

Externalities and Valuation of Farmland in the Urban Fringe

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1.0 Objectives and Background

Canada's agricultural land is under pressure at the intensive margin – the rural-urban fringe. This is particularly true in British Columbia, even though agricultural land in the Province is protected under the Province's 1973 Agricultural Land Reserve (ALR) legislation. At the rural-urban fringe, agricultural land has become fragmented with farmers unable to take advantage of economies of scale, and land prices have become inflated due to non-agricultural values, so farmers are unable to realize reasonable returns to land. Increasing pressure from urban encroachment results in externalities that are bi-directional. Urban complaints about off-farm externalities such as smell, noise, and pollution of waterways has necessitated 'right-to-farm' legislation – the BC Farm Practices Protection Act (1995) – that reduces the ability of urbanites to complain about agricultural practices, while requiring 'normal farming practice'. At the same time, farmers have difficulty moving equipment from one field to another and must tolerate trespass and vandalism associated with their proximity to urban development. The response to these externalities has been threefold:

1. Landowners permit their stock of farm capital or farm improvements to deteriorate because they lack the incentive and finances to undertake new investments. In essence, farming is slowly being abandoned.
2. Agricultural producers switch to specialty 'products', including market garden crops that cater to the nearby urban market, organic production and/or very intensive agriculture (viz., greenhouses in Delta municipality). Intensive agriculture near urban areas has often been opposed by environmentalists and others, although it may be one means to ensure an adequate income for agricultural producers. Alternatively, food safety concerns have made consumers increasingly wary about where food originates, and thus they have been willing to drive to nearby farms to purchase locally and often organically produced farm products directly. Farmers near urban centers may be able to command a price premium by producing organically or eliminate the marketing chain, thereby enabling them to earn an adequate income and continue farming. However, little is known about the success and ability of these farming approaches to maintain agricultural land at the rural-urban fringe.
3. Landowners may subdivide land to the smallest size permitted under the ALR zoning ordinance, selling the land much like single-family lots to those willing to treat it as a sub-urban 'ranchette'. The land may be taken out of agricultural production entirely, and allowed to deteriorate, or rented out for livestock use or production of forages.

The main objective of the research is to determine the factors that result in landowners being classified into one of the three categories identified above. We want to know how factors such as off-farm income, proximity to urban centres/markets, government support, and regulations affect the continuation of farming in areas within a certain distance (perhaps 50-100 km) of urban

centres, and how they affect the adoption of organic farming, market-garden operations, and other specialty farms that facilitate the continuation of agriculture. We want to know what characterizes landowners who go into intensive agriculture (e.g., greenhouse production) in urban areas. The focus of the research will be on BC's attempt to control urban growth through the ALR.

The current research seeks to answer some of the questions related to agricultural activities near large urban centers. The particular focus is British Columbia's Agricultural Land Reserve and its success in retaining land near the urban centers in the lower mainland (Vancouver and suburbs), Okanagan Valley and Saanich Peninsula (southern Vancouver Island near Victoria). Because land prices are the major determinant of farmers' abilities to retain financially viable operations, the particular objective of the current research is to examine how land prices are impacted by the rural-urban interface. To do so, we examine farmland and residential values in the Saanich Peninsula.

2.0 The Nature of Rural-Urban Conflict in British Columbia

Agriculture in BC generates approximately \$2.2 billion in farm gate sales and creates jobs for more than 30,000 British Columbians in primary agriculture alone. Using only 2.7% of the provincial land base (about half of the total ALR land), BC agriculture provides about 50% of provincial food requirements. While agriculture serves as a key component in a network of working farms, forests, parks and natural spaces that contain urban growth, the fastest-growing towns and cities in BC are typically located adjacent to prime agricultural land, creating pressure for the conversion of farms to other uses.

The challenges inherent in managing growth and supporting a viable agricultural industry are exemplified on Vancouver Island. As in other regions of BC, the Island's small areas of fertile soil, along with a moderate climate, are the basis for world-class agricultural productivity. Urban growth places tremendous pressure on the Island's prime farmland; agriculture and development for recreation, retirement homes and other urban needs compete for the same lands in the Victoria-Nanaimo-Campbell River corridor. Community and environmental values need to be balanced with the need for housing and industrial development. In the Regional District of Comox-Strathcona (RDSCS, which lies within the corridor), for example, the ALR accounts for just two percent of the land. The RDSCS's 445 working farms reported over \$26 million in gross receipts in 2001, while helping to provide a healthy and secure food supply and contributing nearly \$6 million in wages to the local economy. Yet, this land is under pressure from retirement development and recreation, some of which is associated with the increasing recognition of Mount Washington as a world-class ski destination.

As the urban fringe is pushed out, there is increasing fragmentation of the surrounding farmland and intensification of the externalities associated with farmland and development. These externalities flow in both directions. On the negative side, there are nuisance complaints from neighboring urban residents who object to the sounds and smells of farming operations, and the added traffic congestion caused by slow-moving farm equipment traversing from one field to another some distance away. Of course, this spatial fragmentation adds to farming costs, as do vandalism and trespass. Nonetheless, urban residents enjoy living near open spaces that facilitate wildlife viewing, provide pleasant agrarian landscapes during commutes and recreational amenities. Indeed, real estate brokers include farmland views and proximity to natural areas as selling features of houses. One of the properties included in our sample was listed for sale in 2007 with the following description: "Central Saanich – Victoria: This .28 acre view property is priced to sell and move in today. Overlooking the Marindale Valley and farm fields, the property has some distant water views and close to Island View Beach.... Only 15 minutes from downtown and 10 minutes from ferry and airport...." That people are willing to pay more for a house with these amenities, including nearness to agricultural lands, has been demonstrated by a number of empirical studies.

We investigate the value of open space (farmland and parkland) using a hedonic pricing model of residential properties to derive shadow prices for lands in the ALR and other open space (e.g., parks, nature reserves) – to determine the premium that open space and other non-market amenities add to residential property values. Most researchers have estimated open space premiums using a proxy variable to represent its various attributes. One such proxy is the percentage of open space within a specified buffer zone around each property, while another is an index that allows the value of the open space amenity to decrease in a nonlinear fashion as distance increases. The contribution of open space to property values in a region falls to zero once an ‘outer ring’ is reached, with the distance to this outer ring determined endogenously in the statistical model. The problem with distance measures is that large and small open space areas are treated equally; the problem with area percentages is that arbitrary buffer zones around each property have to be specified and open space outside those boundaries is not taken into account. We addressed this issue by explicitly combining the distance and percentage measures using a Reilly index. In this way, all nature areas, parks and farmland areas are taken into account, insuring that both the size and distance measures are represented.

The dependent variable in our hedonic pricing model is the value of residential properties sold during the period 1974-2006. We examine both actual market values and assessed property values, but use the same explanatory variables in both models. By using actual and assessed property values, we can compare estimates of shadow prices of the characteristics of interest. If they are similar, this suggests that it might be valid to use assessed values as dependent variables in hedonic pricing studies. If the results indicate that it is equally valid as an approximation to use assessed values as the dependent variable in hedonic price studies, this would facilitate non-market valuation since assessed values are much more widely available, at least in jurisdictions where properties are assessed annually for tax purposes.

Our primary objectives are to evaluate the effect that public open space (e.g., parks) has on residential property values compared to privately-held agricultural land (both inside and outside the ALR), and to determine whether use of assessed as opposed to actual market values yield similar estimates of amenity values. Since obtaining exclusions from the ALR is a time-consuming and uncertain process, (private) farmland can be viewed as quasi-protected. This is similar to other studies that categorize open space according to whether it is privately-owned and developable, privately-owned but protected from development, or publicly owned. A third objective is to test the hypothesis that expectations about development likelihood should be reflected in its price. If buyers of residential properties expect farmland to in agriculture, an open space premium should be observed. However, if buyers expect that neighbouring land will be developed in the future, no such premium should exist.

3.0 Data and Variables

We focus on the Saanich Peninsula located on southern Vancouver Island, near Victoria, British Columbia, Canada. Properties in Victoria are not included because the research focuses on the rural-urban, where conflict between agricultural and urban land uses is greatest, and this occurs north of Victoria. The data consist of actual transactions of residential properties for the period 1974 to 2006 and assessment data for the period 2000 to 2006 in three municipalities – North Saanich, Central Saanich and Saanich.

The LandCor database we purchased records 208,273 transactions for the period 1901 to 2006, but we select only transactions since 1973 when the ALR was introduced. Further, only ‘single-cash’ transactions were included, because we felt transactions that did not involve cash or involved the sale of multiple properties at once were unsuitable for hedonic price analysis. We incorporated only detached family dwellings in the analysis; strata blocks, duplex buildings, seasonal dwellings and apartment blocks were excluded to focus the analysis on more

homogeneous properties. Further, since we could only analyze properties for which all of the variables of interest were available, other properties were filtered out.

A variety of databases was used to construct the explanatory variables used in the hedonic pricing model. Relevant characteristics were obtained by linking properties using their identification numbers (so-called jurors) or spatial location (in GIS). Distance data were constructed using spatial location information from GIS. An overview of all the variables included in the hedonic pricing model can be found in Table 1. All of the databases used to construct these variables are listed in Table 2. More detailed description of the variables can be provided upon request.

4.0 Preliminary Results

Not surprisingly, we find evidence of open space premiums in the sales prices of residential properties that border parks and farmland, especially farmland in the ALR. While we were quite confident that parks would have a positive effect on residential property values, we could not be entirely sure that this would be the case for farmland. On the one hand, theory predicts that residential properties bordering ALR land should have a premium over other residential land, because open space is valued by homeowners; on the other, there are negative externalities that agriculture imposes on neighboring residential properties (dust, noise and smell). If properties located nearer farmland have a premium, this indicates that open space is valued more than the negative externalities associated with agriculture, and that buyers of residential properties have confidence that farmland will remain in agriculture and not be developed in the future. Although we find this to be the case, there is slight evidence in our preliminary analysis suggesting that nearness to farmland is negatively related to residential property prices. This might indicate that negative externalities dominate the open space premium and/or that residential property owners do not have confidence that the farmland will remain in agriculture, or even worse, that they are concerned that farmland could be developed into a land use that is undesirable (e.g. shopping center, high-rise apartment, industrial park). Clearly, this needs to be investigated further.

Further, we find that distance to Victoria is inversely related to residential property prices as people value a shorter commute to work. We also find that house prices decline with age but increase with developed area, size of lot, number of bedrooms and bathrooms, and the presence of a garage, as intuition would dictate.

5.0 Conclusions for Agricultural Policy Makers

In an attempt to determine the prospects of agricultural producers in the rural-urban fringe, where farmers are under tremendous pressure to convert their lands to urban uses and high land values create a situation that often makes farming an untenable land use from a financial perspective, we have thus far only investigated how farmland and other factors affect residential property values. The preliminary analysis that we have conducted to date indicates that farmland is valued by residents for the non-market (extra-farm) amenities that it provides. As a result, a case can be made to somehow provide subsidies to farmers located in the rural-urban fringe, subsidies that enable them to continue farming despite the higher costs resulting from the location of farms in or near urban areas.

Designing policies that facilitate such subsidies pose a particular challenge, because not all farms are affected equally. That is, not all farmlands encounter the same development pressure or incur the same costs of operating in the urban shadow. One potential tool that might be considered is the use of transferable development rights. Such rights could be issued whenever the Agricultural Land Commission decides to exclude some land from the ALR, or they could be issued by municipalities with ALR land before they permit the development of land that is currently designated for future development. Whatever policy is chosen, it is important to act soon.

Table 1: Variables included in hedonic pricing model

Variables	Database nr*
Dependent variables	
Sale price property corrected with New Housing Price Index (in Can \$)	1, 18
Assessed value property corrected with New Housing Price Index (in Can \$)	2, 18
Housing characteristics	
Lot size (in square metres)	3
Effective year – year of last major renovation	3
Foundation type (basement, crawl, slab)	3
Finished area – area with finished ceilings and floors (in square metres)	3
Stories (Number of floors)	3
Number of 3- and 4-piece bathrooms	3
Number of 2-piece bathrooms	3
Number of bedrooms	3
Garage (dummy = 1 if multi or single car garage is present, 0 otherwise)	3
Car port (dummy = 1 if a car port is present, 0 otherwise)	3
Pool (dummy = 1 if pool is present, 0 otherwise)	3
Other buildings (dummy = 1 if there are other buildings on the lot than the main house, 0 otherwise)	3
Corner lot (dummy = 1 if the house is on a street corner, 0 otherwise)	3
Waterfront lot (dummy = 1 if the house is on the water front, 0 otherwise)	3
Water on lot (dummy = 1 if there is water on the lot, 0 otherwise)	3
Open space	
Reilly index for nature parks	7
Bordering nature park (dummy = 1 if property is bordering a nature park, 0 otherwise)	7
Reilly index for farm land	5, 6
Nearest distance to ALR boundary (if property is outside the ALR, 0 otherwise)	11
ALR (dummy = 1 if property is located within the ALR, 0 otherwise)	11
Bordering ALR boundary (dummy = 1 if property is on the outside of the ALR boundary, 0 otherwise)	11
Reilly index for golf courses	8
Bordering golf course (dummy = 1 if property is bordering a golf course, 0 otherwise)	8
Other land uses - distance variables	
Nearest distance to Swartz Bay ferry terminal (in km)	8
Nearest distance to Victoria airport (in km)	8
Nearest distance to Victoria City Hall – city centre (in km)	8
Nearest distance to Patricia Bay highway (in km)	12
Nearest distance to school (in km)	8
Nearest distance to recreational centres (in km)	8
Elevation levels	
Elevation level (maximum elevation level in metres)	9
Elevation difference (difference between maximum and minimum elevation level in metres)	9
Macro-economic variables	
Interest rates	13
Mortgage rates	14
Population	15
GDP	16
Income	17

* For a description of the databases see Table 2; the number in this column refers to the corresponding database number in Table 2.

Table 2: Data sources

Nr	Name database	Data source	Year data
1	Sales history	LandCor	1974-2006
2	Assessment information	LandCor (originating from BC Assessment)	2000-2006
3	Property information	LandCor	2006
4	Actual use codes	BC Assessment	2006
5	Cadastral information	Capital Regional District (CRD)	2005
6	Cadastral information	Ministry of Agriculture	2004
7	Nature parks	Capital Regional District (CRD)	2006
8	Points of interest (schools, airport, Victoria city centre, golf courses, ferry terminal, recreational centres)	Capital Regional District (CRD)	2005
9	Elevation data	Municipalities (North Saanich, Central Saanich, Saanich)	2005
10	Soil classes	BC Assessment	2005
11	ALR	BC Assessment (originating with the Agricultural Land Commission)	2005
12	Road Network	Statistics Canada	2005
13	Interest rates Canada	Bank of Canada	1935 - 2005
14	Mortgage rates Canada	Bank of Canada	1951 - 2005
15	Population by municipality (Saanich peninsula)	BC Statistics	1976 - 2006
16	GDP annual data Canada	Statistics Canada	1961 - 2005
17	Income by municipality (Saanich peninsula)	Statistics Canada	1971, 1981, 1986, 1991, 1996, 2001
18	New Housing Price Index (Victoria)	Statistics Canada	1981 - 2006

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