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The background image shows a rural farm scene in the foreground with a city skyline in the background. The farm features a large red barn with a gambrel roof, a smaller red outbuilding, and two large cylindrical silos, one blue and one white. The foreground is filled with tall green and yellow crops, likely corn. The city skyline in the background is silhouetted against a warm, orange and yellow sky, suggesting a sunset or sunrise.

AN ECONOMIC ANALYSIS OF RURAL LAND USE POLICIES IN ONTARIO

By Glenn Fox and Yi Wang

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Executive summary

There is a widely held public perception that agricultural land is being converted to non-agricultural uses at a high—even an alarming—rate in Ontario. This perception has had an appreciable effect on public policy. Frankena and Scheffman (1980) conducted the most recent comprehensive economic analysis of rural land use policies in Ontario. Their primary findings were that the rate at which agricultural land had been converted to non-agricultural uses was not high for the period 1951 to 1976, and that conversion of agricultural land to urban uses represented a small share of overall conversions at a provincial scale. They also concluded that rural land use policy and planning in Ontario had been conducted with insufficient regard for the contributions that economic analysis could make to policy development.

The purpose of this report is to revisit Frankena and Scheffman's findings to determine if they still hold for the years that have elapsed since 1980. Our analysis proceeds along two lines. First, we examine the empirical evidence on the amount of agricultural land in Ontario and how that has changed over time. Our empirical work covers the 1951 to 1976 time period studied by Frankena and Scheffman, but we also examine data up to 2013, the most recent year for which data are available. We consider several data sets that provide empirical estimates of the amount of agricultural land in Ontario.

We conclude that Frankena and Scheffman's major findings still hold. The area of cropland in Ontario, which we argue is the most meaningful measure of the amount of agricultural land in the province, has been essentially constant, with perhaps a slight increase in area, since 1951. Farmland area, which is defined on a different basis from cropland area, has been decreasing, but we explain that this is a less meaningful measure of the amount of agricultural land in the province.

After reviewing the empirical evidence and research on the supply of agricultural land in Ontario, we develop a framework for evidence-based policy making with respect to land use. This framework draws on the theories of market and non-market failure, as well as the lessons learned from the economic calculation debate on central planning. We also differentiate between the theories of absolute and comparative advantage as competing perspectives on resource use. Evidence-based policy making has been endorsed

by both the Government of Canada and the Government of Ontario. This approach to policy making originated in education policy and public health policy. In more general contexts, a conceptual framework is needed to integrate some of the more normative elements in policy decision making that are perhaps less prominent in the original contexts of this approach. Our view is that the economic theory of government policy can make an important contribution to the application of evidence-based policy making in new areas.

We proceed to identify and describe the major changes in land use policy that have occurred in Ontario since 1980. In particular, we examine the series of four Provincial Policy Statements, the Niagara Escarpment Act and Plan, the Oak Ridges Moraine Act and Plan, and the Greenbelt Act and Plan. We then apply our theoretical framework to these major changes in policy with a view to addressing the following questions:

- 1 Is the rationale for policy consistent with at least one category of market failure? What evidence of the existence and severity of market failure was used to develop the rationale for policy?
- 2 Was there evidence of consideration of potential non-market failure problems arising from the policy measures in question?
- 3 Was implementation analysis applied before policy implementation?
- 4 Was there evidence that consideration was given the lessons learned from the economic calculation debate?
- 5 Was there acknowledgement of the theory of comparative advantage?
- 6 Are there any general trends toward increased provincial control over local land use decisions?

Sadly, we found that, generally speaking, Frankena and Scheffman's conclusion that land use policy could benefit from increased regard for critical economic concepts still holds. Policy documents make frequent and general references to concepts like efficiency, prosperity, optimality, and even cost-benefit analysis of alternative policy measures. Unfortunately, there seems to have been little in the way of application or follow-through on these concepts. Lessons learned from the economic calculation debate on the viability of central planning, in our view, have application in land use planning. The theory of comparative advantage, as opposed to the theory of absolute advantage, deserves more serious consideration in land use policy. In addition, the widespread reliance on land use designation, and the abandonment of the prior provincial policy approach of purchase of environmentally sensitive lands financed through tax revenue, are inconsistent with the economic theory of public goods and have created important equity concerns for rural land owners, who have ended up bearing a disproportionate share of the burden of providing benefits shared among the citizens of the province.

The final section discusses alternative approaches that might be considered for rural land use policy. These include the use of tradeable

development rights, compensation for land owners adversely affected by a development proposal, restrictive covenants and deed restrictions, proprietary community models, land trusts, and a club goods model.

Despite the vast and diverse area of land that makes up Canada's second-largest province, less than five per cent of it is suitable for food production. And once farmland is gone, it's never coming back.

Larry Davis, Ontario Federation of Agriculture, *Ontario Farmer*, November 25, 2014

On a clear day, over one-third of Canada's best agricultural land can be seen from the top of Toronto's CN Tower.

Statistics Canada, *Canadian Agriculture at a Glance*, 1999

Despite its obvious importance, Ontario is losing its agricultural land base at a rapid rate as many farms go out of production every year. Urban sprawl and rural non-farm development are contributing to the annual loss of thousands of acres of farmland.

Ontario Farmland Trust, *Why Save Farmland*, 2014

18% of Ontario's Class 1 farmland has been lost to urban expansion.

Ministry of Municipal Affairs and Housing, *Sustainability: The Intersection of Land Use Planning and Food*, 2010

The answer to the central question must depend on how much of our cropland, present and potential, is currently being transformed for urban uses. I suggest that the likely amount is only about one-third of the amount claimed by NALS in its national campaign to arouse concern about the issue, a rate probably no greater but rather less than in the past, and certainly not three times the rate of the recent past as claimed by NALS. This true rate is not likely to worry those knowledgeable about agriculture.

Julian Simon, *Are We Losing Our Farmland?* 1982

The amount of agricultural land in the world is continuing to rise, just as in the past centuries, despite popular belief that it is fixed in quantity.

Julian Simon, *Worldwide, Land for Agriculture Is Increasing*, 1980

The data on land use conversion indicate clearly that in the aggregate the rate of conversion of land to built-up urban use is low in relation to the rate of productivity increase in agriculture, the stock of agricultural land, and the decrease in the acreage of census farms.

Mark Frankena and David Scheffman, *Economic Analysis of Provincial Land Policies in Ontario*, 1980

In recent CAST and NALS studies which conclude that market forces will not adequately protect agricultural land, there is little recognition of the information and knowledge problems that lie at the heart of all questions concerning the relative merits of the market versus central direction in resource allocation.

E. C. Pasour, *Land-Use Planning: Implications of the Economic Calculation Debate*, 1983

Introduction

Concerns about the amount of agricultural land and the conversion of agricultural land to non-agricultural uses in Ontario are not new. A popular perception is that agricultural land, and particularly good agricultural land, is being converted to non-agricultural uses at an alarming rate. Motivated, at least in part, by this perception, the Government of Ontario has undertaken a series of policy measures to protect agricultural land. Adequacy of the supply of agricultural land may seem like a topic of primary concern to farmers, but unintended consequences of policies put in place to slow the rate at which agricultural land is converted to non-agricultural uses have broad implications outside of the agricultural economy. The supply of wildlife habitat, the supply of affordable housing, and the development of transportation and other infrastructure can all be affected by these policy measures.

The governments of Canada and Ontario have both committed themselves to a process known as evidence-based policy making, which originated in education and public health policy.¹ This approach is offered by its advocates as an alternative to policy making based either on anecdotal evidence or on ideology, without regard to empirical analysis. Application outside of the contexts in which it was developed is a work in progress. Generally, there is not much controversy about whether elementary school students should achieve better scores on standardized math tests, or whether smoking cessation programs are a good way to enhance public health. In other policy contexts, however, more difficult normative questions may arise.

The economic theory of government policy offers a template for the application of evidence-based policy making in these more challenging contexts. The first element of this theory is the diagnosis of a market failure. The existence of at least one of the categories of market failure is a necessary condition for there to be an economic justification for policy action by government. Market failures lead to inefficient use of resources. Policy action, in principle, can mediate these efficiency losses, if certain conditions are met.

1. See Rajsic and Fox (2015) for an overview of the literature on evidence-based policy making and for a discussion of the application of this approach in agricultural and natural resource policy.

Two elements are involved in the diagnosis of market failure. First, a theoretical case is needed to argue that a given problem under consideration for policy action could indeed arise as a consequence of at least one of the categories of market failure. The second element involves compiling empirical evidence, beyond anecdotes, that the market failure hypothesized in the first element is ongoing and significant.

Diagnosis of market failure, however, is not a sufficient condition for an economic justification for government policy. Economists have developed a theory of non-market or policy failure that complements the theory of market failure. Non-market failure arises when government policies themselves cause inefficiency. It is possible that the inefficiencies generated by the policy cure end up being more serious than the inefficiencies created by the market failure disease. The second stage, therefore, in the economic theory of government policy, is to examine the existing problem being considered for policy action to determine if it is symptomatic of one of the categories of non-market failure. If it is, then the remedy might be to reform or rescind that original policy. Non-market failure analysis should also be conducted on an *ex ante* basis for any policy action being considered.

The third element in the economic theory of policy is called implementation analysis, following Wolf (1979). This process involves the assessments of market and non-market failures, the latter of which may involve retrospective as well as forward looking application, to evaluate the overall benefits and costs, or advantages and disadvantages, of policy action. Ideally, implementation analysis should be done before policy is adopted, however retrospective analysis can also be useful. The economic theory of policy development is a helpful supplement to the evidence-based policy making model. It provides a framework to address important normative questions. It also provides guidance on the type and nature of empirical evidence required to get beyond public perceptions, anecdotes, and ideology.

In this report, we apply the economic theory of government policy and the model of evidence-based policy making to the question of what policy action, if any, is indicated in response to the widely-held public perception that Ontario is losing farmland at an alarming rate. We do this by first reviewing and analysing the existing data on the question: “How much agricultural land is there in Ontario and how has that changed over time?” Then, we apply the economic theory of government policy to changes in Ontario’s rural land use policies between 1980 and the present time.

Frankena and Scheffman (1980) conducted the most recent comprehensive and rigorous economic analysis of rural land use policies in Ontario. Their general findings, for the time period from 1951 to 1976, were that agricultural land had not been disappearing at an alarming rate in Ontario and that urban use represented only a small contribution to the overall conversion of agricultural land to non-agricultural uses. In addition, they concluded that

rural land use policy had been generally conducted without reference to the constructive role that economic analysis could play in policy development and evaluation. One of our purposes is to assess the extent to which Frankena and Scheffman's (1980) findings apply to more recent decades.

1. Empirical evidence on agricultural land trends in Ontario, 1951–2013

This section addresses the question of how much agricultural land exists in Ontario and how this has changed over the time period from 1951 to 2013. Our particular focus is on the period since 1980, the year in which Frankena and Scheffman published their review of rural land use policies in Ontario. We compare trends during the post-1980 period to their analysis of the pre-1980 period. In addition to marking the 35th anniversary of the publication of Frankena and Scheffman’s study, 2015 also marks the 10th anniversary of the creation of Ontario’s Greenbelt, which is undergoing a legislatively required review.

Frankena and Scheffman (1980) relied primarily on data from the Census of Agriculture between 1951 and 1976, the latter being the most recent year for which Census data were available in 1980. Based on data from the Census of Agriculture (1951–2011), we estimate that farmland area in Ontario decreased by 39.33 percent over the period from 1951 to 2011, while cropland area actually increased by 3.29 percent.² Frankena and Scheffman (1980) focused on farmland area and concluded that it decreased by 29.4 percent from 1951 to 1976. This implies a much slower rate of decrease in farmland area in the post-1980 period. And cropland area, which, in our view is a more meaningful measure related to food production, has increased.

In addition to Census data, we consider data from *Agricultural Statistics for Ontario* (1951–1996), and, more recently, *Statistics* (2003–2012) from the Ontario Ministry of Agriculture, Food, and Rural Affairs (OMAFRA), the *Annual Crop Inventory* from Agriculture and Agri-Food Canada (2011–2013), *Agricultural Resources Inventory* (1983) and the *Soil Survey Complex* (2009) from OMAFRA, production and yield data from *Statistics* (2014) collected by Statistics Canada and distributed by OMAFRA, and *Tile Drainage Area* (2012) collected by the Ministry of Natural Resources.

2. The definition and meaning of the terms farmland and cropland are discussed later in this report. At this point, it is important to note that cropland area is a subcategory of farmland area. Our view, which we will explain later, is that cropland area is a more relevant measure of the amount of agricultural land in the province than farmland area.

The additional data sources that we consider used different methods of data collection, cover different time periods, are collected at different frequencies, and, to some extent, have different spatial coverage. But, collectively, they offer a richer perspective on the question of how much agricultural land exists in Ontario and how that has been changing over time. The Census data are available at five-year intervals. The *Agricultural Statistics for Ontario* data are published annually. The *Crop Inventory* data are also annual.

Later, we will also discuss three studies, *Human Activity and the Environment—Agriculture in Canada* (Gagnon et al., 2014), *Urban Consumption of Agricultural Land* (Hoffmann, 2001), and *The Loss of Dependable Agricultural Land in Canada* (Hofmann et al., 2005), which offer important insights on trends in what is sometimes referred to as prime agricultural land.

Boundaries of the study area

We are primarily concerned with the amount of agricultural land in Ontario, but we also report some estimates at the regional level. Some of our data sets report estimates for all of Ontario. Others report estimates for primarily the southern portions of the province. Three data sets, the Census of Agriculture (1951–2011, census years), *Agricultural Statistics for Ontario*, and the production and yield data are reported for the whole province. For some of the other data sets, estimates are only available regionally, focusing mainly on the southern regions of the province. In addition, land areas in the fruits and vegetables category from the *Agricultural Statistics for Ontario* (1951–2013) or the production and yield data (2014) are reported only at the provincial level.

For data sets which offer only partial coverage of the province, we focus on southern Ontario, western Ontario, central Ontario, and eastern Ontario, where most of the agricultural land and agricultural production are located. The *Agricultural Resource Inventory* (1982) covers the 36 counties which have the most significant share of agricultural production. In some comparisons, we select data from provincial data sets for only these 36 counties.

The names and boundaries of some counties and regional municipalities have changed during the period from 1951 to 2014. These municipal boundary changes do not affect the overall provincial totals, but some adjustments in county and regional level estimates were necessary to accommodate changes in municipal boundaries.³ The definition of regions in the province is based on the Census Agricultural Regions, which include the Southern

3. For details of county boundary changes, please refer to Wang (2015).

Region, the Western Region, the Central Region, and the Eastern Region, which were defined by Statistics Canada in 1981.⁴

Definition of agricultural land

The seemingly simple term agricultural land turns out to be complicated. In the Greenbelt Plan (2005), “agricultural land” is not defined, but “agricultural uses” is defined based on the Provincial Policy Statement (2005):

Agricultural uses: Means the growing of crops, including nursery and horticultural crops; raising of livestock; raising of other animals for food, fur or fibre, including poultry and fish; aquaculture; apiaries; agro-forestry; maple syrup production; and associated on-farm buildings and structures, including accommodation for full-time farm labour when the size and nature of the operation requires additional employment. (Ontario, 2005c)

The definition of agricultural land varies across the five data sets we examine, and also in the three studies that we review. Farmland is the broadest term defined in the Census of Agriculture (1951–2011). Cropland is a narrower category than farmland. Cropland includes all land reported for field crops⁵ and hay, vegetables, sod, nursery products, fruits, berries and nuts. Farmland includes cropland and adds pasture, summer fallow, woodlands, wetlands, and other land (i.e., farm buildings, barnyards, etc.). Agricultural land may include, therefore, area which would not be what we think most people have in mind when they think about agricultural land. Woodland and wetlands may provide benefits in the form of habitat and amenities, but are less central to the agricultural economy. The definition of agricultural uses in the Provincial Policy Statement (2005) is broader than the definition of cropland defined in the Census of Agriculture, because it also includes farm buildings; however, it is narrower than the definition of farmland as defined in the Census of Agriculture, which defines farmland to include woodlands and wetlands.

4. The Northern Ontario region also contains some agricultural land; some of our data sets provide estimates of this area, but others do not. The Northern Region is large in total land area but the amount of agricultural land in this region is small relative to the more southerly portions of the province. For our calculations, the lists of counties included in the Western and Central Regions were modified to accommodate changes in municipal boundaries between 1951 and 2014. Details are provided in Wang (2015). Sometimes changes in municipal boundaries involved the transfer of agricultural land from one municipality to another. At the regional level, the empirical impacts are small, and, for the most part, we are concerned with provincial level trends.

5. A detailed list of the crops included in field crop area is provided in the notes to figure 2.

In the *Agricultural Statistics for Ontario* dataset, field crops include major row crops, such as corn, soybeans, winter wheat, and other grains and oilseeds. In other data sets, definitions of farmland and cropland are sometimes not specified. To make datasets comparable, we calculate area of farmland and cropland for each dataset using categories similar to the ones defined in the Census of Agriculture.

The definition chosen for estimating the availability of agricultural land ideally depends on the nature of the intended analysis. If the concern is food security or the viability of the agricultural economy, then cropland would be more relevant. If the concern is the total rural land area providing habitat, greenspace, or amenity benefits, then farmland area might be the more relevant measure. However, there are important limitations to using farmland as a measure of agricultural land area, which we will discuss shortly. Also, in the final section of our report, we suggest alternative approaches to land use policy that might be considered as means of securing habitat and amenity benefits.

Agricultural Census data (1951–2011)

For the Census of Agriculture⁶ data, Statistics Canada sends questionnaires to farmers whose operations meet the definition of a Census Farm. The definition of a Census farm has changed several times since 1951. A summary of these changing definitions is provided in the Appendix and in Wang (2015).

We used census data at the county, regional, and provincial levels. Regional data are available from the original census data sets beginning in 1981, when the Census of Agricultural Regions (CAR) were created. Before 1981, we calculated regional estimates by summing individual Census Division level data. Only regional and provincial level data are presented in the tables.

Table 1 and table 2 report estimates of farmland area and cropland area for the whole province and for regions respectively from 1951 to 2011. **Table 1** shows that farmland area has been decreasing since 1951, at both the provincial and regional levels. At the provincial level, farmland area was 8,449,857 hectares in 1951, and it was 6,261,705 hectares in 1976—the most recent year available to Frankena and Scheffman (1980). In 2011, farmland area was 5,126,653 hectares.

Table 2 reports that cropland area increased provincially from 3,498,629 hectares in 1951 to 3,506,943 hectares in 1976, and further increased to 3,613,821 hectares in 2011. Trends vary regionally. From 1951 to 2011, the southern and western regions experienced increases in cropland area, while the eastern, central, and northern regions experienced decreases in cropland

6. The Census of Agriculture data are collected every five years. The most recent agricultural census was conducted in 2011.

area. Southern Ontario experienced the most significant increase, from 1,024,180 hectares to 1,337,269 hectares from 1951 to 2011.

Table 1
Estimates of provincial and regional farmland area from the Census of Agriculture, 1951–2011 (hectares)

	Census year												
	1951	1956	1961	1966	1971	1976	1981	1986	1991	1996	2001	2006	2011
Ontario	8,449,857	8,045,006	7,518,454	7,213,944	6,460,019	6,261,705	6,039,236	5,646,582	5,451,379	5,616,860	5,466,233	5,386,453	5,126,653
Southern Region	1,848,743	1,819,790	1,775,765	1,745,968	1,687,403	1,661,905	1,651,064	1,590,702	1,579,424	1,659,580	1,612,725	1,592,343	1,549,113
Eastern Region	1,842,812	1,736,181	1,618,464	1,544,252	1,331,680	1,244,664	1,153,950	1,050,780	1,003,620	1,012,037	1,002,046	973,568	913,832
Central Region	1,566,070	1,443,498	1,345,395	1,253,475	1,075,951	1,003,221	963,044	877,337	829,276	833,445	798,487	778,936	717,760
Western Region	2,216,117	2,166,709	2,082,623	2,012,762	1,854,502	1,820,547	1,778,684	1,684,896	1,627,375	1,696,918	1,643,423	1,627,992	1,571,145
Northern Region	976,115	878,829	696,208	657,487	510,483	531,367	492,495	442,866	411,684	414,880	409,552	413,613	374,803

Notes: Estimated farmland area for Ontario includes all regions. Farmland includes cropland, tame or seeded pasture, natural pasture, woodlands, wetlands, Christmas tree area, and all other land, as filled out in the census questionnaires. The definition of a census farm determines if land is included in farmland area. A piece of land would not be included if it was not part of a census farm. See the Appendix for a discussion of the changing definitions of census farms.

Source: Statistics Canada, 1951–2011.

Table 2
Estimates of provincial and regional cropland area from the Census of Agriculture, 1951–2011 (hectares)

	Census year												
	1951	1956	1961	1966	1971	1976	1981	1986	1991	1996	2001	2006	2011
Ontario	3,498,629	3,326,276	3,232,369	3,382,474	3,179,166	3,506,943	3,632,727	3,457,966	3,411,667	3,544,927	3,656,705	3,660,941	3,613,821
Southern Region	1,024,180	1,052,302	1,057,178	1,138,821	1,169,663	1,261,458	1,329,747	1,285,131	1,286,432	1,343,964	1,359,008	1,353,636	1,337,269
Eastern Region	644,359	577,009	553,894	569,707	481,756	520,763	517,873	488,165	478,756	496,638	542,478	546,492	539,969
Central Region	543,758	485,457	459,901	468,122	409,635	441,958	457,079	417,638	408,840	413,627	429,801	428,484	411,327
Western Region	1,060,258	996,467	979,221	1,029,063	980,026	1,119,217	1,165,156	1,119,924	1,101,931	1,148,852	1,172,573	1,178,474	1,179,240
Northern Region	226,074	215,047	182,178	176,758	138,083	163,546	162,871	147,107	135,708	141,847	152,844	153,856	146,016

Notes: Estimated cropland for Ontario includes all regions. Cropland is defined to include area under field crops and hay, vegetables, sod, nursery products, fruits, berries and nuts.

Source: Statistics Canada, 1951–2011.

Table 3 reports percentage changes of the total farmland area. Ontario experienced a 39 percent decrease in farmland at the provincial level from 1951 to 2011. Frankena and Scheffman (1980) reported a 29 percent decrease in farmland at the provincial level from 1951 to 1976, so the rate of decrease in farmland area was much lower from 1976 to 2011 than it was from 1951 to 1976.

The cropland area tables, however, show a different pattern. **Table 4** reports the percentage changes in cropland area, with a 3.29 percent increase from 1951 to 2011, or an average annual increase of 0.05 percent per year.

Table 3
Estimates of provincial and regional percentage change of farmland area, 1951–2011

	1956	1961	1966	1971	1976	1981	1986	1991	1996	2001	2006	2011	Total % change	Average annual % change
Ontario	-4.79	-6.55	-4.05	-10.45	-3.07	-3.55	-6.50	-3.46	3.04	-2.68	-1.46	-4.82	-39.33	-0.66
Southern Region	-1.57	-2.42	-1.68	-3.35	-1.51	-0.65	-3.66	-0.71	5.08	-2.82	-1.26	-2.72	-16.21	-0.27
Eastern Region	-5.79	-6.78	-4.59	-13.77	-6.53	-7.29	-8.94	-4.49	0.84	-0.98	-2.84	-6.14	-50.41	-0.84
Central Region	-7.83	-6.80	-6.83	-14.16	-6.76	-4.01	-8.90	-5.48	0.50	-4.19	-2.45	-7.85	-54.17	-0.90
Western Region	-2.23	-3.88	-3.35	-7.86	-1.83	-2.30	-5.27	-3.41	4.27	-3.15	-0.94	-3.49	-29.10	-0.49
Northern Region	-9.97	-20.78	-5.56	-22.36	4.09	-7.32	-10.08	-7.04	0.78	-1.28	0.99	-9.38	-61.60	-1.03

Notes: Farmland area is defined in the notes to table 1. The changing definitions of census farms are discussed in the Appendix. Calculations for Ontario include all regions.

Annual percentage change is calculated by dividing the total change from 1951 to 2011 by 60 years.

Source: Statistics Canada, 1951–011.

Table 4
Estimates of provincial and regional percentage change of cropland area, 1951–2011

	1956	1961	1966	1971	1976	1981	1986	1991	1996	2001	2006	2011	Total % change	Average annual % change
Ontario	-4.93	-2.82	4.64	-6.01	10.31	3.59	-4.81	-1.34	3.91	3.15	0.12	-1.29	3.29	0.05
Southern Region	2.75	0.46	7.72	2.71	7.85	5.41	-3.36	0.10	4.47	1.12	-0.40	-1.21	30.57	0.51
Eastern Region	-10.45	-4.01	2.86	-15.44	8.10	-0.56	-5.74	-1.93	3.74	9.23	0.74	-1.19	-16.20	-0.27
Central Region	-10.72	-5.26	1.79	-12.49	7.89	3.42	-8.63	-2.11	1.17	3.91	-0.31	-4.00	-24.35	-0.41
Western Region	-6.02	-1.73	5.09	-4.77	14.20	4.10	-3.89	-1.61	4.26	2.06	0.50	0.06	11.22	0.19
Northern Region	-4.88	-15.29	-2.98	-21.88	18.44	-0.41	-9.68	-7.75	4.52	7.75	0.66	-5.10	-35.41	-0.59

Notes: Cropland includes area under field crops and hay, vegetables, sod, nursery products, fruits, berries, and nuts. Refer to table 2 notes for details of the crop categories included. Refer to the Appendix for a discussion of the changing definitions of a census farm. Calculations for Ontario include all five regions.

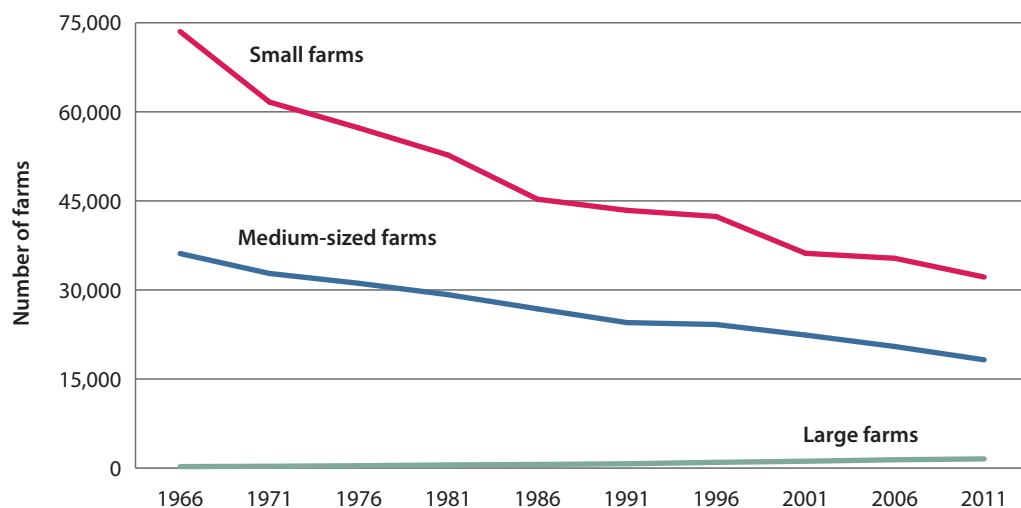
Annual percentage change is calculated by dividing the total change from 1951 to 2011 by 60 years.

Source: Statistics Canada, 1951–2011.

One possible resolution of the different trends observed in estimates of farmland and cropland areas over time has to do with changes in what agricultural economists call the structure of agriculture, meaning the size distribution of farms. Over time, consolidation into larger farm units has been occurring in agriculture across North America. Part of this change has to do with size and scale economies in farming, and part can be attributed to the rising opportunity cost of labour. We hypothesize that, as smaller farms have been consolidated into larger farms, the primary productive asset that has moved to the larger farms has been cropland. As we explain in the Appendix, the threshold for a farm to be counted in the Agricultural Census, historically, has been low. Many Census Farms are not what most people have in mind when they think of a farm. As smaller farms have exited from the Census data base, the non-cropland area that they occupied may have simply been dropped from the estimates, because the owners were not completing questionnaires. On the other hand, cropland transferred, either through sales or leases, would be included in the questionnaires of the larger farm. We suspect that the non-cropland area of these smaller farms has largely remained intact, but that it is not being measured and hence the estimated area of farmland has appeared to decline.

Figure 1 shows the change in the number of census farms by size, in terms of land area. The green line represents the number of large farms, and shows a slightly increasing trend. The blue line represents the number of medium sized farms, and shows a decreasing trend—from 36,130 in 1966 to

Figure 1
Number of census farms in Ontario by size from Census of Agriculture, 1966–2011



Notes: See the Appendix for discussion of changes in definition of census farms. Small farms are defined as up to 179 acres (72.4 hectares), medium sized farms as from 180 to 1119 acres (72.8 hectares to 452.8 hectares), and large farms as 1120 acres (453.2 hectares) or more.

Source: Statistics Canada, Census of Agriculture, various years.

18,233 in 2011, a decrease of 49 percent. The red line represents the number of small farms, which decreased sharply from 73,506 in 1966 to 32,170 in 2011, a 56 percent drop.

Annual provincial crop area data

Agricultural Statistics for Ontario data were published in paper form every year from 1951 to 1995. More recent data published on the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) website under statistics and county data are available since 2003.⁷ We were able to obtain data for the intervening years from statisticians at OMAFRA.

These provincial data do not include estimates of farmland or cropland area, but only areas for individual agricultural products. We added these individual product areas to obtain estimates of cropland area.⁸ **Figure 2** presents regional field crop harvested area. Southern Ontario and western Ontario show an increase in field crop area, while eastern Ontario and central Ontario remained relatively constant. Both southern Ontario and western Ontario started with 900,000 hectares of field crop harvested area in 1951; by 2013, the former reached above 1,200,000 hectares and the latter reached 1,000,000 hectares. There has been considerable variation in areas planted to individual crops over time.⁹ **Figure 3** reports estimates of harvested cropland¹⁰ area at the provincial level. Two series are plotted. The longer series is based on our summation of reported individual field crop, fruit, and vegetable areas over the time period. The shorter series is a published total obtained from Historical Statistics. The minor differences between the two series arise due to periodic differences in the availability of area estimates for individual commodities. Both series indicate a stable-to-slightly-increasing trend in cropland area during our study period.

7. During Census Years, OMAFRA usually transcribed the data from the Census, except in census years after 1996. Even though these years were census years, OMAFRA still collected data from other sources. Refer to Wang (2015) for details.

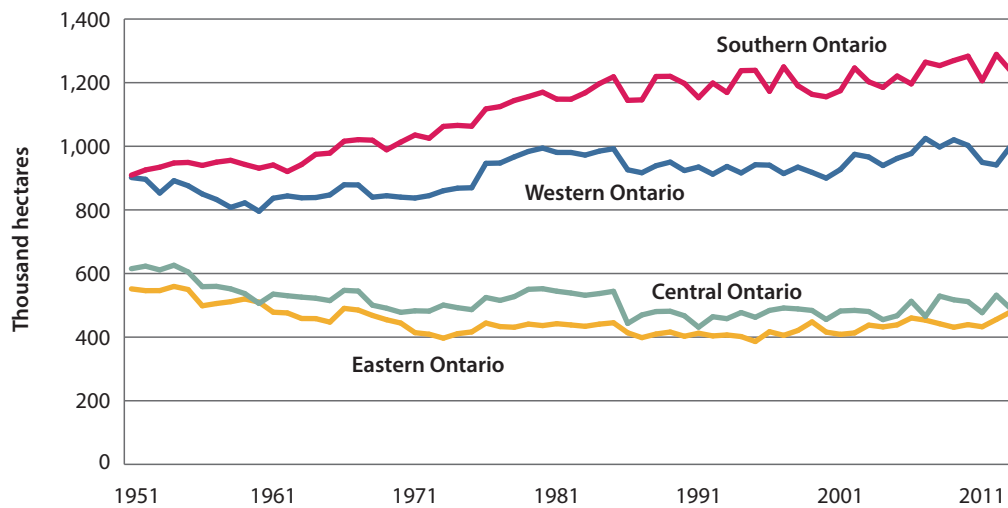
8. Details of data of different crop categories at the county level are described in Wang (2015).

9. The areas of individual field crops respond to farmers' price expectations and also to weather conditions at the beginning of the growing season. Changing technology has also played a role. Historically, oat production declined as mechanical power replaced horses for field work.

10. Cropland area consists of field crop area plus the areas of fruits and vegetables. Typically, area devoted to fruit and vegetable production has amounted to about 2.5 percent of cropland area in recent years.

Figure 2

Estimates of regional field crop harvested area based on *Agricultural Statistics for Ontario* (1951–1995) and *Statistics* (1996–2013)



Notes: Refer to text for boundary definitions for regions.

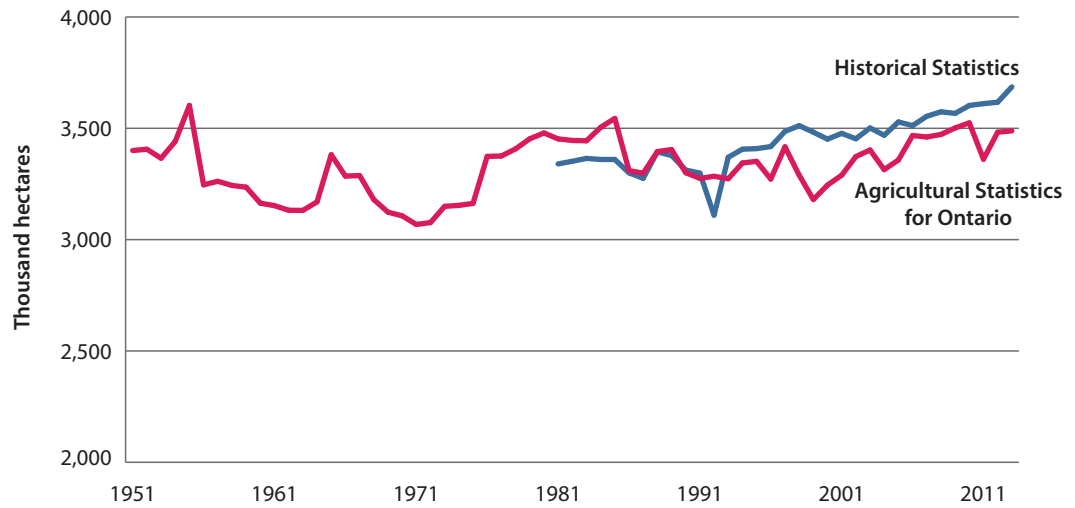
Field crop harvested area is calculated by summing up the county level harvested area data of grain corn (1974–2013) or husking corn (1951–1973), soybeans, winter (1955–2013) or fall (1951–1954) wheat, spring wheat, buckwheat, oats, barley, rye, flaxseed, mixed grain, dry peas, dry beans, coloured beans, fodder corn, field roots (excluding potatoes), sugar beets and canola, which are categories listed in *Agricultural Statistics for Ontario*, field crops. Sweet corn is included in vegetables, so it is not shown here. Winter wheat was named fall wheat from 1951 to 1954. Rye was named fall rye from 1955 to 1962.

Data for some crops are not available at the county level for certain years. Spring wheat data are not available from 1968 to 1996 and from 2010 to 2013 at the county level. Buckwheat data are not available from 1968 to 2013 at the county level. For flaxseeds, data are available from 1951 to 1967 at the county level. For dry peas, data are available from 1951 to 1967 at the county level. Dry white beans were named dry beans from 1951 to 1995 at the county level. For coloured beans, data are only available from 2005 to 2013 at the county level. Grain corn was called husking corn from 1951 to 1973 at the county level. For field roots, data are available only from 1951 to 1967 at the county level. For sugar beets, data are available at the county level from 1957 to 1966 only. For canola, data were only available from 2003 to 2013 at the county level. The missing data may lead to underestimation of field crop harvested area.

Source: OMAFRA, *Agricultural Statistics for Ontario* and *Statistics*, various years.

Figure 3

Estimates of provincial cropland area based on *Agricultural Statistics for Ontario* (1951–1995) and *Statistics* (1996–2013), and *Historical Provincial Estimates* (1981–2013)



Notes: The red line represents data on cropland area collected at the county level, reported in *Agricultural Statistics for Ontario* data and *Statistics*, from 1951 to 2013. The blue line represents data on cropland area collected at the provincial level, reported in the table “Historical Provincial Estimates” from 1981 to 2013.

Data cover Southern Region, Western Region, Eastern Region, Central Region, and Northern Region, and some data at provincial level are not reported at the county level.

Cropland area includes harvested field crop area, vegetables and fruits area.

Source: OMAFRA, *Agricultural Statistics for Ontario* and *Statistics*, various years.

Agricultural Resource Inventory (1981–1982)

Agricultural Resource Inventory (ARI) data were collected by OMAFRA in 1982 and 1983. Data were collected by mapping crews doing in-field observations. In 2010, the county level data were merged into a provincial ARI data set in Geospatial format. Farmland and cropland area are not defined in this data set. We added land use types into the categories of farmland or cropland to correspond to the approach in the Census. For example, we calculated cropland area as the area sum of: continuous row crop, corn system, mixed system, grain system, hay system, peaches, cherries, peaches-cherries, orchard, vineyard, orchard-vineyard, vineyard-orchard, berries, extensive field vegetables, market garden or truck farms, tobacco system, nursery, and sod farms, which are categories listed in the Agricultural Resource Inventory. Farmland is calculated as the sum of cropland, pasture, grazing, idle agricultural land, woodland, pastured woodland, swamp or marsh, and reforestation.

Table 5 reports the results at the regional level. Farmland area was 6,935,400 hectares during the period of 1981 to 1982 and cropland area was 4,322,194 hectares during the same period. Southern Ontario possessed the largest amount of cropland, at 1,586,482 hectares, and its farmland area was 1,605,779 hectares. Western Ontario had 2,029,173 hectares of farmland and 1,309,789 hectares of cropland. The province of Ontario, excluding the Northern Region, had 4,322,194 hectares of cropland and 6,935,400 hectares of farmland in the early 1980s, according to these estimates.

Table 5
Estimates of Ontario cropland and farmland area based on
the *Agricultural Resource Inventory, 1981–1982* (hectares)

	Cropland	Farmland
Southern Ontario	1,586,482	1,605,779
Western Ontario	1,309,789	2,029,173
Central Ontario	814,770	1,691,719
Eastern Ontario	611,153	1,608,729
Ontario total	4,322,194	6,935,400

Notes: Cropland calculated as the area sum of: continuous row crop, corn system, mixed system, grain system, hay system, peaches, cherries, peaches-cherries, orchard, vineyard, orchard-vineyard, vineyard-orchard, berries, extensive field vegetables, market garden/truck farms, tobacco system, nursery and sod farms. Cropland is calculated in a manner consistent with definition of cropland in the Census of Agriculture. Farmland includes cropland, pasture, grazing, idle agricultural land, woodland, pastured woodland, swamp/marsh, and reforestation.

Data were collected by study teams using field surveys from 1981 to 1982.

Ontario total excludes northern Ontario.

Source: OMAFRA, 1983a.

Annual Crop Inventory (2011–2013)

The Annual Crop Inventory dataset (2011–2013) was compiled by Agriculture and Agri-Food Canada (AAFC) using remote sensing technology, using various methods. Data are available for 2011, 2012, and 2013 for Ontario. The data exist in the form of projected geospatial data, with map projections developed by AAFC. AAFC cooperates with provincial crop insurance agencies to validate the crop inventory data. Where insurance data are not available, ground-truth data were acquired by AAFC staff and from other resources. For Ontario, the overall accuracy of the interpretation of the remote sensing data was 82 percent for 2011, 76 percent for 2012, and 87 percent in 2013. The lower accuracy in 2012 had to do with using lower cost remote sensing and interpretation methods. Neither farmland nor cropland estimates are reported as aggregates in this data set. We used a procedure similar to what we used with the Agricultural Resource Inventory to construct these aggregates.

Table 6 reports cropland area from this dataset from 2011 to 2013. At the provincial level, excluding northern Ontario, cropland area was 2,848,693 hectares in 2011, 2,633,224 in 2012, and 2,893,044 in 2013. At the regional level, southern Ontario, which had the largest cropland area, had a more or less constant amount of cropland area, ranging from 1,332,532 hectares to 1,391,434 hectares during the period. Western Ontario had the second largest area of cropland, ranging from 812,269 to 878,507 hectares during the period.

Canada Land Inventory System

Often, concerns about loss of farmland focus on the conversion of high quality agricultural land to non-farm uses. Provisions aiming at protecting prime agricultural land can be found in the Provincial Policy Statement (2014) and the Greenbelt Plan (2005). The Canada Land Inventory System (AAFC, 2013) classifies agricultural land into seven categories based on physical land and soil attributes and climatic information.

Table 7 lists the definitions of each major soil class.¹¹ The major soil classes describe to what extent a plot of land is suitable for agriculture. Any individual land parcel can consist of several different major and minor soil classes. Class 1 to Class 3 land is often used to define prime agricultural land or dependable agricultural land.

11. There are also minor soil classes in the CLI that describe the factors contributing to the soil's ability to accommodate agricultural production.

Table 6
Estimates of Ontario cropland area based on the *Crop Inventory*, 2011–2013
(hectares)

	2011	2012	2013
Southern Ontario	1,332,532	1,391,434	1,360,443
Western Ontario	853,551	812,269	878,507
Central Ontario	363,924	260,000	369,635
Eastern Ontario	298,687	169,522	284,460
Ontario total	2,848,693	2,633,224	2,893,044

Notes: Cropland area is calculated as the area sum of all crops estimated in a year recorded by Agricultural and Agri-food Canada in its *Crop Inventory* (2011–2013). Crop classification is based on data accuracy each year. If the accuracy of distinguishing certain crops is low, these crops will be classified in an upper category. (i.e., if winter wheat and spring wheat cannot be distinguished, they will be classified as wheat). Categories for each year will be listed in the notes below. The *Crop Inventory* data exist in the format of geospatial raster data, and Arc GIS is the software applied here to convert the data from raster to polygon data, and to calculate the sums for each category in each county. A projected map of 2011 Ontario's county boundaries was placed as an upper layer on the *Crop Inventory* map. The projection method applied to the Ontario's county boundary is "NAD_1983_Ontario_MNR_Lambert". Data for each county were extracted by cutting out the individual county on the *Crop Inventory* map. Once data for a single county were collected, each crop category area was calculated by summing up all the area polygons which are in the same category. The *Crop Inventory* comes with a customized projection method, which cannot be found in the ArcGIS software. So there exists a possibility of measurement error when calculating the county level crop area data.

In 2011, cropland area includes: fallow, cereals, camelina, canola, sunflowers, soybeans, beans, peas, beans, vegetables, fruits, herbs, nursery, buckwheat, other crops and undifferentiated agriculture. For this year, individual types of cereal were not identified. Corn, wheat, and soybeans were not identified individually.

In 2012, the cropland area includes: fallow, cereals, barley, corn, canola, sunflowers, soybeans, peas, beans, vegetables, potatoes, sugarbeets, other vegetables, fruits, berries, orchards, vineyards, herbs, nursery, buckwheat, hemp, other crops and undifferentiated agriculture. For this year, types of cereals other than barley and corn were not identified individually.

In 2013, the cropland area includes: fallow, barley, oats, rye, triticale, wheat, corn, other cereals, ginseng, canola/rapeseed, mustard, safflower, sunflowers, peas, soybeans, beans, potatoes, sugarbeets, vegetables, other vegetables, fruits, berries, orchards, other fruits, vineyards, herbs, sod, nursery, buckwheat, tobacco, undifferentiated agriculture, and other crops.

Ontario total excludes northern Ontario. Refer to text for boundary definition.

Source: Canada, *Crop Inventory*, 2011–2013.

Table 7**Canada Land Inventory definitions: Soil capability for agriculture (major classes)**

Class 1	Soils in this class have no significant limitations in use for crops. The soils are deep, are well to imperfectly drained, hold moisture well, and in the original state were well supplied with plant nutrients. They can be managed and cropped without difficulty. Under good management they are moderately high to high in productivity for a wide range of field crops.
Class 2	Soils in this class have moderate limitations that restrict the range of crops or require moderate conservation practices. The soils are deep and hold moisture well. The limitations are moderate and the soils can be managed and cropped with little difficulty. Under good management they are moderately high to high in productivity for a fairly wide range of crops.
Class 3	Soils in this class have moderately severe limitations that restrict the range of crops that can be grown or require special conservation practices. The limitations are more severe than for class 2 soils. They affect one or more of the following practices: timing and ease of tillage, planting and harvesting, choice of crops, and methods of conservation. Under good management they are fair to moderately high in productivity for a fair range of crops.
Class 4	Soils in this class have severe limitations that restrict the range of crops that can be grown or require special conservation practices. The limitations seriously affect one or more of the following practices: timing and ease of tillage, planting and harvesting, choice of crops, and methods of conservation. The soils are low to fair in productivity for a fair range of crops but may have high productivity for a specially adapted crop.
Class 5	Soils in this class give very severe limitations that restrict their capability in producing perennial forage crop and improvement practices are feasible. The limitations are so severe that soils are not capable of use for sustained production of annual field crops. The soils are capable of producing native or tame species of perennial forage plants, and may be improved by use of farm machinery. The improvement practices may include clearing of bush, cultivation, seeding, fertilizing, or water control.
Class 6	Soils in this class are capable only of producing perennial forage crops and improvement practices are not feasible. The soils provide some sustained grazing for farm animals, but the limitations are so severe that improvement by use of farm machinery is impractical terrain may be unsuitable for use of farm machinery, or the soils may not respond to improvement, or the grazing season may be very short.
Class 7	Soils in this class have no capacity for arable culture or permanent pasture. This class also includes rockland, other non-soil areas, and bodies of water too small to show on the maps.
Class 0	Organic soils (not placed in capability classes).

Note: There are 8 major classes in this system in addition to 13 sub-categories of classes. Class 1 is considered to be the most suitable for mechanized agricultural production, Class 7 the least suitable. Class 0 is organic soil, which is not placed in capability classes.

Source: Canada, 2013.

Soil Survey Complex Data (2009)

The Soil Survey Complex database for southern Ontario has been produced by the Ontario Ministry of Agriculture and Food, the Ontario Ministry of Rural Affairs, and Agriculture and Agri-Food Canada, in cooperation with the Ministry of Natural Resources (Land Information Ontario, 2009). The existing data were collected by surveyors from the 1920s to the 1990s, but the data are still being updated (Rabe, 2014). Up to three soil classes are recorded for each map unit or “polygon”, representing a parcel of land on the map. Nevertheless, the number of soil classes to be included in the dataset is up to the surveyor’s professional judgement. For instance, a parcel of soil may contain more than 3 classes of soils, but the surveyor must estimate, based on his or her knowledge, the three predominant classes in each polygon¹². The percentages of the three soil types are assumed to add up to 100 percent.

Table 8 presents the area of dependable agricultural land at the regional level. Southern Ontario possesses the third largest area of class 1 land at 275,453 hectares. Western Ontario has the most class 1 land, at 878,364 hectares, and central Ontario comes second with 452,080 hectares of class 1 land. However, when examining the amount of dependable agricultural land, southern Ontario comes first with 1,864,483 hectares, followed by western Ontario with 1,501,532 hectares and central Ontario with 1,013,867 hectares.

Table 8
Estimates of total Class 1, Class 2, and Class 3 land area in Ontario, based on the Soil Survey Complex (hectares)

	Class 1 Land Area	Class 2 Land Area	Class 3 Land Area	Total Area, Classes 1, 2, 3
Southern Ontario	275,453	1,034,369	536,661	1,864,483
Western Ontario	32,522	414,363	317,898	764,783
Central Ontario	452,080	286,810	301,977	1,013,867
Eastern Ontario	878,364	347,050	276,117	1,501,532
Ontario total	1,611,420	2,082,592	1,432,654	5,126,667

Notes: *The Soil Survey Complex* (2009) reports the most recent soil class data available for Ontario. Data were collected by OMAFRA, whose surveyors conducted soil survey for each county.

The figures were calculated by applying the boundary definitions onto the soil data using ArcGIS. Refer to table 7 for soil class definitions.

Ontario total excludes northern region. Refer to text for boundary definitions.

Source: OMAFRA, 2009a.

¹². For details of data acquisition and processing, refer to Wang (2015).

Other estimates of agricultural land area in Ontario

Hofmann (2001) and Hofmann et al. (2005) reported estimates of dependable agricultural land for Ontario, and estimates of the cumulative amount of Class 1 agricultural land that has been converted to urban uses since the beginning of European settlement. Hofmann (2001) estimated that 6.8 percent of the land area of Ontario is dependable agricultural land and that 13 percent of Class 1 land had been converted to urban uses by 1971, 14 percent had been converted by 1981, 17 percent by 1991, and 19 percent by 1996. Findings from this first study have been quoted widely in both the research literature and in the press.

Hofmann et al. (2005), however, estimated that 15.5 percent of Ontario's land area is dependable agricultural land, more than double the previous estimate of 6.8 percent. The 2005 report shows that the conversion rate of Class 1 agricultural land to urban uses since the beginning of European settlement was 5 percent by 1971, 7 percent by 1981, 9 percent by 1991, and 11 percent by 2001. In contrast to Hoffman (2001), this study has been generally ignored in the research literature and the press.

The two studies used different data sources: for the 2001 report, McCuaig and Manning (1982) and the Environment Accounts and Statistics Division in Statistics Canada, and for the 2005 report, the Canada Land Inventory and the Environment Accounts and Statistics Division in Statistics Canada. The method used to calculate settlement areas was different as well. In the 2001 report, estimated settlement area was calculated by generating circles around urban areas, while these estimates were calculated as squares in the 2005 report.¹³ The second approach generated much lower and arguably more realistic estimates of urban area, since settlement areas more typically follow a rectangular road grid pattern.

Gagnon et al. (2014) estimated the change of agricultural land at the national scale based on ecozones, and concluded that urban development on prime agricultural land has not been a significant contributor to farmland conversion in the Mixedwood Plains ecozone. The Mixedwood Plains ecozone corresponds to southern Ontario and western Quebec (Gagnon et al., 2014). **Table 9** presents their estimates of total dependable agricultural land, farm area on dependable agricultural land, and settled area on dependable agricultural land. The authors used a different settlement area GIS map and a different GIS map projection from the one used by Hofmann et al. (2005).

13. Filoso (2014) wrote that : “The reports used urban enumeration area (EA) points from the census years (1971 to 2001) and generated a polygon based on the average urban EA polygons from the 1991 Statistics Canada digital EA polygon file. The first pass (2001 report) generated circles with the calculated average provincial urban EA area. In 2005 it was decided that instead of using a circle we would generate a square around each urban EA point. This was deemed to be closer to the rectangular grid pattern of the road network.”

Table 9
Farm area and settled areas in relation to Canada Land Inventory by ecozone (hectares)

	Dependable agricultural land	Land with important limitations for agriculture	Farm area on dependable agricultural land		Farm area on land with important limitations for agriculture		Settled area on dependable agricultural land	
			2001	2011	2001	2011	2000	2011
Canada total	50,534,9224	74,413,254	36,796,533	35,826,731	23,410,939	23,772,487	1,173,8245	1,393,335
Mixedwood Plains	6,991,637	2,812,461	4,567,559	4,360,662	1,297,333	1,242,348	479,923	607,953

Notes: Dependable agricultural land is land designated as Class 1 (no significant limitations), Class 2 (moderate limitations) and Class 3 (moderately severe limitations) by the Canada Land Inventory and includes all evaluated land areas that are not affected by severe constraints for crop production. Land with important limitations for agriculture is designated as Class 4 (severe limitations), Class 5 (forage crops improvement practices feasible), and Class 6 (forage crops improvement practices not feasible).

Settled area is based on Agriculture and Agri-Food Canada's (AAFC) 30 m land cover code for developed areas. Some northern areas only partially covered by the AAFC land cover were supplemented with estimates derived from Statistics Canada's settlements data and AAFC's 30 m land cover (see Statistics Canada, 2013: Map 1, Appendix C, for geographic coverage).

Total dependable agricultural land presented here differs from that in Hofmann et al. (2005), due to differences in the projection selected and the reporting geography for the GIS analysis and the supplementary data sources.

Total settled area on dependable agricultural land presented here differs from that in Hoffman et al. (2005); the latter uses 2001 Census Enumeration Area (EA) files for the estimate of total settled area, while this study mainly used 2000 AAFC 30 m satellite imagery.

The Mixedwood Plains ecozone covers the Quebec City–Windsor corridor, including Southern Ontario.

Source: Gagnon et al., 2014.

Table 9 suggests that there are 6,991,637 hectares of dependable agricultural land in the Mixedwood Plains. The farmland area on dependable agricultural land was 4,567,559 hectares in 2000 and 4,360,662 hectares in 2011, which represents a 4 percent decrease from 2000 to 2011. Settled area on dependable agricultural land increased by 128,030 hectares, or 27 percent, from 2000 to 2011. The authors pointed out that “over half this growth came from the Greater Golden Horseshoe.” However, the settlement area is relatively small compared to the total area of dependable agricultural land in this ecozone.

Cummings (undated) reported that, from 2001 to 2011, the rate of decline in farmland area within the Ontario Greenbelt was 16 percent higher than the rest of Ontario, which saw a decline of 5.4 percent during the same period. However, we believe that cropland area is a more relevant measure of the agricultural land base than farmland area. Dr. Cummings kindly shared his customized data (Statistics Canada, 2014) to enable us to calculate changes in cropland area for 2001, 2006, and 2011. **Table 10** shows that from 2001 to 2006, cropland area within the Greenbelt Area decreased by 7.8 percent. From 2006 to 2011, cropland area within the Greenbelt Area decreased by 3.79 percent. The total decrease in cropland area within the Greenbelt Area from 2001 to 2011 was 11.3 percent. The trend for the rest of Ontario showed a minor increase of 0.77 percent in cropland area from 2001 to 2006, followed by a decrease of 1 percent from 2006 to 2011, so from 2001 to 2011, the total decrease of cropland was 0.3 percent for the rest of Ontario.

Table 10
Cropland area, Ontario's Greenbelt versus the rest of Ontario, 2001–2011
(hectares)

	2001	2006	2011	Percentage change, 2001-2006	Percentage change, 2006-2011	Percentage change, 2001-2011
Ontario total	3,656,705	3,660,941	3,613,821	0.11584%	-1.28710%	-1.17275%
Greenbelt area	278,570	256,824	247,102	-7.80629%	-3.78555%	-11.29633%
Rest of Ontario (excluding Greenbelt)	3,378,135	3,404,117	3,366,719	0.76912%	-1.09860%	-0.33793%

Sources: Statistics Canada, Census of Agriculture, various years; Cummings (undated); customized data request from Statistics Canada.

Comparisons among datasets and studies

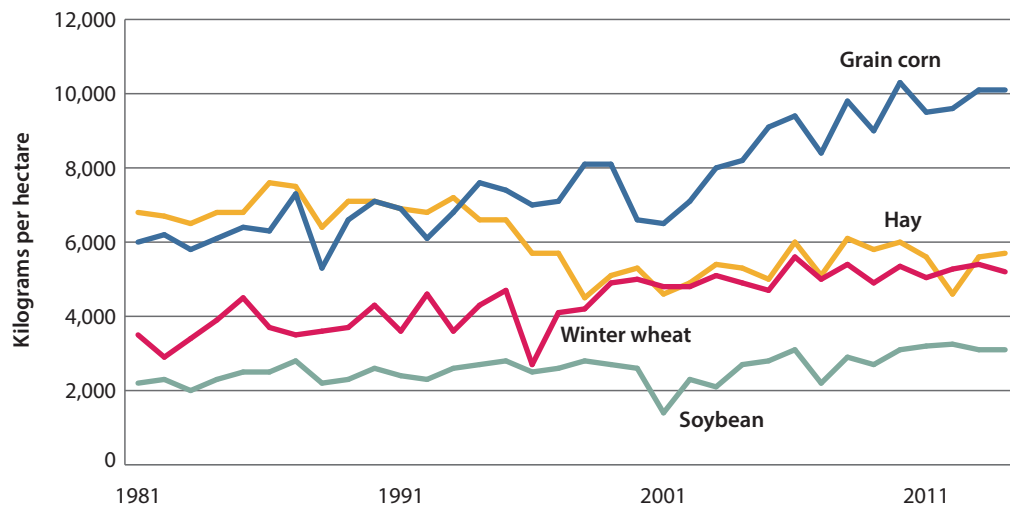
While there are important differences in data collection methods, definitions and area of coverage, the data indicate a consistent pattern with respect to cropland area and dependable agricultural land area. While farmland area has experienced a long-standing declining trend in Ontario, cropland area and dependable agricultural land area have been either almost constant or perhaps increasing slightly. Conversion of cropland area and dependable agricultural land area to non-agricultural uses, which may be taking place at significant rates in some locations, from a provincial scale does not seem to be a significant factor influencing the availability of agricultural land. Our view is that cropland area or dependable agricultural land area are better indicators of the land base of agriculture in Ontario. In addition to estimates of land area, however, important changes have taken place over the time period covered in this study, changes that have influenced the productivity and quality of the agricultural land base in Ontario. These changes need to be taken into account in any consideration of the adequacy of the amount of agricultural land in the province.

Crop yield data (1980–2014)

Like many agricultural regions of the world, output per hectare of most crops has increased substantially in Ontario over the time period considered in this study. **Figure 4** presents provincial selected crop yields from 1980 to 2014 for four major crops: grain corn, soybeans, winter wheat, and hay.¹⁴ Grain corn yields increased substantially, from 6,000 kilograms per hectare in 1981 to over 10,000 kilograms per hectare in 2014. The yield of winter wheat has increased by 48 percent and the yield of soybeans increased by 40 percent during the same period. Increases in yields have been achieved through improvements in technology and management, including investments in tile drainage, which we will discuss separately. One implication of these increased yields is that, if the primary concern about the adequacy of the supply of agricultural land is food security or the viability of the agricultural economy, then less land is needed to produce the volume of production obtained in the past. In principle, this could free up agricultural land for other purposes, including habitat, recreation, transportation infrastructure, and urban use.

Figure 4

Estimates of provincial average yields for selected crops, 1981–2014



Source: OMAFRA, *Statistics*, various years.

¹⁴. Date for major crop yields were available at the provincial level, published on the OMAFRA website. The data were adapted from Statistics Canada, Field Crop Reporting Series (Statistics Canada, 2014).

Tile drainage area (2012)

Excess moisture at the beginning of the growing season can limit yields on poorly drained soils. Farmers have made extensive investments in tile drainage to overcome this limitation to crop production.¹⁵ Tile drainage can improve average yields and reduce production risk, making lower quality land (in the absence of tile drainage) into better quality, more productive land. Tile drainage area data are compiled by the Ministry of Natural Resources, based on information provided by installers.¹⁶ **Table 11** presents the tile drainage area at the regional and provincial level. As of 2012, a total of 1,646,624 hectares had been tile drained in Ontario, excluding northern Ontario. This represents about 50 percent of the cropland area from the Statistics data, indicating a substantial increase in the capability of agricultural land in the province.

Table 11
Estimates of provincial and regional cumulative tile drainage area

	Hectares
Southern Region	882,554
Western Region	517,502
Central Region	70,934
Eastern Region	175,634
Ontario total	1,646,624

Notes: Tile Drainage area data were recorded up to 2012, with continuing updates. Tile drainage records were collected from sources of GIS, GPS, Tile Drainage Record, and other sources.

Ontario total excludes northern region. Refer to text for boundary definitions for regions.

Source: OMAFRA, 2010b.

Summary

The available data and published research indicate that the total amount of cropland area in Ontario has been roughly constant or has increased slightly over the past 50 years. These findings are consistent with earlier work by Frankena and Scheffman (1980) and also with more recent research by Labbé et al. (2007). In addition, advances in technology and management practices and investments in tile drainage have increased the capability of this farmland for food production substantially. Frequently quoted estimates of loss in farmland area, in our judgement, are less informative measures of the

¹⁵. The term “tile drainage” has been carried over from an earlier era. Current practice involves burying a system of interconnected plastic pipes under farmland to collect excess water.

¹⁶. Details of data collection and calculations are reported in Wang (2015).

adequacy of the supply of agricultural land in Ontario and may have had an undue influence on popular perceptions of trends. An additional factor that may have influenced public perceptions is that an increasingly urbanized population in Ontario has less direct contact with rural landscapes outside the Golden Horseshoe region. What they might perceive regarding trends in agricultural land area where they live is not indicative of the situation for the province as a whole.

2. Provincial land use policy analysis framework

Frankena and Scheffman (1980) found, for the 1951–1980 time period, that rural land use policy in Ontario exhibited a limited appreciation for the potential contributions of economic analysis, and that a trend was evident toward increased centralized control of land use. We document and review major changes in land use policy since 1980 and confirm their findings for the post-1980 period. Land use policies have become even more centralized and restrictive since 1980. Yet most Ontario land use policies lack cost-benefit analysis or implementation analysis to justify rationales and implementation. Land use policy has relied heavily on physical attributes assessment. More specifically, prime agricultural land, which is designated based on the CLI system, has been increasingly used as the stated rationale for land use policy and as the criterion for selecting land to be protected, indicating an implicit reliance on a theory of absolute, rather than comparative advantage.

To develop a conceptual framework to guide this aspect of our analysis, we summarize the elements of the economic theory of government policy, drawing on elements of the theories of market and non-market failure. In addition, we explain some implications of the economic calculation debate and the economic theory of comparative advantage which are relevant for the economic analysis of land use policy in Ontario.

With this framework in hand, we proceed in Section 3 to identify the major changes in rural land use policy that have occurred in Ontario since 1980 and document the stated rationales for these policy changes—the stated purposes and objectives. We then characterize changes in the assignment of powers and authorities, particularly in the distribution of power and authority between the provincial government and the municipal levels of government. We also describe the evidence, if any, that was offered in support of the stated rationales for each major policy change. We go on to compare the stated rationales for policy changes to the categories of market failure and discuss the available evidence for the stated policy rationales. We identify possible non-market failures associated with the policy changes.

Background

The report of the Niagara Escarpment Task Force states that:

The most common means used so far to preserve Escarpment land is public purchase. But it is highly questionable whether a program based on this method could preserve the whole Escarpment. Cost alone would seem to rule out this possibility. The Task Force has estimated that purchasing only the relatively small area adjacent to the Escarpment face would cost more than \$3 billion—half the province's total budget. (Niagara Escarpment Task Force, 1972)

Following the publication of the report, in 1973, John White, then the Treasurer of Ontario, made a statement at the second reading of the Niagara Escarpment Plan:

The question has been asked about acquiring, by purchase, all of the lands. In fact, in my view and the view of my colleagues, this is completely unnecessary. With the strong planning framework which the government now accepts, the purchase of all this land is simply not essential, we can conserve through planning designation for the benefit of all our people. (White, 2004)

This turned out to be a pivotal moment in land use policy in Ontario. Previously, the provincial strategy for protection of what today might be called environmentally sensitive land was to purchase that land, in an open market transaction, from current private land owners, and to apply parkland or wilderness land management policies to these newly acquired government lands. These purchases were financed either from provincial tax revenues or from donations. The approval and implementation of the Niagara Escarpment Plan, however, introduced a new policy approach, involving designation and planning, while the actual title of the lands in question remained nominally with the original private owners. The stated rationale for this change in policy was that the old approach, while effective, was more costly than the new approach. From a more holistic economic and distributional perspective however, the claim that the planning and designation approach was less costly sidestepped the question of “Less costly for whom?” Planning and designation reduces costs for taxpayers and beneficiaries of these land protection actions. However, the use of designation and planning increased costs for land owners, compared to the previous approach.

Market failure rationales for intervention in rural land markets

The economic theory of government policy requires that a market failure must be identified if a policy is to have an economic justification. Market failures represent inefficient use of resources. Policy, potentially, can reduce those inefficiencies. In the absence of a documented market failure, however, there is no economic rationale for policy action. Wolf (1979) argued that the presence of market failure is a necessary but not sufficient condition for government policy, and developed a theory of non-market or policy failure as an analogue to the theory of market failure. The theory of non-market failure suggests that, sometimes, the policy cure is worse than the market failure disease.

Frankena and Scheffman (1980) began their examination of policies by identifying potential market failures in rural land markets. The four main categories of market failure that have been prominent in the rural land use policy context are public goods, externalities, excessive discounting, and uninsurable risk.

Public goods

According to Samuelson (1954), public goods are non-rival in consumption and it is either expensive or difficult to exclude people who have not contributed to their provision from consuming them. Non-rivalrousness requires that the consumption of a good by one person does not reduce its availability to others. Public goods lead to inefficiency in several ways, but, generally, the main concern is under-provision. First, difficulties in exclusion create an incentive to free ride, which, if it becomes the dominant strategy, can lead to excessive demand. Second, the non-rival nature of consumption means that the marginal cost of providing a public good for one more person is zero. So the efficiency condition of setting marginal cost equal to marginal revenue requires that public goods be made available at a zero price. The standard model for efficient financing for public goods, then, is to use general tax revenues to pay for a public good and then to make that good available at no cost.¹⁷

Barlowe (1986) and others have argued that open space is a public good. Rural land, including farmland, provides scenic amenity services. These

¹⁷ In practice, textbook writers and others often offer examples of public goods which are not consistent with the two required aspects of the definition. Lighthouses are a common textbook example. Coase (1974), however, demonstrated that the lighthouse industry emerged in the United Kingdom as a fee-for-service industry financed by private investors, contrary to the textbook writers' assertions that lighthouses can't exist unless they are financed from general revenues. In fact, very few commonly used textbook examples of public goods satisfy the non-rival in consumption requirement.

services, according to this view, are available to all of the citizens. They reap a benefit but incur no cost. Regulation of rural land use to maintain these services is offered as a rationale for policy. Of course, this approach is not fully consistent with the public goods model. General tax revenues are not used to finance the provision of these public good amenity services, rather land use planning and agricultural zoning are used to maintain open space. Sometimes the claim is made that open space, in addition to amenity services, furnishes opportunities for outdoor recreation. But outdoor recreation is not non-rival in consumption. Two mountain bikers cannot occupy the same spot on the same trail at the same time, and the existence of the trail itself is rival with silvicultural or agricultural production. Frankena and Scheffman (1980: Chapter 7) identified open space as a public good; however, they argued that, even if this is the case, it cannot be known if the action of restricting land development will increase efficiency without a cost-benefit analysis.

Externalities

Externalities arise when the actions of one party impose a cost on or provide a benefit to another party without that party's consent. An externality is a source of inefficiency due to unaccounted costs or benefits, which results in over- or under-production. Typically, negative externalities are the primary focus. For negative externalities, if harm to the third party were taken into account, the cost of production would be higher and, with demand being constant, there would be reduced equilibrium output. Pollution by factories is a frequently cited example, with regulations, emission taxes, emission quotas, and tradable emission permits some common remedies.

Externality claims are commonplace in the land economics literature. One argument for policy action is that if farmers are allowed to sell farmland for residential development, the residents of the new homes will eventually object to the noise, dust, and odors associated with farming practices, and take steps, including potentially litigation for trespass or nuisance, to restrict the offending practices. Externality claims in the reverse direction are also made. An example would be children living in the new residential development riding their bicycles in crop fields. Agricultural zoning, according to this perspective, is a means to avoiding these types of externality problems. Frankena and Scheffman (1980) also noted that:

The basic motivation behind the intervention of the province in regional land use planning was essentially dissatisfaction with certain patterns which seemed to be evolving during the period of rapid population growth in the post-war period, such as concentration of growth in the largest urban area and the central and southwestern parts of the province, urban sprawl and urban development on prime agricultural land and pollution of the environment. (Frankena and Scheffman, 1980)

Urban expansion and development on prime agricultural land, and associated pollution, fall into the category of negative externalities. Urban expansion is closely connected to car-dependent living, traffic jams, and carbon emissions.

Excessive discounting

People exhibit time preference, which, in general means that they prefer to achieve their goals sooner rather than later. Discount rates represent measures of time preference. Discounting is used to compare magnitudes of future benefits and costs to present benefits and costs. The market failure of excessive discounting is said to occur when people apply discount rates to future benefits and costs in excess of what is called the social discount rate. The social discount rate, in principle, is a lower discount rate relative to the current market or private discount rates. The application of a social discount rate to future benefits and costs results in higher present values of those benefits and costs than would be the case when the private or market discount rates are applied. The Stern Report (2006), for example, in its analysis of the benefits and costs of reductions in greenhouse gas emissions, applied a low social discount rate to compare the future benefits of greenhouse gas relative to the costs. Critics of social discounting have argued that it is one thing to say that future benefits and costs should be discounted at different rates than private or market discount rates in particular circumstances, but that the theory provides no clear guidance as to the nature of the circumstances under which this differential approach to present value calculations should be applied, nor what the optimal social discount rate is in those circumstances.

In the rural land use context, it may be the case that individuals discount the value of future benefits of leaving agricultural land in agriculture at a higher rate than the social discount rate. Agricultural land preservation policy, under this view, would be justified economically by appealing to a social discount rate, which would increase the present value of leaving agricultural land in agriculture. Pasour (1983: 113), for example, notes that “[a] recent CAST report holds that there is no strong economic incentive for individuals to support farmland preservation policies because so much of the benefit is realized by future generations.” The authors of that CAST report believed that current land owners overly discount the future benefits of preserving land for agriculture.

Journalists, particularly in the farm press, have also offered rationales for government intervention in rural land markets. For example, Larry Davis of the Ontario Federation of Agriculture was quoted as follows in *Ontario Farmer*:

(Ontario is) losing more than 350 acres of farmland every day. If this loss rate continues, Ontario farmers will be unable to meet the growing

demand for food in Canada and around the world. And as a non-renewable resource, productive farm land will be lost forever.

Despite the vast and diverse area of land that makes up Canada's second-largest province, less than five per cent of it is suitable for food production. And once farmland is gone, it's never coming back. (Binkley, 2014)

This concern could be interpreted in welfare economic terms as a problem of excessive private discounting.

Uninsurable risk

A fourth theoretical category of market failure arises in the face of a risk which cannot be insured at an actuarially fair premium. This is sometimes referred to as a missing market problem. Inefficiency arises because there is no insurance market available on which someone can purchase insurance coverage against a particular type of risk.

In the context of rural land use, a possible uninsurable risk arises if future demands for food, for example, increase relative to present demand, which might cause future citizens to regret the previous conversion of agricultural land to non-agricultural uses. Currently, according to this view, there is no insurance policy that present citizens can buy to offset this risk of future higher demand for agricultural land. Under this view, agricultural land protection policy can be justified, economically, as a policy response to a missing insurance market. Pasour characterized the insurance perspective as follows:

In analyzing the issues related to preserving agricultural land, a recent study stresses major uncertainties about such factors as the future conversion of farmland to non-farm uses, possible long-run climate changes, future trends in agricultural productivity, and future water and energy supplies and costs. The study then concludes that "preserving farmland for the future is like buying an insurance policy for future contingencies." (Pasour, 1983: 134)

Available policy measures addressing market failures

Frankena and Scheffman (1980: Chapter 2) identified four forms of government intervention in rural land markets in the Ontario context, namely direct regulation, tax-subsidy schemes and user charges, government leasing or purchasing of limited property rights or titles, and changes in liability laws.

Direct regulation is the most common policy measure, usually taking the form of zoning and planning (Frankena and Scheffman, 1980). Tax-subsidy schemes can also be used to achieve desired resource allocation. In

Ontario, agricultural land is subject to a different property tax than residential or commercial land. Government leasing or purchasing of land from private owners is another means to achieve public benefits. Frankena and Scheffman stated that the government leasing or purchasing is probably the most efficient method to create a greenbelt. Government purchases can be made on the open market or through expropriation.

Reform of liability laws is another approach to addressing externality problems. Frankena and Scheffman discussed this method briefly, and believed that a well-designed reform of liability law could be effective in addressing externality problems arising from rural land uses.

Frankena and Scheffman analyzed the advantages and disadvantages of each policy instrument. For direct regulation, they pointed out that allocating land without markets can give rise to inefficiencies. They didn't refer to this as a problem of non-market failure and they didn't mention the economic calculation debate, but this could have been what they had in mind.

Potential non-market failures in rural land use policy

Wolf (1979) explained that there are unique attributes of the supply of and demand for non-market outputs that can give rise to non-market failures. He identified four categories of non-market failures: internalities and private goals, redundant and rising costs, derived externalities, and distributional inequities.

Internalities and private goals

Internalities and private goals occur when the original mission of a government agency, which typically would be to remedy some category of market failure, gets modified over time. This is sometimes referred to as capture theory. The mission of the agency becomes captured, either by its own employees or by the industry groups that the agency is intended to regulate, and starts serving the career plans of the employees or the interests of the industry. One way in which this process can arise is if planners substitute their own vision and preferences for land use decisions rather than developing plans in the general or public interest, when citizens' preferences differ from the professional or political aspirations.

In relation to the market failure of excessive discount rate discussed above, the public choice literature has also documented something called the political or electoral discount rate, which arises when elected officials emphasize putative benefits of policies expected before the next election and de-emphasize costs expected after the next election. Estimates of the political or electoral discount rate are much higher than market or private discount rates. It is not clear, from this literature, if empowering legislatures with the task of

calculating present values of future benefits and costs will apply the optimal social discount rate or the political or electoral discount rate. Nonetheless, the political or electoral discount rate reflects internalities and private goals.

Redundant and rising costs

Redundant and rising costs can occur in an environment where outputs are difficult to measure in quantitative or qualitative terms and where services are provided exclusively by a single agency. With little incentive to exercise cost control, redundant inputs and higher costs can occur. Wolf also argued that the costs of non-market outputs can increase over time due to the demand for action to remedy to the previous unsatisfying policy outcomes.

Derived externalities

Derived externalities are generally physically indistinguishable from externalities. Both involve costs being imposed on third parties. The distinction between an externality and a derived externality is that the derived externality arises as a consequence of policy action. Effluent released into a river might be an externality or a derived externality. It would be a derived externality if, for example, the effluent was released by a municipal sewage treatment plant or by a manufacturing facility which possessed a government permit to release the effluent into the river.

In the rural land use context, derived externalities of farmland preservation policies could include higher housing prices or less land for transportation infrastructure, commercial and industrial use, recreation, or even amenity services. They can displace development to areas just outside a protected zone and can also lower farmland prices within the protected zone. Frankena and Scheffman (1980) discussed the case of increased housing prices and decreased farmland prices as a result of land allocation by policies. O'Toole (2007, 2012) has provided extensive evidence of these types of effects in the United States. Deaton and Vyn (2010, 2015) have documented the effects of Ontario's Greenbelt on prices of agricultural land. Vyn (2012) has found evidence of what is sometimes called a leapfrog effect, which occurs when urban development accelerates in the areas just outside a protected zone, jumping over the protected land.

Distributional inequities

Distributional inequities arise when the benefits and costs of policy actions fall disproportionately upon individuals, either in terms of power or wealth. In the rural land use context, such distributional inequities can arise as a result of land designation. Benefits from land designation may be bestowed on the general population, but the burden or cost of providing these benefits falls disproportionately on land owners, who are generally not compensated when designation reduces the value of their land or restricts the range of land use choices available to them.

Implementation analysis

Wolf (1979) argues that market failure is a necessary but not a sufficient condition for an economic justification of policy action by government. Without the demonstration of a market failure, there can be no economic rationale for policy. This is the necessary part. However, even if there is a demonstrable market failure, it is possible that the consequences of non-market failures arising from policy action are worse than the consequences of the original market failure itself. This is the sufficient part.

Wolf outlines a process that he calls implementation analysis, which he suggests should be followed in policy development. Implementation analysis consists, first, of applying the categories of market failure to an issue, to determine if one or more applies. There is a conceptual or theoretical aspect to this step. Is there a coherent theoretical case that a recognized category of market failure could be responsible for the problem under consideration for policy action? There is also an empirical aspect to this step. Are there data, beyond anecdotal evidence, that indicate that the hypothesized market failure actually exists and that it has sustained and substantial consequences? The second step involves an *ex ante* analysis of the possible non-market failure problems that might arise if a proposed policy measure is applied. This could be a comparative analysis if multiple policy measures are under consideration. Finally, the results of the market failure analysis should be compared with the results of the prospective non-market failure analysis to see if a given policy measure passes a net benefit test.

Benson (1981) adopted a perspective that is consistent with Wolf, in arguing that land use regulation is a political response to demands of the politically powerful interest groups, rather than a response to market failure. He also argues that changes in land policies are due to changes of strengths of the interest groups. Benson points out that, following Olson (1971), on the demand side, small interest groups with high benefits per caput can often dominate large groups, because their marginal cost to gain useful information and to organize themselves will be relatively lower than large groups. In this case, as long as their marginal benefit exceeds the marginal costs, it will be worthwhile for them to demand regulations benefiting themselves. Hence, a regulation can be the result of the effort of a small cohesive interest group, rather than the interest of the majority.

The economic calculation debate: Implications for rural land use policy

The economic calculation debate has important implications for land use planning, implications that seem to have been underappreciated in the land use policy literature. The economic calculation debate took place between 1920 and roughly 1940. The leading participants were Mises, later joined by Hayek and Robbins on one side, and Lerner and Lange on the other.¹⁸ The key issue in the debate was whether collective ownership of the means of production was an effective means of social coordination in human society. The economic calculation debate concluded that central planning is not a viable means of efficient resource allocation in general. Mises argued that without market prices for factors of production, it is impossible to know the relative scarcity of those goods, and therefore allocation of those goods among competing uses will be arbitrary.¹⁹ With the exception of Pasour (1983), agricultural economists and land use planners have not generally appreciated the implications of the economic calculation debate for rural land use planning. If central planning does not work for an entire economy, why do we think it is a viable way to allocate land? Pasour linked the economic calculation debate to the failure of the American Scientific Management Movement, and explained that allocating land at the central level cannot avoid the knowledge problem identified by Hayek.

Absolute versus comparative advantage

Economists generally endorse the theory of comparative advantage as a principle for efficient resource use and reject the rival theory of absolute advantage. The theory of absolute advantage stipulates that a resource should be used to do the thing that it is best at. The theory of comparative advantage stipulates, in contrast, that a resource should be used where its opportunity cost is least. Suppose that LeBron James is the best basketball player in the world and that he is also the best barber in the world. Should he take time off from professional basketball to cut people's hair? The theory of absolute advantage says yes. The theory of comparative advantage says that the opportunity cost of an evening of cutting hair is one NBA basketball game forgone and that the value of LeBron playing one NBA basketball game is higher than the value of an evening's worth of haircuts. So he should specialize in the activity with the lower opportunity cost and play basketball. The principle of comparative advantage, which is arguably one of the more difficult concepts

18. See Lavoie (1981) for a re-examination of the economic calculation debate.

19. Mises called factors of production "goods of higher order."

in economics to understand and apply consistently, has been largely neglected in rural land use policy in Ontario. The theory of absolute advantage has predominated, when policy statements express the view that the best use of the highest quality agricultural land is for agricultural production. We will return to this issue later.

3. Identification and documentation of major land use policy changes in Ontario since 1980

Several major changes in rural land use policy have been implemented since 1980 (**table 12**). In this section, “power” and “authority” are treated as synonyms. In the Acts to be documented, “authority” generally refers to a political agency which is able to make decisions. On the other hand, “power” generally refers to the ability to make concrete types of decisions by an agency. We use the word “power” in the following text for consistency. Land use planning Acts outline powers assigned to relevant agencies, and Plans provide concrete planning procedures. We discuss the power assignment and shifts associated with the Niagara Escarpment Conservation Act (1990), the Oak Ridges Moraine Conservation Act (2001), and the Greenbelt Act (2005), from the implementation of the Acts to the present.

The Planning Act and the Provincial Policy Statements

The Planning Act and the Provincial Policy Statements are foundational documents guiding rural land use policy in Ontario. The Planning Act is the legislation under which the Provincial Policy Statements were developed. In the amended Planning Act of 1994, subsection 3(5) states:

A decision of the council of a municipality, local board, planning board, the Minister and the Municipal Board under this Act and such decisions under any other Acts as may be prescribed shall be consistent with policy statements issued under subsection (1).

Table 12
Major changes in Ontario land use policies since 1980

Policy and subsequent major amendments	Significance of the Act or the Plan
<p>Ontario Planning Acts (1980; 1983; 1990)</p> <p><i>Amendments:</i> Strong Communities (Planning Amendment) Act, (2004) Planning and Conservation Land Statute Law Amendment Act, (2006)</p>	<p>In different versions of the Planning Act, Section 3 required that planning authorities “shall have regard to” or “shall be consistent with” policy statements issued under the Act when exercising any authority that affects a planning matter or when providing comments, submissions or advice. This standard, along with the Provincial Policy Statement that was approved in 1996 and amended in 1997, still applies to planning matters or applications commenced prior to March 1, 2005.</p>
<p>Provincial Policy Statements Mineral Aggregate Resources Policy Statement (1986) Flood Plain Planning Policy Statement (1988) Land Use Planning for Housing Policy Statement (1989) Wetlands Policy Statements (1992) Comprehensive Set of Policy Statements (1995) Provincial Policy Statement (1996, amended in 1997) Provincial Policy Statement (2005) Provincial Policy Statement (2014)</p>	<p>Provincial Policy Statements have been issued under the Planning Act. These policy statements provide guidelines for land used policy. Municipal Official Plans must follow these guidelines. Table 13 is a comparison of these Provincial Policy Statement. Details of provision change regarding agricultural land will be presented in Table 14 to Table 17.</p>
<p>Niagara Escarpment Planning and Development Acts (1973; 1980; 1990) Niagara Escarpment Plans (1985; 2005; 2014)</p> <p><i>Amendments</i> Red Tape Reduction Act (1999) Red Tape Reduction Act II (2000) Greenbelt Act (2005)</p>	<p>The stated purpose of this Act is to provide for the maintenance of the Niagara Escarpment and land in its vicinity substantially as a continuous natural environment, and to ensure only such development occurs as is compatible with that natural environment.</p> <p>The Niagara Escarpment Plan was Canada’s first large scale environmental land use plan. Its stated purpose is to balance protection, conservation, and sustainable development to ensure that the Escarpment will remain substantially as a natural environment for future generations.</p>
<p>Oak Ridges Moraine Protection Acts (May 1st, 2001; Nov.1st, 2001; 2002)</p>	<p>The Oak Ridges Moraine Protection Act was a trial Act of land conservation in this area. The Oak Ridges Moraine Conservation Act later replaced it in November 2001. It provides a suspension period for public consultation.</p> <p>The Oak Ridges Moraine Conservation plan authorized by the Act. The stated purpose of the plan is to protect the Moraine’s ecological and hydrological features and functions. Permits only land and resources uses that maintain, improve, and restore the ecological and hydrological features and functions.</p>
<p>Greenbelt Act (2004) Greenbelt Plan (2005)</p>	<p>The Greenbelt Act (2005) enables the creation of a Greenbelt Plan. The stated purpose of the Plan is to protect about 1.8 million acres of environmentally sensitive and agricultural land in the Golden Horseshoe from urban development.</p> <p>The Greenbelt Plan (2005) requires planning decisions to conform to the Greenbelt Plan.</p> <p>The addition of the “Urban River Valley” policies, which protects natural heritage, natural gateway, etc. along urban river valleys, which was not included in the original Greenbelt Plan (2005).</p>

In the amended Planning Act of 1996:

In exercising any authority that affects a planning matter, the council of a municipality, a local board, a planning board, a minister of the Crown and a ministry, board, commission or agency of the government, including the Municipal Board and Ontario Hydro, shall have regard to policy statements issued under subsection (1).

The current version of the Planning Act (1990) was amended by the Strong Communities Act (2004). Section 3 (5) states:

A decision of the council of a municipality, a local board, a planning board, a minister of the Crown and a ministry, board, commission or agency of the government, including the Municipal Board, in respect of the exercise of any authority that affects a planning matter,

(a) shall be consistent with the policy statements issued under subsection (1) that are in effect on the date of the decision; and

(b) shall conform with the provincial plans that are in effect on that date, or shall not conflict with them, as the case may be.

In 1995, four previously separate policy statements were replaced by a Comprehensive Set of Provincial Policy Statements (Ontario, 1995).²⁰ Revised Policy Statements were released in 1996 (revised in 1997), 2005, and 2014.

Table 13 compares provisions regarding agricultural land use in different versions of Policy Statements. Notice that, except in the 1996/1997 version, all versions adopt the wording “shall be consistent with” rather than “shall have regard to.” **Tables 14 to 17** list the agricultural land use provisions of the four Policy Statements. In **table 15**, the directive to “avoid the need for costly remedial measures” is a unique feature among all the versions. In **table 16**, notice under 2.3.3 of the 2005 Policy Statements that provisions are introduced to emphasize that, within prime agricultural areas, all types, sizes, and intensities of agricultural uses will be promoted and protected. In **table 17**, notice that in 2014, Section 2.3 gave explicit instructions to planners to designate prime agricultural land.

20. The replaced statements were the Mineral Aggregate Resources Policy Statement (1986), the Flood Plain Planning Policy Statement (1988), the Wetlands Policy Statement (1992), and the Land Use Planning for Housing Policy Statement (1989).

Table 13
Comparisons of Provincial Planning Statements, 1995–2014

Year	1995	1996/1997	2005	2014
Governing party	New Democratic Party	Progressive Conservative Party	Liberal Party	Liberal Party
“have regard to” vs. “be consistent with”	“shall be consistent with” (Section G, Interpretation and Implementation, p. 18)	“shall have regard to” (1996, Preamble, p. 1 and also in 1997 revision)	“shall be consistent with” (Part II, Legislative Authority, p. 1)	“shall be consistent with” (Part II, Legislative Authority, p. 1)
General structure	No preamble, statement of principles or vision statement. Section G “Interpretation and Implementation.”	Preamble, Principles (p. 1): 1) land use patterns which stimulate economic growth; 2) Protecting resources for their economic use and/or environmental benefits; 3) Reducing the potential for public cost or risk.	Preamble, Legislative Authority (p. 1), How to Read the Provincial Policy Statement (pp. 1-2), Vision for Ontario’s Land Use Planning System (pp. 2-3) Vision makes specific reference to Niagara Escarpment Planning and Development Act and the Oak Ridges Moraine Conservation Act, 2001, for further articulation of Vision.	“Under the Planning Act” added to cover page Preamble (p. 1), Legislative Authority (p. 1), How to Read the Provincial Policy Statement (pp. 1-3) and Vision for Ontario’s Land Use Planning System (pp. 4-5).
Protection of prime agricultural land	1. Set the goal of protecting Prime Agricultural land for long-term agricultural use. It allows settlement area expansion into Prime Agricultural Land if the goal of “communities being socially, economically, environmentally and culturally healthy and efficient use of land, new and existing infrastructure, and public service and facilities” as indicated in this policy, is met. (p. 13)	1. Protection of Prime Agricultural land for Agricultural uses. This is similar to the 1995 policy provision. (Section 2.2.1)	1. Emphasizes that such protection is long-term. (Section 2.3.1) 2. Requires planning authorities to designate specialty crop areas. (Section 2.3.2) 3. Requires protection and promotion of all types, sizes, and intensities of agricultural uses and farm practices located on Prime Agricultural Land. (Section 2.3.3.2)	1. Same as in the 2005 version. (Section 2.3.1) 2. Further requires planning authorities to designate Prime Agricultural land besides specialty crop areas. (Section 2.3.2) 3. Same as in 2005. (Section 2.3.3.2) 4. Requires further protection of agriculture from impacts of non-farm development, and support agricultural uses in rural areas. (Section 1.1.4.1 and Section 1.1.5.8)
Lot creation on prime agricultural land	1. Permits new lot created for agricultural uses, agricultural related uses, farm retirement lot, a residence surplus to farming operation, residential infilling and infrastructure. (p. 13)	1. Adds permission for farm retirement lot. (2.1.2)	1. Deletes the permission for farm retirement lot and residential infilling. (2.3.4.1)	1. More restrictions on size regarding the use of residence surplus to farming operation. (2.3.4.1 (c))
Remove Land from Prime Agricultural Land Area	Not discussed.	1. May allow removal due to urban and settlement area expansion, subject to provision 1.1.1(c), which states that expansion only occurs when municipalities do not have sufficient land supply for projected growth. May allow removal due to mineral extraction and limited non-residential uses with conditions. (Section 2.1.3)	1. May allow removal due to the expansion or identification of settlement area, subject to provision 1.1.3.9, which states that the expansion or identification only occurs at the comprehensive review. Other allowed removal cases are similar to the ones in the 1996 Policy Statement. (Section 2.3.5.1)	1. The only possible removal allowed is for settlement area expansion or identification, subject to provision 1.1.3.8, which states that the expansion or identification only occurs at the comprehensive review. (Section 2.3.5.1)

Table continues on page 40

Table 13, continued

Year	1995	1996/1997	2005	2014
Number of pages	38	18	37	50
Number of agricultural land provisions	5	5	13	11
Number of agricultural land related provisions	0	4	6	7
Number of times economic awareness appeared in Preamble or Principles	0	7	2	2

Sources: Ontario 1995, 1996 (amended 1997), 2005c, 2014a, 2014b.

Table 14

Summary of agricultural land use provisions in the 1995 Provincial Policy Statement

Section G, Interpretation and Implementation

Section 3 of the Planning Act requires that, in exercising any authority that affects planning matters, planning authorities “shall be consistent with” policies adopted under the Act. (Interpretation)

Section D, Agricultural Land Policies (pp. 13–14)

Goals

To protect prime agricultural area for long-term agricultural uses.

Provisions

1. Prime agricultural areas will be protected for agricultural use, being primary agricultural uses, secondary agricultural uses, and agricultural related uses. Extension of settlement area affecting prime agricultural areas will be permitted only if the policies of Goal B are met. (Provision 1)
2. Non-agricultural uses, including public service facilities, are not permitted within prime agricultural areas and are encouraged to locate in existing communities, to support, where possible, community economic development.
3. Lot creation in prime agricultural areas is generally discouraged and permitted only for listed situations:
 - a. primary agricultural uses where the severed and retained lots are intended for primary agricultural uses and are of a size appropriate for the type of agricultural use(s) common in the area, and are sufficiently large to maintain flexibility for future changes in type or size of agricultural operation;
 - b. existing agriculture-related uses;
 - c. residences surplus to farming operations;
 - d. residential infilling;
 - e. one lot for a farm operation for a full time farmer of retirement age who is retiring from active working life, was farming on January 1, 1994 or an earlier date set in an existing official plan, and has owned and operated the farm operation for a substantial number of years;
 - f. infrastructure where the facility cannot be accommodated through the use of easements or rights-of-way; and
 - g. legal or technical reasons.
4. In prime agricultural area, extraction of mineral aggregates on prime agricultural lands may be permitted as an interim use provided that agricultural rehabilitation of the site will be carried out whereby substantially the same areas and same average soil quality for agriculture are restored. On prime agricultural lands, extraction may occur below the water table and complete agricultural rehabilitation is not required only if it is demonstrated that:
 - a. there is a substantial quantity of mineral aggregate below the water table warranting extraction below the water table
 - b. other alternatives have been considered by the applicant and found unsuitable. other alternatives include resource in area of class 4 to 7 agricultural lands, resources on lands committed to future urban uses, and resources on prime agricultural lands where rehabilitation to agriculture is possible; and
 - c. in those areas remaining above the water table following extraction, agricultural rehabilitation will be maximized.
5. New development and land uses, including livestock facilities, must comply with the minimum distance separation formula.

Source: Ontario, 1995.

Table 15
Summary of agricultural land use provisions in the 1996 Provincial Policy Statement

Preamble (p. 1)

Section 3 of the Planning Act requires that, in exercising any authority that affects planning matters, planning authorities “shall have regard to” policy statements issued under the Act.

These Policies will be completed by locally-generated policies regarding local interest.

A healthy economy is vital to Ontario’s ongoing prosperity.

Doing things right the first time can avoid the need for costly remedial measures to correct problems.

Principles (p. 1)

Ontario’s long term economic prosperity, environmental health and social well-being depend on:

1. managing change and promoting efficient, cost-effective development and land use patterns which stimulate economic growth and protect the environment and public health;
2. protecting resources for their economic use and/or environmental benefits; and
3. reducing the potential for public cost or risk to Ontario’s residents by directing development away from areas where there is a risk to public health or safety or of property damage.

1.1 Developing Strong Communities (pp. 2–3)

Subject to the provisions of policy 1.1.2, cost-effective development patterns will be promoted. Accordingly:

(c) Urban areas and rural settlement areas will be expanded only where existing designated areas in the municipality do not have sufficient land supply to accommodate the growth projected for the municipality. Land requirements will be determined in accordance with policy 1.1.2. The policies of Section 2: Resources, and Section 3: Public Health and Safety will be applied in the determination of the most appropriate direction for expansions. Expansions into prime agricultural areas are permitted only where:

1. there are no reasonable alternatives which avoid prime agricultural areas; and
2. there are no reasonable alternatives with lower priority agricultural lands in the prime agricultural area; (1.1.1)

Long term economic prosperity will be supported by:

(f) optimizing the long-term availability and the use of agricultural and other resources; (1.1.3 (f)).

2.1 Agricultural Policies (p. 6)

Prime agricultural area will be protected for agriculture. Permitted uses and activities in these areas are: agricultural uses; secondary uses; and agricultural-related uses.

Proposed new secondary uses and agricultural related uses will be compatible with, and will not hinder, surrounding agricultural operations. (Section 2.1.1)

Lot Creation in prime agricultural areas is generally discouraged and will be permitted only in the following situations:

6. new lots for agricultural uses may be permitted provided that they are of a size appropriate for the type of agricultural use(s) common in the area and are sufficiently large to maintain flexibility for future changes in the type or size of agricultural operation;
7. new lots may be permitted for agriculture-related uses; and
8. new lots for residential uses may be permitted for:
 1. a farm retirement lot;
 2. a residence surplus to a farming operation; and
 3. residential infilling.

Any new lot for residential uses will be limited to a minimum size needed to accommodate the residence and an appropriate sewage and water system. (Section 2.1.2)

An Area may be excluded from prime agricultural area only for:

5. an expansion of an urban area or rural settlement area, in accordance with policy 1.1.1(c);
6. extraction of mineral resources, in accordance with policy 2.2; and
7. limited non-residential uses, provided that:
 1. there is a demonstrated need for additional land to be designated to accommodate the proposed use;
 2. there are no reasonable alternative locations which avoid prime agricultural areas; and
 3. there are no reasonable alternative locations in prime agricultural areas with lower priority agricultural lands.

Impacts from any new non-agricultural uses on surrounding agricultural operations and lands will be mitigated. (Section 2.1.3)

New land uses, including the creation of lots, and new or expanding livestock facilities will comply with the minimum distance separation formula. (Section 2.1.4)

In prime agricultural areas, agricultural uses and normal farm practices will be promoted and protected. (Section 2.1.5)

Table continues on page 42

Table 15, continued**2.2 Mineral Resources: Mineral Aggregates, Minerals, Petroleum Resources (p. 7)**

Extraction of minerals and petroleum resources is permitted in prime agricultural areas, provided that the site is rehabilitated. (Section 2.2.2.4)

In Prime agricultural areas, on prime agricultural land, extraction of mineral aggregates is permitted as an interim use provided that rehabilitation of the site will be carried out whereby substantially the same areas and the same average soil quality for agriculture are restored.

On these prime agricultural lands, complete agricultural rehabilitation is not required if:

- a) there is a substantial quantity of mineral aggregates below the water table warranting extraction; or
- b) the depth of planned extraction in a quarry makes restoration of pre-extraction agricultural capability unfeasible; and
- c) other alternatives have been considered by the applicant and found unsuitable; and
- d) agricultural rehabilitation in remaining areas will be maximized. (2.2.3.6)

Source: Ontario, 1996.

Table 16**Summary of agricultural land use provisions in the 2005 Provincial Policy Statement****Part I: Preamble (p. 1)**

The Provincial Policy Statement provides policy direction on matters of provincial interest related to land use planning and development. As a key part of Ontario's policy-led planning system, the Provincial Policy Statement sets the policy foundation for regulating the development and use of land.

The Provincial Policy Statement provides for appropriate development while protecting resources of provincial interest, public health and safety, and the quality of the natural environment. The Provincial Policy Statement supports improved land use planning and management, which contributes to a more effective and efficient land use planning system.

The policies of the Provincial Policy Statement may be complemented by provincial plans or by locally-generated policies regarding matters of municipal interest.

Part II: Legislative Authority (p. 1)

In respect of the exercise of any authority that affects a planning matter, Section 3 of the Planning Act requires that decisions affecting planning matters "shall be consistent with" policy statements issued under the Act.

1.1.3 Settlement Areas (p. 6)

A planning authority may identify a settlement area or allow the expansion of a settlement area boundary only at the time of a comprehensive review and only where it has been demonstrated that:

- 1) sufficient opportunities for growth are not available through intensification, redevelopment and designated growth areas to accommodate the projected needs over the identified planning horizon;
 - b. the infrastructure and public service facilities which are planned or available are suitable for the development over the long term and protect public health and safety;
 - c. in prime agricultural areas:
 1. the lands do not comprise specialty crop areas;
 2. there are no reasonable alternatives which avoid prime agricultural areas; and
 3. there are no reasonable alternatives on lower priority agricultural lands in prime agricultural areas; and
 - d. impacts from new or expanding settlement areas on agricultural operations which are adjacent or close to the settlement area are mitigated to the extent feasible. (1.1.3.9)

1.1.4 Rural Area in Municipalities (p. 6)

New land uses, including the creation of lots, and new or expanding livestock facilities, shall comply with the minimum distance separation formulae; (1.1.4.1 (c)).

Locally-important agricultural and resource areas should be designated and protected by directing non-related development to areas where it will not constrain these uses; (1.1.4.1 (e)).

1.7 Long-Term Economic Prosperity (p. 13)

Long-term economic prosperity should be supported by:

- (g) promoting the sustainability of the agri-food sector by protecting agricultural resources and minimizing land use conflicts; (1.7.1)

2.1 Natural Heritage (p. 16)

Nothing in policy 2.1 is intended to limit the ability of existing agricultural uses to continue. (2.1.7)

Table continues on page 43

Table 16, continued**2.3 Agriculture (pp. 17-18)**

Prime agricultural areas shall be protected for long-term use for agriculture. Prime agricultural areas are areas where prime agricultural lands predominate. Specialty crop areas shall be given the highest priority for protection, followed by Classes 1, 2 and 3 soils, in this order of priority. (2.3.1)

Planning authorities shall designate specialty crop areas in accordance with evaluation procedures established by the Province, as amended from time to time. (2.3.2)

2.3.3 Permitted Uses

In prime agricultural areas, permitted uses and activities are: agricultural uses, secondary uses and agriculture-related uses. Proposed new secondary uses and agriculture-related uses shall be compatible with, and shall not hinder, surrounding agricultural operations. These uses shall be limited in scale, and criteria for these uses shall be included in municipal planning documents as recommended by the Province, or based on municipal approaches, which achieve the same objective. (2.3.3.1)

In prime agricultural areas, all types, sizes and intensities of agricultural uses and normal farm practices shall be promoted and protected in accordance with provincial standards. (2.3.3.2)

New land uses, including the creation of lots, and new or expanding livestock facilities shall comply with the minimum distance separation formulae. (2.3.3.3)

2.3.4 Lot Creation and Lot Adjustments

Lot creation in prime agricultural areas is discouraged and may only be permitted for ... (2.3.4.1)

Lot adjustments in prime agricultural areas may be permitted for legal or technical reasons. (2.3.4.2)

The creation of new residential lots in prime agricultural areas shall not be permitted, except in accordance with policy 2.3.4.1(c). (2.3.4.4)

2.3.5 Removal of Land from Prime Agricultural Areas

Planning authorities may only exclude land from prime agricultural areas for ... (2.3.5.1)

Impacts from any new or expanding non-agricultural uses on surrounding agricultural operations and lands should be mitigated to the extent feasible. (2.3.5.2)

2.4.4 Extraction [Minerals and Petroleum] in Prime Agricultural Areas

Extraction of minerals and petroleum resources is permitted in prime agricultural areas, provided that the site is rehabilitated. (2.4.4.1)

2.5 Mineral Aggregate Resources (pp. 19-20)

Extraction of minerals and petroleum resources is permitted in prime agricultural areas, provided that the site is rehabilitated. (2.4.4.1)

2.5.4 Extraction in Prime Agricultural Areas (p. 20)

In prime agricultural areas, on prime agricultural land, extraction of mineral aggregate resources is permitted as an interim use provided that rehabilitation of the site will be carried out so that substantially the same areas and same average soil quality for agriculture are restored.

On these prime agricultural lands, complete agricultural rehabilitation is not required if:

- there is a substantial quantity of mineral aggregate resources below the water table warranting extraction, or the depth of planned extraction in a quarry makes restoration of pre-extraction agricultural capability unfeasible;
- other alternatives have been considered by the applicant and found unsuitable. The consideration of other alternatives shall include resources in areas of Canada Land Inventory Class 4 to 7 soils, resources on lands identified as designated growth areas, and resources on prime agricultural lands where rehabilitation is feasible. Where no other alternatives are found, prime agricultural lands shall be protected in this order of priority: specialty crop areas, Canada Land Inventory Classes 1, 2 and 3; and
- agricultural rehabilitation in remaining areas is maximized.

Source: Ontario, 2005c.

Table 17
Summary of agricultural land use provisions in the 2014 Provincial Policy Statement

Part I: Preamble (p. 1)

The Provincial Policy Statement provides policy direction on matters of provincial interest related to land use planning and development. As a key part of Ontario's policy-led planning system, the Provincial Policy Statement sets the policy foundation for regulating the development and use of land.

The Provincial Policy Statement provides for appropriate development while protecting resources of provincial interest, public health and safety, and the quality of the natural and built environment. The Provincial Policy Statement supports improved land use planning and management, which contributes to a more effective and efficient land use planning system.

The policies of the Provincial Policy Statement may be complemented by provincial plans or by locally-generated policies regarding matters of municipal interest.

Part II: Legislative Authority (p. 1)

In respect of the exercise of any authority that affects a planning matter, section 3 of the Planning Act requires that decisions affecting planning matters "shall be consistent with" policy statements issued under the Act.

1.1.3 Settlement Areas (p. 8)

A planning authority may identify a settlement area or allow the expansion of a settlement area boundary only at the time of a comprehensive review and only where it has been demonstrated that:

- c) in prime agricultural areas:
 - 1. the lands do not comprise specialty crop areas;
 - 2. alternative locations have been evaluated, and
 - i. there are no reasonable alternatives which avoid prime agricultural areas; and
 - ii. there are no reasonable alternatives on lower priority agricultural lands in prime agricultural areas;
 - e) impacts from new or expanding settlement areas on agricultural operations which are adjacent or close to the settlement area are mitigated to the extent feasible. (1.1.3.8)
-

1.1.4 Rural Area in Municipalities (p. 10)

Healthy, integrated and viable rural areas should be supported by:

- i) providing opportunities for economic activities in prime agricultural areas, in accordance with policy 2.3. (1.1.4.1)
-

1.1.4 Rural Area in Municipalities (p. 11)

Opportunities to support a diversified rural economy should be promoted by protecting agricultural and other resource-related uses and directing non-related development to areas where it will minimize constraints on these uses. (1.1.5.7)

Agricultural uses, agriculture-related uses, on-farm diversified uses and normal farm practices should be promoted and protected in accordance with provincial standards. (1.1.5.8)

New land uses, including the creation of lots, and new or expanding livestock facilities, shall comply with the minimum distance separation formulae. (1.1.5.9)

1.7 Long-Term Economic Prosperity (p. 20)

Long-term economic prosperity should be supported by:

providing opportunities to support local food, and promoting the sustainability of agri-food and agri-product businesses by protecting agricultural resources, and minimizing land use conflicts ... (1.7.1(h))

2.1 Natural Heritage (p. 22)

Natural heritage systems shall be identified in Ecoregions 6E & 7E1, recognizing that natural heritage systems will vary in size and form in settlement areas, rural areas, and prime agricultural areas. (2.1.3)

Nothing in policy 2.1 is intended to limit the ability of agricultural uses to continue. (2.1.9)

2.3 Agriculture (pp. 24-26)

Prime agricultural areas shall be protected for long-term use for agriculture.

Prime agricultural areas are areas where prime agricultural lands predominate. Specialty crop areas shall be given the highest priority for protection, followed by Canada Land Inventory Class 1, 2, and 3 lands, and any associated Class 4 through 7 lands within the prime agricultural area, in this order of priority. (2.3.1)

Planning authorities shall designate prime agricultural areas and specialty crop areas in accordance with guidelines developed by the Province, as amended from time to time. (2.3.2)

Table continues on page 45

Table 17, continued**2.3.3 Permitted Uses**

In prime agricultural areas, permitted uses and activities are: agricultural uses, agriculture-related uses and on-farm diversified uses.

Proposed agriculture-related uses and on-farm diversified uses shall be compatible with, and shall not hinder, surrounding agricultural operations. Criteria for these uses may be based on guidelines developed by the Province or municipal approaches, as set out in municipal planning documents, which achieve the same objectives. (Section 2.3.3.1)

In prime agricultural areas, all types, sizes and intensities of agricultural uses and normal farm practices shall be promoted and protected in accordance with provincial standards. (Section 2.3.3.2)

New land uses, including the creation of lots, and new or expanding livestock facilities shall comply with the minimum distance separation formulae. (Section 2.3.3.3)

2.3.4 Lot Creation and Lot Adjustments

Lot creation in prime agricultural areas is discouraged and may only be permitted for ... (Section 2.3.4.1)

Lot adjustments in prime agricultural areas may be permitted for legal or technical reasons. (Section 2.3.4.2)

The creation of new residential lots in prime agricultural areas shall not be permitted, except in accordance with policy 2.3.4.1(c). (Section 2.3.4.3)

2.3.5 Removal of Land from Prime Agricultural Areas

Planning authorities may only exclude land from prime agricultural areas for expansions of or identification of settlement areas in accordance with policy 1.1.3.8. (Section 2.3.5.1)

2.3.6 Non-Agricultural Uses in Prime Agricultural Areas

Planning authorities may only permit non-agricultural uses in prime agricultural areas for:

11. Extraction of minerals, petroleum resources and mineral aggregate resources, in accordance with policies 2.4 and 2.5; or, Limited non-residential uses, provided that all of the following are demonstrated: (Section 2.3.6.1)

Impacts from any new or expanding non-agricultural uses on surrounding agricultural operations and lands are to be mitigated to the extent feasible. (2.3.6.2)

2.4.4 Extraction [Minerals and Petroleum] in Prime Agricultural Areas

Extraction of minerals and petroleum resources is permitted in prime agricultural areas provided that the site will be rehabilitated. (Section 2.4.4.1)

2.5.4 Extraction in Prime Agricultural Areas (pp. 28-29)

In prime agricultural areas, on prime agricultural land, extraction of mineral aggregate resources is permitted as an interim use provided that the site will be rehabilitated back to an agricultural condition.

Complete rehabilitation to an agricultural condition is not required if:

- a) outside of a specialty crop area, there is a substantial quantity of mineral aggregate resources below the water table warranting extraction, or the depth of planned extraction in a quarry makes restoration of pre extraction agricultural capability unfeasible;
- b) in a specialty crop area, there is a substantial quantity of high quality mineral aggregate resources below the water table warranting extraction, and the depth of planned extraction makes restoration of preextraction agricultural capability unfeasible;
- c) other alternatives have been considered by the applicant and found unsuitable. The consideration of other alternatives shall include resources in areas of Canada Land Inventory Class 4 through 7 lands, resources on lands identified as designated growth areas, and resources on prime agricultural lands where rehabilitation is feasible. Where no other alternatives are found, prime agricultural lands shall be protected in this order of priority: specialty crop areas, Canada Land Inventory Class 1, 2 and 3 lands; and
- d) agricultural rehabilitation in remaining areas is maximized.

(Section 2.5.4.1)

Source: Ontario, 2014a.

The Niagara Escarpment Planning and Development Act and the Niagara Escarpment Plan

The Niagara Escarpment Planning and Development Act was passed in 1973.²¹ **Table 18** highlights the powers of different planning authorities it assigned, and how these have changed since 1973. The Niagara Escarpment Plan was implemented in 1985; a revised version was implemented in 2005. Frankena and Scheffman (1980: Chapter 7) discussed the history of the establishment of the Niagara Escarpment Act and the early implementation of the land use control policies.

Stated purposes and objectives

The stated purposes and objectives for the Niagara Escarpment Planning and Development Act (1990; henceforth NEPDA) and the Niagara Escarpment Plan (2005) focus on natural environment preservation. Section 1 of the NEPDA states that the Niagara Escarpment Plan is “designed to promote the optimum economic, social, environmental and physical condition of the Area.” Section 2 states that the purposes of the Act, which are unchanged since its original version, are:

To provide for the maintenance of the Niagara Escarpment and land in its vicinity substantially as a continuous natural environment, and to ensure only such development occurs as is compatible with that natural environment.

Section 8 of the NEPDA states the objectives of the Niagara Escarpment Plan:

- (a) to protect unique ecologic and historic areas;
- (b) to maintain and enhance the quality and character of natural streams and water supplies;
- (c) to provide adequate opportunities for outdoor recreation;
- (d) to maintain and enhance the open landscape character of the Niagara Escarpment in so far as possible, by such means as compatible [with] farming or forestry and by preserving the natural scenery;
- (e) to ensure that all new development is compatible with the purpose of this Act as expressed in section 2;
- (f) to provide for adequate public access to the Niagara Escarpment;
- (g) to support municipalities within the Niagara Escarpment Planning Area in their exercise of the planning functions conferred upon them by the Planning Act.

21. It was revised in 1980 and 1990 (Revised Statutes of Ontario). Clauses were amended from time to time by different Acts. The NEPDA currently in use is the R.S.O 1990.

Table 18**Niagara Escarpment Planning and Development Act: Historical comparison of powers, 1973–2005**

Authority	Current version of the NEPDA	Previous version(s) of the NEPDA
Lieutenant Governor in Council	<p>1. Regulation Power: to alter the boundary of the Niagara Escarpment Planning boundary (1990, R.S.O., S.3.(2))</p> <p>2. Appointment Power: to appoint seventeen members for the composition of the Niagara Escarpment Commission (1990, R.S.O., S.5 (2).)</p> <p>3. Regulation Power: to vary, supplement or override any provision in this Act or the Niagara Escarpment Plan in order to facilitate the effective operation of the Greenbelt Plan (1990, R.S.O., S.23.1)</p>	<p>1. The Act authorizes the Minister the power to establish the Niagara Escarpment Planning Area by order, and to alter the Area by amendments later. (1973,1980)</p> <p>2. Same.</p> <p>3. Provision added by the Greenbelt Act (2005).</p>
Minister of Rural Affairs and Housing and/or the NEP Commission	<p>1. The Act authorizes the Minister or the Commission to initiate amendments to the Niagara Escarpment Plan. (1990, R.S.O., S.6.1 (2))</p> <p>2. The Act authorizes the Commission and the Minister the judgment power to refuse the application of amendments (1990, R.S.O., S.6.1(3).)</p> <p>3. The Act authorizes the Minister the decision-making power to inform the applicant if his or her application of the amendment is refused or processed after the procedure set out in the Act. (1990, R.S.O., S.6.1(4)).</p> <p>4. (i) Recommendation Power to the Commission to offer recommendations to the Minister. (1990, R.S.O., S.10 (9)). (ii) Decision Power to the Minister: to approve or to refuse the proposed amendments with modifications after receiving the recommendations by the Commission. (1990, R.S.O., S. 10 (11).) (iii) Decision Power to the Lieutenant Governor in Council: to refuse or approve with desirable modifications the undecided proposed amendment submitted by the Minister. (1990, R.S.O., 10 (14)).</p> <p>5. Supervision Power to the Minister over the municipalities: (i) to request the municipalities to proposals to resolve any conflicts between the local plan or zoning by-law and the Niagara Escarpment Plan. (1990, R.S.O.,S.15(1)). (ii) power to amend local plans if the municipality fails to submit proposal as required or the conflicts identified cannot be solved. (1990, R.S.O., S.15(2)).</p> <p>6. The power to the Minister to conduct reviews of the NEP.</p> <p>7. The power to the Minister to propose amendments to the NEP. (1990, R.S.O., S.17 (3).</p> <p>8. Land Acquisition Power to the Minister: to acquire land without owner's consent, if it's for the purpose of developing any feature of the Niagara Escarpment Plan. (1990, R.S.O., S.18 (1))</p> <p>9. Power to the Minister to enter into an agreement of the land owner as a condition of issuing development permit. (1990, R.S.O., S.24 (2.1).)</p>	<p>1. Provision added in 2005.</p> <p>2. The "Amendment to Plan" section added by the Red Tape Reduction Act (1999).</p> <p>3. Provision added by the Red Tape Reduction Act (1999).</p> <p>4. Amended by the Red Tape Reduction Act (1999). Before that amendment, this section is provisions of making the Niagara Escarpment Plan.</p> <p>5. Same power since the original version (1973).</p> <p>6. Same power since the original version (1973).</p> <p>7. Same power since the original version (1973).</p> <p>8. Same power since the original version (1973).</p> <p>9. Provision added by the Red Tape Reduction Act (2000).</p>
Role of municipalities	<p>1. The Act authorizes the Minister to establish two advisory committees under two subsections. One committee consists of people appointed by the Minister "who are broadly representative of the people of the Niagara Escarpment Planning Area"; and the other committee consist of people appointed by the Minister. (1990, R.S.O.,S 4(1).)</p> <p>2. The Act authorizes the Lieutenant Governor in Council to transfer functions of the Commission to the relevant upper-tier municipality council or single-tier municipality council if it is outside of an upper-tier municipality, if they think the area where the Niagara Escarpment Plan has been substantially completed. (1990, R.S.O., S.21(1)).</p> <p>3. The Minister can delegate power to (a) the Commission; (b) an officer or employee of the Commission who is designated by the Commission; (c) an upper-tier or (d) a single tier municipality (outside an upper-tier municipality) having jurisdiction in the Niagara Escarpment Planning Area or any part thereof. (1990, R.S.O., S.25(2)).</p>	<p>1. Provisions were amended by the Red Tape Reduction Act (1990). The older versions stated that: "The Minister shall establish two or more advisory committees, consisting of such persons as the Minister appoints, one of which will represent the municipalities in the Niagara Escarpment Planning Area in whole or in part and one of which will be broadly representative of the people of the Planning Area."</p> <p>2. Same since the original version.</p> <p>3. Option (b) was added by the Red Tape Reduction Act (1999).</p>
Legislative Assembly	<p>1. Unless the regulation concerns reduction of the Niagara Escarpment Planning Area, the regulation does not need to be approved by the Assembly. (1990, R.S.O, S.3(3))</p>	<p>1. The power to approve, revoke and change the order or the amendments made by the Minister (1973, S.3(3)).</p>

Sources: Ontario, 1990b, 1999, 2000, 2005a.

Policy instruments

Three types of policy instrument are authorized: land acquisition, land designation, and limited development rights. There have been several cases of land acquisition by the Escarpment Biosphere Conservancy and various agencies outlined in Section 3.3. The land acquisition was funded by donations and taxes.

Land designation began to be a common instrument, with criteria based on ecological attributes. The Plan designated an Agricultural Purposes Only area, which permits limited development consistent with the agricultural uses. Legal restrictions are required to be registered against the property title (Section 2.4.24), and the authorities can enter into agreement with the property owners as outlined in NEPDA.

The Oak Ridges Moraine Conservation Act (2001) and the Oak Ridges Moraine Conservation Plan (2002)

The Oak Ridges Moraine Conservation Act (2001) is the legal authority for the Oak Ridges Moraine Conservation Plan (2005). **Table 19** summarizes the major powers of different planning authorities assigned by the Act. There are nine powers related to the Minister, and four powers related to the municipalities or the public.

The Plan is a regulation under the Act. There have been no amendments to the Plan yet.

Stated purposes, objectives, rationales

The stated objectives of the Oak Ridges Moraine Conservation Plan (2001: c.31, s.4) are:

- (a) protecting the ecological and hydrological integrity of the Oak Ridges Moraine Area;
- (b) ensuring that only land and resource uses that maintain, improve, or restore the ecological and hydrological functions of the Oak Ridges Moraine Area are permitted;
- (c) maintaining, improving or restoring all the elements that contribute to the ecological and hydrological functions of the Oak Ridges Moraine Area, including the quality and quantity of its water and its other resources;
- (d) ensuring that the Oak Ridges Moraine Area is maintained as a continuous natural landform and environment for the benefit of present and future generations;
- (e) providing for land and resource uses and development that are compatible with the other objectives of the Plan;

Table 19
Powers and authorities under the Oak Ridges Moraine Conservation Act (2001)

Authority	Current version of the ORMCA
Lieutenant Governor in Council	1. The ORMCA Act (S.O. 2001,C.31) give the Lieutenant Governor in Council the regulation power to “designate an area of land as the Oak Ridges Moraine Area.” (S.O. 2001, S.2)
The Minister of Municipal Affairs and Housing	<ol style="list-style-type: none"> 1. The regulation power to the Minister to establish and review the Oak Ridges Moraine Conservation Plan at the same time with the Greenbelt Plan. (2001, S.3, revised by the Greenbelt Act (2005)) 2. The power to the Minister or to the Municipality to enter into agreements with persons or public bodies to share costs for implementing the features of the ORMCP. (S.O. 2001, S.6) 3. The power to the Minister to excise municipal power if related municipalities fail to adopt official plan amendments to implement the ORMCP. (S.O. 2001, S.9(4)). 4. The power to the Minister to approve zoning by-laws amendments by the municipalities for the purpose of conformity to the Plan. (S.O. 2001, S. 9(5)). 5. The power to the Minister to advise municipalities to solve conflicts between the official plan and the ORMCP, and to amend the official plan or by-laws by order if the conflicts cannot be solved. (S.O. 2001, S.9 (7&8)). 6. The decision power to the Minister to approve, to approve with modification, or to refuse amendments to official plans. (S.O. 2001, S.10 (9)). 7. The Act authorizes the Minister to propose amendments to the ORMCP, and to allow prescribed person or public bodies to apply to the Minister for an amendment. (S.O. 2001, S. 12 (1&2)). 8. The power to the Minister to allow persons to apply for amendments under certain circumstances. And the Minister can refuse the application if non-conformity arises. (S.O. 2001, S. 12 (3)). 9. The Minister’s decision regarding proposed amendments is final. (S.O. 2001, S.12(10)).
Role of municipalities and the public	<ol style="list-style-type: none"> 1. The Act requires the Minister to consult public bodies. (S.O. 2001, S.3(5)) 2. The Act prohibits any municipalities to undertake work or pass by laws conflicting the Act. (S.O. 2001, S7 (2)) 3. The Act requires the regional municipalities of Peel, York and Durham shall “each prepare and adopt an official plan amendment to implement the Plan.” (2001, S.9(1)) 4. The upper-tier municipality can have decision power delegated by the Minister regarding official plan amendments required by this Act to implement the ORMCP. (S.O. 2001, S.10 (3))

Source: Ontario, 2001.

- (f) providing for continued development within existing urban settlement areas and recognizing existing rural settlements;
- (g) providing for a continuous recreational trail through the Oak Ridges Moraine Area that is accessible to all including persons with disabilities;
- (h) providing for other public recreational access to the Oak Ridges Moraine Area; and any other prescribed objectives.

Policy instruments

The policy instrument authorized under this Act is land designation. The Oak Ridges Moraine Conservation Plan designated the moraine into four Areas: Natural Core Areas, Natural Linkage Areas, Countryside Areas, and Settlement Areas. For each designation, provisions in the Plan specify what activities are permitted and what are not.

The Greenbelt Act and the Greenbelt Plan

The Greenbelt Act (2005) is the legal authority for the Greenbelt Plan (2005). The Act requires that local official plans to be amended to conform to it. **Table 20** lists the major powers it assigned to the Cabinet and the OMAH. The Plan was implemented in February, 2005, and amended in January, 2013.

Stated purposes, objectives, and rationales

The stated purposes of the Greenbelt Plan are to identify “where urbanization should not occur in order to provide permanent protection to the agricultural land base and the ecological features and functions occurring on this landscape.” The stated goals are organized in five areas:

1. Agricultural Protection
2. Environment Protection
3. Cultural, Recreation and Tourism
4. Settlement Areas
5. Infrastructure and Natural Resources.

Four objectives are stated under Agricultural Protection:

Protection of the specialty crop area land base while allowing supportive infrastructure and value added uses necessary for sustainable agricultural uses and activities;

- (a) Support for the Niagara Peninsula specialty crop area as a destination and centre of agriculture focused on the agri-food sector and agri-tourism related to grape and tender fruit production;
- (b) Protection of prime agricultural areas by preventing further fragmentation and loss of the agricultural land base caused by lot creation and the redesignation of prime agricultural areas;
- (c) Provision of the appropriate flexibility to allow for agriculture, agriculture-related and secondary uses, Oak Ridges Moraine Conservation Act farm practices and an evolving agricultural/rural economy; and
- (d) Increasing certainty for the agricultural sector to foster long-term investment in, improvement to, and management of the land.”

Table 20
Powers and authorities under the Greenbelt Act (2005)

Authority	Current version of the Greenbelt Act
Lieutenant Governor in Council	<ol style="list-style-type: none"> 1. The power to designate the Greenbelt area, and the power to amend a designation. (S.O. 2005, C.1, S.2) 2. The power to establish the Greenbelt Plan. (S.O. 2005, S.3) 3. The final decision power to approve, modify and refuse the amendments, which have been through the procedure described in Section 12 and 13 of this Act. (S.O. 2005, C1, S.14 (1&2))
Minister of Municipal Affairs and Housing	<ol style="list-style-type: none"> 1. The regulation power to pass regulations “for prescribed matters to address applications which were commenced prior to December 16, 2004 but for which no decision has been made and for other transitional matters, including the application of prescribed polices for applications made under the Ontario Planning and Development Act, 1994, the Planning Act or the Condominium Act, 1998, which were commenced before December 16, 2004.” (S.O. 2005, C.1, S.5(2)) 2. The review power to conduct the ten-year review together with the Niagara Escarpment Planning and Development Act (1990) and the Oak Ridges Moraine Conservation Act (2001). (S.O. 2005, C.1, S.10 (1)) 3. The power to propose amendments to the Greenbelt Plan (2005) with regard to Protected Countryside area. (S.O. 2005, C.1, S.11(1)) 4. The power to recommend the proposed amendment, modified as they feel appropriate, to the Lieutenant Governor in Council. (S.O. 2005, C.1, S.12(1)) 5. The power to establish the Greenbelt Council, whose function is to advise the OMAH on the matters relating to this Act and other things specified by OMAH. (S.O. 2005, C.1, S.15) 6. No matter the appealed matter came to the OMB or joint boards before or after the Greenbelt Act (2005), the OMAH shall notice the OMB or joint boards of the deferral of the consideration of the matters until further notice is given. (S.O. 2005, C.1, S.18 (1)). 7. Regulation power to pass regulations on the following three subjects: requiring the municipalities to pass by-laws under certain sections of the Municipal Act (2001), and the City of Toronto Act (2006) for the Protected Countryside area; prescribing powers must be exercised by municipalities in making by-laws under the above mentioned Acts; and prescribing anything related to the Greenbelt Act (2005). (S.O. 2005, S.23)
Role of municipalities	<ol style="list-style-type: none"> 1. The Act requires that decisions made under major current land use plans should conform with the Greenbelt Plan (2005). (2005, C.1, S.7) 2. The Act requires the Greenbelt Plan (2005) to prevail over official plans, zoning by-laws and a policy statement if conflicts arise. (2005, C.1, S.8)

Source: Ontario, 2005a.

The general stated rationale to protect the Greenbelt appears in Section 1.1 of the Plan, which identifies the importance of the Greenbelt:

The Greenbelt is a cornerstone of Ontario’s proposed Greater Golden Horseshoe Growth Plan which is an overarching strategy that will provide clarity and certainty about urban structure, where and how future growth should be accommodated, and what must be protected for current and future generations.

More detailed rationales regarding the protection of the Agricultural System are under section 3.1, subsection 3.1.1.; the first paragraph states that “[t]he Protected Countryside contains an Agricultural System that provides a continuous and permanent land base necessary to support long-term agricultural production and economic activity.”

Policy instrument

The policy instrument authorized under the Act is land designation, which is similar to the Oak Ridges Moraine Conservation Plan, where each designation has permitted and not permitted uses. In the Greenbelt Plan, prime agricultural land is reserved for agricultural purposes and settlement is not allowed to expand into Specialty Crop Areas and Natural Heritage Areas.

4. Analysis of major changes in rural land use policy in Ontario since 1980

The analysis presented in Section 2 of this report raises the following questions:

- 1 Is the rationale for policy consistent with at least one category of market failure? What evidence of the existence and severity of market failure was used to develop the rationale for policy?
- 2 Was there evidence of consideration of potential non-market failure problems arising from the policy measures in question?
- 3 Was implementation analysis applied before policy implementation?
- 4 Was there evidence that consideration was given the lessons learned from the economic calculation debate?
- 5 Was there acknowledgement of the theory of comparative advantage?
- 6 Are there any general trends toward increased provincial control over local land use decisions?

We now address each of these questions for each of the Provincial Policy Statements, Acts, and Plans described in Section 3. In addition to the Statements, Acts and Plans, we searched related Task Force Reports and staff discussion reports. We reviewed the stated rationales, purposes, and objectives of the Statements, Acts and Plans, to identify implicit market failure rationales. We evaluated the authorized policy instruments in light of the categories of non-market failure. We looked for evidence of implementation analysis being conducted before policies were implemented. We looked for awareness of the issues examined in the economic calculation debate, with specific reference to Hayek's knowledge problem: Does the policy assume that all of the necessary knowledge to allocate land optimally is possessed by those doing the designation? Alternatively, does the policy allow for effective local

participation in the decision making process? We also searched for awareness of the concept of comparative advantage in setting policy. The Policy Statements contain numerous references to economic growth, prosperity, efficiency in resource use, and other economic concepts. Our review looked for evidence of metrics used to assess outcomes on these economic criteria.

Finally, we documented trends in the assignment of powers between the provincial and local governments, as well as the number of agricultural land use provisions in different policy statements, in order to assess changes in the level of centralization or decentralization of land use policy over time.

1. Is the rationale for policy consistent with at least one category of market failure? What evidence of the existence and severity of market failure was used to develop the rationale for policy?

We identified three main categories of market failure on which the policy rationales seem to be based, namely public goods, externalities, and excessive discounting. The fourth category of uninsurable risk, in practice, is difficult to distinguish from excessive discounting.

Provisions related to maintaining ecological features, open space, and natural heritage area appear frequently in the policies we reviewed. For instance, the introduction in the Oak Ridges Moraine Conservation Plan recognizes the moraine's unique environmental, geological, and hydrological features, and this leads to its objectives (a) to (d) as listed in the relevant section above, which are intended to protect these features. In the Greenbelt Plan, the second goal is environmental protection—to protect, maintain and enhance the natural heritage, hydrologic and landform features, open space, and water within the Greenbelt Area. These statements are broadly consistent with the theory of public goods. The benefits of these ecological features are non-rival in consumption. However, the full public goods model requires that payments used to acquire the public goods by the government must come from raising general tax revenue, and that the public goods should be available to the public at no cost. Designation of land use imposes the cost and the benefits disproportionately on land owners, which is not fully consistent with the economic theory of public goods.

In the Niagara Escarpment Task Force Report (1972), the Task Force team was aware that land purchasing was a way to address this public goods market failure, as an alternative to land designation. And some part of the Niagara Escarpment was indeed purchased using tax revenues or donations, which is more consistent with the full public goods model.

Provisions regarding prevention or limitation of urban development and urban sprawl on rural land use are common in the policy documents we reviewed. These statements are consistent with externality theory. Objective (f) in the Oak Ridges Moraine Conservation Plan is intended to limit urban expansion in the interest of reducing noise and traffic congestion. Also,

residents living at the edge of the urban area will be negatively impacted by odour and dust from farming operations. Land designation is one method to address these potential externalities. However, reform of liability rules and restrictive covenants are also alternatives to designation.

Objective (d) in the Oak Ridges Moraine Conservation Plan and the Vision Statement (1.2.1) in the Greenbelt Plan are also consistent with the excessive discount rate and uninsurable risk market failure categories. The rationale implies that if land is converted from agricultural uses to non-agricultural uses today, and the demand for agricultural land rises due to an increase of food demand, this will be inefficient. Demsetz (1967), however, argued that current land owners face strong incentives to take into account the needs and preferences of future generations, including possible changes in prices of agricultural products, as they make land use decisions in the present.

Although language in the rationales, preambles, and goals of the Policy Statements, Acts, and Plans is broadly consistent with selected categories of market failures, we were not able to locate empirical studies or evidence of the severity or duration of these externality problems. The economic theory of policy development suggests that such evidence, as well as cost-benefit analysis based on such evidence, is a prerequisite for economically justified policy making.

2. Was there evidence of consideration of potential non-market failure problems arising from the policy measures in question?

We identified two potential categories of non-market failures in the policies we reviewed, namely distributional inequity and derived externalities. Land designation has become the dominant method of protecting agricultural land. Landowners within the designation areas may have limited land use options when protected designations are applied to their land. Consequently, they may bear a disproportionate burden in the provision of benefits for their fellow citizen, giving rise to distributional inequities. The Niagara Escarpment Planning and Development Act, the Oak Ridges Moraine Conservation Act, and the Greenbelt Act do not provide compensations to land owners for losses.

In addition, there is potential for the policies we reviewed to generate derived externalities. In the policy documents we reviewed, provisions restricting development on the agricultural land will likely result in increases in prices of surrounding housing, infrastructure, and recreational uses of the land, could reduce prices of agricultural land within a protected area, and could increase the rate of urban development in regions adjacent to a protected region. As we mentioned earlier, O'Toole (2007, 2012) has documented these types of derived externality effects from rural land use policies in the United States, and Deaton and Vyn (2010, 2015) and Vyn (2012) have documented these types of derived externality effects in the Ontario context.

3. Was implementation analysis applied before policy implementation?

We found limited evidence of awareness of the need for implementation analysis in the policy documents, and were unable to find evidence of implementation analysis performed in related reports or literature. In the Preamble of the 1996 Provincial Policy Statement, a paragraph discussing “A healthy economy” states that “doing things right the first time can avoid the need for costly remedial measures to correct problems.” However, this paragraph does not appear in 2005 or in 2014. The awareness of cost-benefit appears once under Subsection 2.12.2 in the Niagara Escarpment Plan, which states that “[e]xisting heritage features, areas and properties should be retained and reused. To determine whether such actions are feasible, consideration shall be given to both economic and social benefits and costs.” Cost-benefit analysis is mentioned once in Section 25 (1 (g)) of the Oak Ridges Moraine Conservation Plan, which requires that the cost and benefit analysis of water conservation measures and practices to be implemented. However, we found no evidence that this has been done. In the Greenbelt Act, Subsection 12 (2) stipulates that the Minister cannot recommend a proposed amendment that would reduce the total area of the Greenbelt. This provision is inconsistent with the principles of implementation analysis, since it does not allow for revisiting and potentially changing past decisions.

4. Was there evidence that consideration was given the lessons learned from the economic calculation debate?

The Provincial Policy Statements acknowledge differences in economic growth, economic opportunities, and demographic trends across Ontario. On the other hand, they stipulate that the principles in these statements should be applied across all regions. Similarly, if conflicts arise between the local plans and the Niagara Escarpment Plan, the Oak Ridges Moraine Plan, or the Greenbelt Plan, the provincial plans prevail over local plans. Provision 18 (1) of the Greenbelt Act stipulates the appeals to Ontario Municipal Board or joint boards of matters relating to land within the designated area to be deferred, which limits the role of municipalities in such decision making. One of the implementations of the economic calculation debate is that the knowledge of particular circumstances of time and place is not available centrally, so local adaptation and experimentation will be needed. To allow variations in local planning would be more consistent with the implications of the economic calculation debate. An example of such an approach is where the approval of development permits is the responsibility of the Commission under the Niagara Escarpment Act, which would represent case-by-case decision making. A case-by-case approach would allow local adaptation of policy in response to the knowledge problem identified by Hayek (1945).

5. Was there acknowledgement of the theory of comparative advantage?

All of the Provincial Policy Statements invoke, implicitly, a theory of absolute advantage, in stipulating that the best use of prime agricultural land is agriculture, typically based on the objective physical characteristics of land, such as those used in the Canada Land Inventory. The problem with the theory of absolute advantage is that it solves the optimal allocation problem by assumption. We don't have a Canada Land Inventory system for other types of land use. If we did have such inventories, say, one for residential use, one for commercial and industrial use, one for infrastructure, one for recreation, and so on, it is likely that a given plot of land could be Class 1 under more than one of these inventories. The principle of comparative advantage might be used as the tie-breaker in this situation.

All Provincial Policy Statements contain provisions regarding the protection of prime agricultural land (table 13). In the 2014 Provincial Policy Statements, prime agricultural designation becomes a requirement. In the Oak Ridges Moraine Conservation Plan, within the designated Countryside Areas, prime agricultural land will be protected, and there are 10 places mentioning the prime agricultural land or area within the Plan. In the Greenbelt Plan 1.1.2., 1(b) is intended to protect prime agricultural land. There are 37 places mentioning prime agricultural land or area within the Plan. In the Niagara Escarpment Plan, a provision under Section 1.5 (8) mentions "Transportation and utility facilities; however only linear facilities may be permitted in prime agricultural areas."

The theory of comparative advantage bases optimal resource use on opportunity costs. As we explained above, allocation based on this opportunity cost basis is in fact more consistent with the economic objectives alluded to in many of the Provincial Policy Statements as well as the Acts and Plans considered in this report.

6. Are there any general trends toward increased provincial control over local land use decisions?

The number of pages of the Provincial Policy Statements, the number of related provisions, and the changes in authorities from local governments to provincial governments all suggest a trend toward increased complexity and centralization of rural land use policy. The change from "have regard to" to "shall be consistent with" in the 2005 and 2014 Provincial Policy Statements reflects an increase in centralization relative to 1996/1997. The number of pages in the Policy Statements fell to 18 in 1996 and increased to 37 in 2005, and 50 in 2014. The number of provisions related to agricultural land use was 5 in 1995, 9 in 1996/1997, 19 in 2005 and 18 in 2014.

For the NEPDA, among the two powers assigned to the municipalities, one was modified to reduce municipality representation, because for constituting one advisory committee "people of the planning area" are no longer

required. One unique feature of the NEPDA is that it stipulates that the power of land use planning within the Niagara Escarpment Area is to be returned to the municipalities once the purposes of the Act are achieved.

Table 21
Policy analysis summary

Stated purpose	Policy instruments authorized	Change in power and authorities	Market failure diagnosis	Non-market failure diagnosis	Acknowledges economic calculation debate?	Acknowledges theory of comparative advantage?
Niagara Escarpment Development and Planning Act and Plan						
Maintenance of natural environment Development compatible with nature	Land purchasing Land designation	3 powers to Lieutenant Governor in Council, 2 from the Minister and municipalities 13 powers to the Minister or the Commission, 9 added by amendments 2 powers to municipalities, 1 power is to reduce municipality representation	Public goods, and externality implied by the rationales No supporting evidence given	Redundant rising costs Distributional Inequality No implementation analysis performed	No, or to very limited extent	No
Oak Ridge Moraine Conservation Act and Plan						
To protect the ecological and hydrological integrity of the Oak Ridges Moraine Area	Land designation	1 designation power to the Lieutenant Governor in Council 9 powers to the Minister 2 powers and 2 requirements to the municipalities and the public	Public goods, externalities, and excessive discounting implied by the rationales No supporting evidence given	Derived externalities, and distributional inequity No implementation analysis performed	No	No
Greenbelt Act and Plan						
Permanent protection of agricultural land; limit urban sprawl	Land designation	3 powers to the Lieutenant Governor in Council 7 powers to the Minister 2 requirements to the municipalities	Public goods, externalities, and uninsurable risks implied by the rationales No supporting evidence given	Derived externalities, internality and private goals, and redundant rising costs. No implementation analysis performed	No	No

Table continues on page 59

Table 21, continued

Stated purpose	Policy instruments authorized	Change in power and authorities	Market failure diagnosis	Non-market failure diagnosis	Acknowledges economic calculation debate?	Acknowledges theory of comparative advantage?
Provincial Policy Statement						
Provide guidelines regarding land use planning reflecting the provincial interests	Land designation	Designation of prime agricultural land Further protection of agricultural land More restrictions apply to lot creation on prime agricultural land	Not applicable	Not applicable	No	No
Planning Act						
To provide a land use planning system in Ontario	Land designation	Under Section 3, local decisions went from "have regard to" to "shall be consistent with" the Provincial Policy Statement	Not applicable	Preamble of 1996 version recognizes cost which could result from incorrect policy measure; not in other versions	No	No

Sources: Ontario, 1990b, 2001, 2002, 2005a, 2005c.

Conclusion: Alternative approaches to rural land use policy

Mark Pennington (2002) has offered a perspective on land use planning that reflects the insights of economics, drawing on the economic calculation debate, transaction cost economics, and public choice theory. Like Frankena and Scheffman (1980), Pennington's view is that economics offers an important but currently underappreciated perspective on problems associated with land use decisions. His work is focused on land use policy in the United Kingdom, but it has important implications for other jurisdictions, including Ontario. Pennington challenges the conventional wisdom and implicit assumptions in land use planning. He points out that land use planning is characteristically an area where market forces are relegated to a limited and declining role, in contrast to other areas of social life where the opposite trend seems to be more prevalent. He outlines a model for reforming land use planning processes which includes an enhanced role for markets.

Pennington challenges the traditional market failure rationales for land use planning. His challenge is rooted in Hayek's knowledge problem. How can planners ever hope to obtain sufficient knowledge of "the particular circumstances of time and place" to rationally, optimally, and efficiently allocate land among competing uses? This was a central question in the economic calculation debate on the feasibility of central planning as a mode of social organization. The contemporary consensus on that debate is that comprehensive central planning of an entire economy, including collective ownership of the means of production, is not a viable way to organize a complex modern society. While this consensus on national economic planning seems to be generally accepted, land use planning stands out as a paradoxical exception.

Public choice theory, which combines insights from mathematical modeling, law, political science, and economics, examines the nature of incentives in the political process. Pennington draws on several important findings from the public choice literature. Problems of rent seeking by interest groups, asymmetric incentives to participate in policy development processes, and high rates of political time preference all figure prominently in his critique of the prevailing approaches to land use planning. He is particularly critical of

the trend away from local autonomy and toward regional or national authority in matters of land use policy.

Pennington also raises fundamental fairness concerns. A common rationale for land use planning is that it provides collective benefits to the citizenry. The implicit assumption, for what it is worth, is usually that market exchanges cannot produce these collective benefits, although Pennington challenges the general applicability of this assumption. But taking the rationale at face value, there are fundamental fairness problems that arise when the burdens or costs of provision of these collective benefits are not equitably shared, which is inevitably the case when designation of land use is made as part of a planning process. If the benefits accrue to everyone, why are the costs and burdens not similarly borne by everyone, as would be the case under a regime of compensation for regulatory takings?

Pennington evaluates several suggestions for increasing the role of markets in land use allocation, including the use of tradeable development rights, compensation for land owners adversely affected by a development proposal, restrictive covenants and deed restrictions, and proprietary community models. These options represent various levels of consistency with the principles of private property and freedom of contract. It is beyond the scope of this study to evaluate these options in the Ontario context. Pennington's list of options, however, are worthy of more serious consideration. He does not take the position that there is no role for government in influencing land use decisions. His conclusion suggests that there is a need to adjust the balance between government planning and market based approaches:

What is critical, however, is that beyond laying down such basic regulatory rules, *no* attempt should be made to co-ordinate land uses according to some holistic plan. Rather, the maximum scope should be allowed for experimentation and innovative property-rights solutions to facilitate co-ordination through the forces of markets. The extent of government intervention in land use far exceeds minimalist principles, and indeed has actively suppressed the emergence of private property approaches through continued adherence to policy prescriptions that do not allow markets to develop. As Hayek put it so well, to recognize that we may have to resort to direct regulation where the conditions for the proper working of competition cannot be created does not mean that we should suppress competition where it *can* be made to function effectively. The analysis presented above suggests much greater scope for relying on property rights and market processes than is commonly recognized. (Pennington, 2002: 102–103)

In addition to the alternative approaches described by Pennington, other strategies based on the economic theory of club goods are being used

in Ontario. One such approach is the use of land trusts, such as the Nature Conservancy and the Ontario Farmland Trust. Land trusts accept donations of land from current owners that stipulate that the land be held in agricultural use in perpetuity. Land trusts also accept cash donations which can be used to purchase land to be held in trust or to purchase development rights. This approach avoids the takings issue, since a landowner may choose to donate land or development rights to a trust, but does not have to do so.

A second approach, which is more generally used to promote environmental practices such as maintenance of wildlife habitat, is payments for ecological goods and services. Under this approach, rural land owners may choose to enroll land in various types of stewardship programs and practices, including preservation in agriculture, in exchange for (typically annual) per-hectare payments. The Alternative Land Use Services program, being used in Ontario and other provinces, is an example of this approach. Again, because the participation decision rests with the land owner, this approach avoids the takings problem and associated fairness concerns.

Appendix: The changing definitions of a census farm

The definition of a census farm has changed over the years. Prior to the 1976 Census, a census farm was defined as a farm, ranch, or other agricultural holding of one acre or more with sales of agricultural products of \$50 or more during the 12 month period prior to the Census Day. For the 1976 Census, a census farm was defined as a farm, ranch, or other agricultural holding of one acre or more with sales of agricultural products of \$1,200 or more during the year 1975. The basic unit for which a questionnaire was collected was termed “agricultural holding.” This term was defined as a farm, ranch, or other agricultural holding of one acre or more with sales of agricultural products of \$50 or more during the 12 month period prior to the Census Day. For the 1981 and 1986 censuses, a census farm was defined as a farm, ranch, or other agricultural holding with sales of agricultural products of \$250 or more during the previous 12 months. Agricultural holdings with anticipated sales of \$250 or more were also included. After 1991, it refers to a farm, ranch, or other agricultural operation producing agricultural products for sale, including feedlots, greenhouses, mushroom houses and nurseries, farms producing Christmas trees, fur, game, sod, maple syrup or fruit and berries, beekeeping and poultry hatchery operations, operations with alternative livestock (bison, deer, elk, llamas, alpacas, wild boars, etc.) or alternative poultry (ostriches, emus, etc.) when the animal or derived products are intended for sale, backyard gardens if agricultural products are intended for sale, operations involved in boarding horses, and riding stables and stables for housing and/or training horses even if no agriculture products are sold. Sales in the previous 12 months are not required, but there must be the intention to sell (Statistics Canada, 2012).

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