one in which $\pi_{sl} = 0$ for all l less than the new lot size minimum.

The impact of downzoning on a farmer's development profits expected at time s can be expressed as:

$$\int_{l=[l_{\max}-(1-\alpha)(l_{\max}-l_{\min})]}^{l_{\max}} p_l \left(\frac{\partial \pi_{sl}}{\partial \alpha}\right) dl \; - \int_{l=l_{\min}}^{[l_{\max}-(1-\alpha)(l_{\max}-l_{\min})]} p_l \pi_{sl}\, dl \qquad (6)$$

where 0 < α < 1.

The second of these two terms represents the loss of expected profits due to the absence of all development options between the old and new lot size minima, while the first term represents possible gains in expected profits from the externality premium for residential lot sizes that are permitted under the new α > 0. One of these permitted sizes will be chosen by the developer as a constrained optimum, provided that it exceeds agricultural opportunity cost.

This framework makes an assumption that is conservative for evaluating the potential loss to farmer's equity from downzoning, and that is that there is no hard and fast relationship between the lot size chosen by the developer at time t* and per acre profits. It is possible, under this model, that one home on twenty acres could return higher net rental payments to the landowner than 100 homes on the same twenty acres. While this seems unlikely, it allows for expected profits to be set by future supply and demand conditions in the market for housing, rather than by a simple arithmetic rule that says that the more houses you are able to build on each acre, the more profit you will earn.

If one wants to argue that the largest lots are unlikely to be the most profitable, one may specify that $\frac{\partial p_l}{\partial l} < 0$. This assumption increases the likelihood that the most profitable lot size at t* will be relatively small, and therefore increases the odds that development profits will be the result of a constrained optimum once zoning becomes more restrictive. This is reasonable, but it does not change the fact that this is still fundamentally an *option* problem. The most profitable future residential density is unknown at time t.

For homeowners, expected development profits at any time *s* after downzoning look like this:

$$\pi_s = \int_{l=\min\{l_{existing},[l_{\max}-(1-\alpha)(l_{\max}-l_{\min})]\}}^{l_{existing}} p_l \pi_{sl}(\alpha)\, dl \qquad (7)$$

The current overall lot size ($l_{existing}$) puts an upper bound on the lot size that can be offered to future homebuyers if the homeowner acts as a developer, while the lower bound of the integral is the lesser of the existing lot size and the minimum lot size permitted under the new zoning. Assume that $l_{existing} < l_{max}$ and that all farmers can supply l_{max} to the market. Market probabilities and expected per-acre payoffs are the same for both groups. Clearly, expected development profits are lower for the homeowner than for the farmer under any α, due to the homeowner's inability to pursue options between $l_{existing}$ and l_{max}. In addition, a given increase in α could easily put the new minimum above the homeowner's existing lot size, eliminating any future marginal effect of α on development value. This will not happen to the farmer until α = 1.

By analogy to (6), we have the following expression for the impact on a single year's development profits to homeowners following an increase in α:

$$\int_{l=\min\{l_{existing},[l_{\max}-(1-\alpha)(l_{\max}-l_{\min})]\}}^{l_{existing}} p_l\left(\frac{\partial \pi_{sl}}{\partial \alpha}\right)dl - \int_{l=l_{\min}}^{\min\{l_{existing},[l_{\max}-(1-\alpha)(l_{\max}-l_{\min})]\}} p_l \, \pi_{sl}\, dl \qquad (8)$$

Close examination of expressions (6) and (8) suggests that expected profit lost in year s because of loss of the development option can never be larger for homeowners than it is for farmers. On the other hand, the gain in expected development value to farmers from the externality effect on future homes could exceed the gain to homeowners because of the larger range of lot sizes the farmer is able to bring to market. In addition, at some point a higher α will eliminate all externality-related real estate profits for homeowners because the right to subdivide will have effectively been eliminated. If $\frac{\partial p_l}{\partial l} < 0$, of course, then the larger expected profits perceived by farmers because of externality effects will be modest, because the subdivision options the farmer possesses that the homeowner does not are mostly large lot sizes with small probability weights.

Having explored the impact of downzoning on expected development profits for the two types of landowners at time s, it is necessary to restore the time dimension to the problem.

Expressions (6) and (8) suggest that the direction and magnitude of the net change in expected development profits in year *s* due to downzoning will be a function of existing lot size (especially for homeowners), the extent of the downzoning $\partial\alpha$, and the magnitude of any positive externality effect on future residential rents.

Let us assume that $\frac{\partial \pi_s^F}{\partial \alpha} < 0 \; \forall s$ for the typical farmer, $\frac{\partial \pi_s^H}{\partial \alpha} < 0 \; \forall s$ for the typical homeowner, and $\frac{\partial \pi_s^F}{\partial \alpha} < \frac{\partial \pi_s^H}{\partial \alpha}$. This means that both types of landowners lose per-acre development profits as a result of downzoning, but the farmer loses more per-acre profits than the homeowner for a given increment in zoning restrictiveness. This will be true if the externality effect of the downzoning is small compared to the option effect, and if the increased minimum lot size "crosses over" the homeowner's current lot size, so that the remaining effect on homeowner option value is zero (in practice, this will happen well before that point is reached because subdivision actually requires an initial lot size that is approximately *twice* the minimum).

Because the discounted stream of earnings is additive and discount factors remain unchanged, it follows that

$$\frac{\partial D^F_{t^*\to\infty}}{\partial \alpha} < \frac{\partial D^H_{t^*\to\infty}}{\partial \alpha} < 0 \qquad (9)$$

A problem with this inequality is that it assumes that the optimal time of conversion, t* does not change when α changes, and it gives no indication that t* might be different for farmers than it is for homeowners. The endogeneity of t* to α is a complex topic that we shall sidestep for now.[4] As for an optimal time of development t* that is different for homeowners than it is for farmers, we believe this is likely. By definition, homeowners value the personal amenity use of their undeveloped acreage to a greater extent than do farmers. The best way to think about this pure preference is that it generates a higher opportunity cost to residential subdivision for homeowners than for farmers, leading to a t* that occurs much later, if at all. Profit opportunities driven by urbanization must be truly massive for most homeowners to exercise their subdivision option.

[4] There are two pathways by which t* could change with a change in α. First, any reduction in expected profits from development should make agriculture more competitive with residential development at any time s, and therefore postpone conversion until development pressure becomes even more intense at a given radius from the city's core: $\frac{\partial t^*}{\partial \alpha} > 0$. Second, to the extent that conversion is postponed because of expected property appreciation (and not simply because development profits do not yet exceed the agricultural hurdle rate), expectations of appreciation may be reduced by the new zoning, and conversion could take place sooner when a new zoning restriction is put into place: $\frac{\partial t^*}{\partial \alpha} < 0$. In this case, the *other* opportunity cost to residential development — the foregone value of the option to enjoy continued appreciation—goes down. Because the prediction on t* goes both ways, we shall ignore it for now and consider t* to be fixed. Moreover, our main concern is not whether t* changes as a function of α, but rather if t* changes as a function of α in a way that differs between farmers and homeowners. It is not obvious that it will.

In this view, net reductions in π_S^H because of downzoning occur further out in time, and are discounted more heavily than similar reductions for farmers. Inequality (9) holds with even more certainty. The role played by the expectation of lower development profits is reduced for homeowners, making it less likely that such reductions will offset gains in amenity rents expected in the short run.

If we relax our assumption that a single minimum lot size must prevail throughout the entire community, we must also acknowledge that homeowners have the ability to downzone the agricultural zone without affecting subdivision options in their own neighborhood. This would eliminate any loss to homeowners from the loss of their own subdivision rights. We believe that this often happens in practice, but we shall continue to motivate our model of local political behavior using universal incentives and community-wide zoning.

The final possible contributor to the difference in wealth effects from downzoning is the simple fact that farmers own more land than homeowners. All this does, however, is multiply the impact of per-acre price changes $\frac{\partial P_t^F}{\partial \alpha}$ and $\frac{\partial P_t^H}{\partial \alpha}$ over the number of total acres held by the landowner. The *sign* of these two partials remains the key determinant of each landowner's opinion of downzoning, for or against. One can argue that because real estate constitutes the primary asset for both types of landowner, it is the percentage change in value of the nest egg that matters, and this is equivalent to the change in price per acre. Empirically, we shall still explore whether a large number of acres per farmer has an extra deterrent effect on the downzoning decision.

We are now in a position to summarize determinants of the signs of $\frac{\partial P_t^F}{\partial \alpha}$ and $\frac{\partial P_t^H}{\partial \alpha}$. We cannot prove that this partial derivative is negative for farmers and positive for homeowners, because those labels do not have clear, quantifiable meanings. What we can do is describe typical farmer characteristics that lead to a prediction of reduced land values from increased α and typical homeowner characteristics that lead to a prediction of increased land values from increased α. This helps give Fischel's observation about opposing interest groups a microeconomic foundation, some economic reasonableness. It does not, however, eliminate a certain circularity in the reasoning: those we observe opposing downzoning *must* be those for whom $\frac{\partial D^F}{\partial \alpha} < 0$ and $\left|\frac{\partial D^F}{\partial \alpha}\right| > \left|\frac{\partial H^F}{\partial \alpha} + \frac{\partial A}{\partial \alpha}\right|$. "Economic reasonableness" remains a contribution, however, because some argue that wealth losses from downzoning never occur, so that even the most strident opponents of the policy are victims of a grand delusion about their own economic welfare.

Our conclusions from this section are as follows.

- Farmers are less likely to experience a positive impact on current land value from downzoning than homeowners because their large parcels are more effectively buffered against community-wide disamenities before the time of conversion
- Homeowners will experience a lower decline than farmers in expected development profits from downzoning because their preferences lead them to subdivide their land much later, other things equal, and thus the negative impacts will be deeply discounted

- Many homeowners will not be affected at all by the loss of development options because they are already at the minimum lot size, or because a given increase in α quickly puts them under the threshold for subdivision. If homeowners succeed in downzoning only farmers' land, of course, they would not be affected at all by loss of the development option.
- The closer α is to 1, the greater the loss in expected profits due to the loss of the option, and the less the gain in expected profits due to externality benefits accruing to future homebuyers in the subdivision. This is because externality-driven gains are available only for lot sizes that are permitted after the zoning change; so the smaller the range of lot sizes permitted in the future, the smaller the impact of this effect. [As the value of one integral rises, the other falls within the full range of lot sizes *l* in 6 and 8.] This effect applies especially to farmers, who are the only ones with actionable development rights that could be lost at high levels of α.
- The model also raises the interesting possibility that there could be net gains in future development profits and present land prices due to small, initial increments in α, before net effects turn negative. This will be more likely under the reasonable assumption that $\frac{\partial^2 \pi_{sl}^F}{\partial \alpha^2} < 0$, i.e., that there are diminishing returns in the externality effect on future development profits at any lot size *l*.
- The greater the likelihood that smaller lot sizes will be the most profitable ones in the future, the greater the chance that the new constraint will bind and that future profits will be reduced by the downzoning. However, any downzoning must

eliminate an economically valuable option, due to the inherent uncertainty of housing markets.

In the next section we explore the politician's choice of α under the assumption that $\frac{\partial P_t^F}{\partial \alpha} < 0$ and $\frac{\partial P_t^H}{\partial \alpha} > 0$ for identifiable farmer and homeowner groups.

Elected officials' choice of α

The government comprises elected representatives of the people, both farm and non-farm. It behaves rationally in the sense that it only decides on such measures (or legislation) as it believes would raise its electoral prospects. The utility function of the government may thus be regarded the same as the expected total vote function:

$$u^G = V = F\Pi^f(\alpha, \gamma; \theta) + N\Pi^n(\alpha, y^n, \upsilon; \Omega) \qquad (10)$$

where F = voting population of farm households, N = voting population of non-farm households, **A**^{i} = probability that the average ith group household will vote for the government, i = f, n; **(** = an index of the political clout of the farm households, **L** = an index of the political clout of the non-farm households, **2**, **S** = other exogenous variables that may influence **A**^{i}.

If the members of F and N are defined such that $\frac{\partial P_t^F}{\partial \alpha} < 0$ and $\frac{\partial P_t^H}{\partial \alpha} > 0$, it follows that $\Pi_\alpha^f < 0$ and $\Pi_\alpha^n > 0$. Following Fischel (1985), we assume that there are diminishing returns in the relationship of land value to zoning restrictiveness, such that $\Pi_{\alpha\alpha}^f < 0$ and

$\Pi^n_{\alpha\alpha} < 0$. If neighborhood amenities are a luxury good, $\Pi^n_{\alpha y^n} > 0$. Political clout amplifies the intensity of voter preferences, such that $\Pi^f_{\alpha\gamma} < 0$ and $\Pi^n_{\alpha\upsilon} > 0$.

The first order condition for maximizing total votes is:

$$\frac{dV}{d\alpha} = F\frac{\partial \Pi^f}{\partial \alpha} + N\frac{\partial \Pi^n}{\partial \alpha} = 0 \tag{11}$$

In order for (11) to define a maximum, the second order condition must hold:

$$\frac{d^2V}{d\alpha^2} = F\Pi^f_{\alpha\alpha} + N\Pi^n_{\alpha\alpha} \tag{12}$$

Given the earlier assumptions, this expression is negative such that the condition in (11) unambiguously defines a maximum.

We can now find the optimal level of zoning restrictiveness, α*, that elected officials will select in order to maximize votes, as a function of the exogenous variables. To do this, we totally differentiate equation (11):

$$dV_\alpha = \Pi^f_\alpha dF + \phi d\alpha + F\Pi^f_{\alpha\gamma} d\gamma + N\Pi^n_{\alpha y^n} dy^n + N\Pi^n_{\alpha\upsilon} d\upsilon + \Pi^n_\alpha dN \tag{13}$$

where $\phi = F\Pi^f_{\alpha\alpha} + N\Pi^n_{\alpha\alpha} < 0$.

Looking at changes in only one exogenous variable at a time, we may obtain from (13) the following:

$$\frac{d\alpha^*}{dF} = -\frac{\Pi^f_\alpha}{\phi} < 0 \tag{14}$$

$$\frac{d\alpha^*}{dN} = -\frac{\Pi^n_\alpha}{\phi} > 0 \tag{15}$$

$$\frac{d\alpha^*}{d\gamma} = -\frac{F\Pi^f_{\alpha\gamma}}{\phi} < 0 \tag{16}$$

$$\frac{d\alpha^*}{dy^n} = -\frac{N\Pi^n_{\alpha y^n}}{\phi} > 0 \tag{17}$$

$$\frac{d\alpha^*}{d\upsilon} = -\frac{N\Pi^n_{\alpha\upsilon}}{\phi} > 0 \tag{18}$$

The signs on (14) and (15) confirm the basic political intuition that the higher the ratio of homeowners to farmers in the community, the greater the likelihood of downzoning. The political clout variables, γ and υ, "amplify" the voting power of one group or another, either through the group's influence on voters in its class (as specified here) or directly on elected officials (16 and 17). Higher income on the part of homeowners increases their demand for the amenity and fiscal benefits that downzoning can provide (17).

Empirical Test of the Political Model of Downzoning

Data Collection and Hypotheses

α* is actually a continuous variable: the elected official may select any minimum lot size between $l_{\min}$ and $l_{\max.}$ When we conducted our zoning survey of New Jersey municipal governments, we asked about minimum residential lot sizes "before" and "after" any downzoning. This information might allow us to estimate the political determinants of α* specified as a continuous variable. Not every municipality provided this information, however; when they did it was often in the form of multiple lot sizes for different zoning classifications. We shall therefore evaluate causes of the decision to downzone as a dichotomous variable: yes=1 and no=0.

In the spring of 2004, we telephoned the main office of every municipal government in New Jersey outside of the fully urbanized, built-out portion of the state. Entire counties like Hudson next to New York City were omitted; built-out municipalities in counties like Passaic and Camden were identified using a road map. Municipalities in the Pinelands preservation area were also omitted because zoning there is subject to special state control.

We called 278 of New Jersey's 566 municipalities. 259 responded to our survey, a response rate of 93%. We asked respondents whether they had passed a downzoning ordinance that significantly increased minimum lot sizes in the undeveloped portion of the community at any time since 1995, when state experts began to notice a sharp upswing in the practice. We were interested in the respondents' opinions about the concept "significant," but we also provided numerical thresholds to define this word. We suggested that an increase in minimum lot size of 50% *or* one acre, and extending over at least 1% of the municipality's land area, would qualify as significant. Most reported downzonings exceeded these thresholds easily: communities typically change their zoning as part of a master plan update, which involves more than mere tinkering. Respondents, who were generally zoning administrators, answered yes or no to the downzoning question. If the answer was yes, they provided us the date of the downzoning and lot sizes before and after, if this information was available.

Table 1. Means and Descriptions of Independent Variables

Variable	Acronym	Downzoning = 0 N	Mean	Downzoning = 1 N	Mean	Means significantly different?
Political economy variables						
Farmers as % of all occupations in 1990	fpct90	200	0.02	89	0.02	yes
Average farm size in 1992	farmsize	135	144.78	85	302.85	yes
Median household income in 1999	medhhi99	200	61211.84	89	74302.16	yes
Right to farm law (0=none, 1=weak, 2=strong)	RTFTYPE	130	0.32	84	0.68	yes
Percent residents who were owner-occupiers in 1990	OWNOCC	200	73.63	89	82.25	yes
Lands at risk variables						
Open land as % total buildable acreage 1995	open	200	33.77	89	67.11	yes
(Open land %)^2	open2	200	1948.34	89	4931.95	yes
Woods and wetlands as % of undeveloped land in 1995	wwood	200	69.37	89	65.05	
Percentage change in population, 1990-1994	CHGPOP	130	12.08	84	27.07	yes
Percentage change in average residential valuation, 1990-1994	CHGRSVA	130	89.19	84	94.47	
Percentage of open, developable land in 1986 that had developed by 1995	dpct	200	20.04	89	7.98	yes
Other political variables						
Acres of farmland preserved or pending, 1994	APACRES	130	81.92	84	196.25	
Percentage of municipal governing body Democrat in 1994	MUNDEM	130	28.51	84	17.33	
Equalized property tax rate in 1995	eqtax95	200	2.21	89	2.09	
Per-capita public debt in 1990	pcdebt90	200	65.56	89	42.12	
Managers and professionals as % of residents with occupations in 1990	whitec	200	28.75	89	31.16	
Percentage of residents over 65 years of age	plus65	200	14.32	89	10.99	yes

Sources:
Occupational counts, housing tenure, age, and income: Decennial Census
Farm size and PDR acres: Reports of NJ Dept. of Agriculture
Right to farm: Adelaja and Friedman 1999.
1986 and 1995 land cover data: NJ Office of Smartgrowth
Data on municipal budgets and political parties: NJ Legislative District Data Book, 1996

We collected independent variables from a number of sources and divided them into three groups corresponding to our theoretical framework. The independent variables are shown in Table 1, along with the means for each downzoning classification and results of a 5% t-test for difference of the means. This provides a rough test of the relationship of each variable to the downzoning decision without imposing *ceteris paribus.*

The *political economy* variables come directly from our model as shown in (14) through (18). The most important of these is the number of farmers as a percentage of all residents with occupations (FPCT90). We expect this variable to have a negative impact on the probability of downzoning, other things equal. Average farm size (FARM SIZE) should also have a negative impact, because it reflects a larger potential asset loss for farmers (although as we have argued, a fixed percentage reduction on even a small farm is politically important). RTFTYPE is a variable with three levels: 0 for no right-to-farm law, 1 for a weak right-to-farm law, and 2 for a strong right-to-farm law (Adelaja and Friedman 1999). We include this variable as a measure of farmers' political clout. The greater the farmers' political clout, the more likely the municipality will have passed a strong RTF law, which helps farmers. Viewed this way, the predicted impact of this variable on the probability of downzoning is negative.

Median household income in 1999 (MEDHHI99) should have a positive impact on the probability of downzoning following the prediction in inequality (17). The higher the percentage of voters who are owner-occupiers (OWNOCC), the more likely they are to use the political system to protect their housing asset. OWNOCC is predicted to have a positive coefficient. MEDHHI99 and OWNOCC are assumed to measure the status of non-farmers, who make up the vast majority of voters in most towns; FPCT90 controls for situations where this is not the case.

The second category of variables is labeled *lands at risk.* These variables reflect the common sense idea that downzoning, like any controversial decision by public officials, will be implemented in response to a perceived problem, not when there is no problem on the horizon. While it is true that equations (6) and (8) describe changes in land values from downzoning that can be expected today no matter when development is expected to take place, the fact is that downzoning merely guarantees a particular externality regime, it does not create one directly.[5] This guarantee has greater value, and becomes more urgent, when the rural landscape is actually expected to change. Without significant development pressure, homeowners will address more urgent priorities than downzoning, while elected officials will be unwilling to expend political capital to focus on such a long-term issue. Farmers, for their part, are happy with the *status quo,* so theirs is not the behavior that needs to be explained when development pressure increases. Development pressure reduces t*, and therefore magnifies the development profit effect for both groups because of discounting (equations 6 and 8), while bringing forward in time the expected negative effects on existing homeowners.

Thus we may expect the opposed interests of the two groups to intensify as a result of impending development, but it seems logical that rapid growth will cause homeowners to put downzoning on the local agenda in the first place. Therefore we hypothesize a positive coefficient for those variables in Table 1 that describe recent growth in population, growth in residential value, and loss of existing open space.

If most of the community's open space is already gone, of course, there is nothing left to protect. We therefore hypothesize a positive coefficient on open space as a proportion of the community's land that is either developed or undeveloped in 1995 (OPEN). We include a squared term for this variable to account for the possibility that when there is a great deal of open space it is not viewed as being at risk; when there is very little open space it is regarded as a lost cause; when it is in-between these two extremes

[5] And even that guarantee is not secure, as we assume throughout this paper. Zoning can be changed by a future governing body.

homeowners will decide to take action. Note the importance of including OPEN in addition to variables that describe urgency due to recent growth: growth rates do not necessarily correlate with the amount of open space remaining in a town at a given time. Finally, we include data on woodlands and wetlands (WWOOD) in order to capture environmental motivations that differ from the more self-interested "growth control" motivations we have focused on so far (Adelaja and Friedman 1999).

The last category of regressors includes political variables that are logical, but are not specified directly in (14) through (18) above. We have data on existing acres in the state's purchase of development rights (PDR) program (APACRES). An interesting question is whether downzoning is viewed by local voters as a complement or a substitute for the PDR program, which involves compensation. It should be noted that local voters do not administer the state PDR program, and do not pay directly for local development rights retired under this program. Local elected officials may, however, have some influence over which farms are enrolled. We hypothesize that use of PDR and downzoning will occur together in the same communities. Even though PDR is more farmer-friendly because of its compensation mechanism, the key consideration will likely be whether a particular community is preservation-minded or not. If so, we should observe preserved farms and regulatory mechanisms like downzoning in the same places.

The percentage of the governing body that is Democratic is hypothesized to increase the probability of downzoning because of the property rights ideology adhered to by many Republicans. The proportion of residents who hold white collar (managerial and professional) jobs is expected to increase the probability of downzoning because of the political skills required to mobilize an anti-growth coalition (Logan 1976; Protash and Baldassare 1983). This variable has the same predicted sign as median household income. It is correlated with that variable (p=.70), and could easily have been included as a political clout variable for homeowners.

EQTAX95 and PCDEBT90 both measure existing fiscal stress in the community. A high equalized property tax rate is a rough measure of fiscal burden, while per-capita debt service is a measure of infrastructure expenditures incurred in the past, possibly making voters wary of new capital expenditures. PLUS65 is the proportion of residents over 65 years of age. Senior citizens are notoriously resistant to new expenditures that increase property taxes. Therefore, if downzoning is seen as being a good way to avoid the capital costs of new development, or to make sure that each new home pays enough to cover the cost of its schoolchildren, we expect the coefficients on these three variables to be positive.

Empirical Results

The logit model is specified as $\log\left[\left\{P(DZONE_{yes})\right\}/\left\{1-P(DZONE_{yes})\right\}\right]=\sum_k b_k r_k + \varepsilon$ where $P(DZONE_{yes})$ is the probability that a municipality has downzoned, $\sum_k b_k r_k$ is a linear combination of k regressors and coefficients, and ε is an independent and normally distributed random error term with a mean of zero and a constant variance.

Table 2. Results of logit model of probability municipality will have downzoned since 1995

Variable	Estimated Coefficien	Standard error	Pr > ChiSq	Marginal effect on probability	x one st. d
Intercept	-7.2481	3.3887	0.0324 **	-1.236992	
Political economy model					
Farm occupations as % of all occupations in 1990	-34.3882	15.6836	0.0283 **	-5.868838	-0.110743
Average farm size in 1992	-0.00028	0.000837	0.7392	-4.78E-05	-0.013302
Median household income in 1999	0.000023	0.000016	0.1614	3.93E-06	0.082257
Right to farm law (0=none, 1=weak, 2=strong)	0.432	0.2521	0.0866 *	0.073727	0.056957
Percent residents who were owner-occupiers in 1990	0.0039	0.0196	0.8423	0.000666	0.008876
Urgency; land at risk					
Open land as % total buildable acreage 1995	0.0946	0.0521	0.0694 *	0.016145	0.492607
(Open land %)^2	-0.00041	0.000456	0.3676	-7E-05	-0.202011
Woods and wetlands as % of undeveloped land in 1995	0.0127	0.0119	0.2821	0.002167	0.04339
Percentage change in population, 1990-1994	0.014	0.00822	0.0874 *	0.002389	0.067108
Percentage change in average residential valuation, 1990-1994	0.0161	0.00901	0.0747 *	0.002748	0.060362
Percentage of open, developable land in 1986 that had developed by 1995	-0.00146	0.0313	0.9628	-0.000249	-0.005292
Other political and policy variables					
Acres of farmland preserved or pending, 1994	0.000612	0.000542	0.2584	0.000104	0.041722
Percentage of municipal governing body Democrat in 1994	-0.00215	0.00696	0.7573	-0.000367	-0.011365
Equalized property tax rate in 1995	-0.1491	0.5484	0.7857	-0.025446	-0.011664
Per-capita public debt in 1990	0.00461	0.00534	0.3876	0.000787	0.070193
Managers and professionals as % of residents with occupations in 1990	-2.7143	3.9833	0.4956	-0.463234	-0.038907
Percentage of residents over 65 years of age	-0.00554	0.0511	0.9136	-0.000945	-0.00551

N = 214

Table 2 shows the estimated coefficients, standard errors, and p-values of this model of the probability that New Jersey communities adopting downzoning between 1995 and 2004. In addition, the marginal effect of each variable on the probability is calculated at the mean value of all of the coefficients (see Adelaja and Friedman for the relevant formula). In the final column, this derivative is multiplied by the standard deviation of each independent variable, which serves to standardize the result.

The impact of the proportion of residents who are farmers is statistically significant at the 5% level and is negative, as predicted. The remaining variables that are significant exceed only a 90% confidence level. The existence of a right-to-farm law is significant but positive, suggesting that municipalities that seek to preserve rural character by downzoning also hold out to farmers the “olive branch” of nuisance protection. This is similar to our hypothesis on the relationship between downzoning and use of the state's purchase of development rights program.

The proportion of developable land that is open, and is therefore at risk to develop at "too high" a density, is significant and positive. Communities act when there is something significant to protect, and when a large amount of the community's built character is up in the air. The sign on the squared version of this variable is negative, as expected, but it is not significant at standard confidence levels. It could be that more observations would show that this slope changes sign at some point: if a very large proportion of a community is open, its citizens do not worry so much about how it is zoned. As expected, two indicators of impending development pressure are positive and significant at the 10% level. The variable CHGRSVAL reflects the increased stakes that both parties have in the protection of their land asset. In addition, this variable may effectively proxy increased property tax payments that feed antigrowth sentiment, as well as an increasing cost of acquiring — rather than re-zoning — lands at risk.[6]

While the broadest predictions of our political economy model are confirmed by the results in Table 1 — farmers and homeowners are diametrically opposed on this issue and politicians listen to them — the subtler nuances of the model are not confirmed. There is little evidence that the probability of adoption is affected by homeowners' income

[6] The fiscal interpretation of the CHGRSVAL variable should be treated with caution. Although actual property values may be increasing rapidly, actual re-assessments for tax purposes are infrequent. And because local budgets must balance in New Jersey, tax rates will eventually fall when property is reassessed upwards unless the governing body decides to increase spending to take advantage of the increase in the base. Unlike the federal government, tax payments by individuals do not automatically rise when economic growth drives an increase in the base, because surpluses are not permitted. (This note of caution applies also to interpretation of the variable EQTAX95.)

elasticity of demand for amenities, the existence of large farms, Democrats in office, or fiscal stresses that amplify no-growth sentiment. Instead, politicians act when there is some rural character to be preserved, when growth is just over the horizon, and when farmers are a small enough minority that passing a downzoning ordinance wins more electoral support than it loses.

While it seems likely that farmers and homeowners experience changes in asset values that follow the predictions of our land value model (the political behavior of New Jersey's farmers would be difficult to explain otherwise), it is certainly possible that the decision to downzone is driven by more than pure self-interest. Non-farm homeowners act to preserve rural character when it is threatened, farmers oppose this particular method, and everything else is just counting noses. Democracy works as designed: the non-farm majority wins. Precisely specifying the personal economic stake that different types of voters have in the outcome does not improve much upon this basic story.

Conclusion

In New Jersey, the real power to affect the future use of land is lodged at the local level. Downzoning is one among a number of tools that local governments have at their disposal. It is easily the most controversial local land use tool because of the "takings" claim made by farmers.

We cannot settle the takings matter without new empirical work, but we have built a theoretical model of the impact of downzoning on land values for both farmers and homeowners. Although our model suggests that a net loss for farmers and a net gain for homeowners is reasonable, it reminds us that homeowners can lose a portion of their present value from community-wide downzoning, while farmers can gain a portion. It would be interesting to look at a sample of land values pre- and post-downzoning to see whether this *conditional* nature of predicted land value changes actually holds. In addition, the fact that landowners are never really pure farmers or pure homeowners could be addressed more formally using detailed data on individuals. In this paper we rely on an all-or-nothing classification of the two groups because that is how the census data come to us.

The second theoretical section of this paper builds a model of politician behavior driven by the assumption that downzoning is a zero-sum game between farmers and homeowners. A formal model of vote maximization is used to get partial derivatives on the politician's choice of an optimal zoning-restrictiveness regime as a function of exogenous variables.

This model is tested using data on 214 New Jersey municipalities. The most important prediction of the political economy model — the fundamentally opposing interest that farmers and homeowners have in downzoning — is confirmed by the data, although the model does not provide strong corroborating evidence of economic self-interest on the part of non-farmers. Regardless of motivation, we may expect continued conflict over zoning rights between shrinking farmer minorities and growing homeowner majorities in places with population growth and rapidly-rising land values.◙

References

Adelaja, A., and K. Friedman. "Political Economy of Right-to-Farm." *J. of Agr. and Appl. Econ.* 31 (December 1999): 565-579.

Campos, R.W. "Toward a Theory of Instrument Choice in the Regulation of Markets." Mimeo. California Institute of Technology, Pasadena, California, January 1987.

Capozza, D.R., and R.W. Helsley. "The Stochastic City." *J. Urban Econ.* 28 (1990): 187-203.

Fischel, W.A. "The Urbanization of Agricultural Land: A Review of the National Agricultural Lands Study." *Land Economics* 58 (1982): 236-259.

______. *The Economics of Zoning Laws.* Baltimore: Johns Hopkins Press, 1985.

______. *The Homevoter Hypothesis.* Cambridge, MA: Harvard University Press, 2001.

Furuseth, O.J. "Influences on County Farmland Protection Efforts in California: A Discriminant Analysis." *Professional Geographer* 37 (1985a): 443-451.

______. "Local Farmland Conservation Programmes in the U.S.: A Study of California Counties." *Applied Geography* 5 (1985b): 211-227.

Gardner, B.D. "The Economics of Agricultural Land Preservation." *Amer. J. Agr. Econ.* 59 (1977): 1027-1036.

Hahn, R.W. "The Political Economy of Environmental Regulations: Toward a Unifying Framework." *Public Choice* 65 (1990): 21-47.

Libby, L. "Efficiency, Equity, and Farmland Protection: An Economic Perspective." In C.B. Moss and A. Schmitz, eds. *Government Policy and Farmland Markets.* Ames, IA: Iowa State Press, 2003, pp. 53-80.

Logan, J.R. "Notes on the Growth Machine: Toward a Comparative Political Economy of Place." *Amer. J. of Sociology* 82 (1976): 349-352.

Pelzman, S. "Toward a More General Model of Regulation." *J. of Law and Econ.* 19 (1976): 211-240.

Plantinga, A., R. Lubowski, and R. Stavins. "The Effects of Potential Land Development on Agricultural Land Prices." Harvard University, John F. Kennedy School of Government Faculty Research Working Paper Series RWP02-012 (February 2002).

Pogodzinski, J.M., and T. Sass. "Measuring the Effects of Municipal Zoning Regulations: A Survey." *Urban Stud.* 28:4 (1991): 597-621.

Protash, W., and M. Baldassare. "Growth Policies and Community Status: A Test and Modification of Logan's Theory." *Urban Affairs Q*. 18 (1983): 397-412.

Schmitz, A., and R.E. Just, "The Economics and Politics of Farmland Values." In C.B. Moss and A. Schmitz, eds. *Government Policy and Farmland Markets.* Ames, IA: Iowa State Press, 2003, pp. 53-80.