An Economic Analysis of Rural Land Use Policies in Ontario

(1951-2014)

by

Yi Wang

A Thesis
Presented to
The University of Guelph

In partial fulfilment of requirements
for the degree of
Master of Science
in
Food, Agriculture, and Resource Economics

Guelph, Ontario, Canada

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ABSTRACT

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Yi Wang
University of Guelph, 2015

Advisory committee:
Dr. Glenn Fox (Advisor)
Dr. John Cranfield (Committee Member)
Dr. Alfons Weersink (Committee Member)

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. The purpose of this study is to revisit Frankena and Scheffman’s findings to determine if they still hold for the period of time that has elapsed since 1980. First, I examine the empirical evidence on the amount of agricultural land in Ontario and how that has changed over time. Second, I develop a framework for evidence-based policy making with respect to land use. I conclude that the area of cropland in Ontario has been essentially constant since 1951, and that Frankena and Scheffman’s (1980) conclusion about land use policy could benefit from increased regard for critical economic concepts still holds.
Acknowledgement

This thesis cannot be completed without the support of professors and professionals. I would like to thank all the people who have offered their help during the process. I would like to thank my advisor, Dr. Glenn Fox for his guidance, patience, and inspiration throughout the process. He taught me to look at things from different perspectives and to always be an open-minded person. I would like to thank Dr. John Cranfield and Dr. Alfons Weersink, who kindly serve as advisory committee members. Their valuable suggestions have made my thesis more readable and interesting.

I would like to thank the Fraser Institute for the project funding and peer reviews. Without their support, this project may not even exist.

I would like to thank Teresa, the librarian in the DRC in University of Guelph, who was with me throughout the process. She has taught me how to process GIS datasets, and she helped me double-check datasets afterwards. I would like to thank Ms. Nicole Rabe and her team from OMAFRA, who expressed great interests in this project and promptly helped me with my questions. I would like to thank Ms. Kumuduni Kulasekera from OMAFRA, who kindly shared unpublished data with me. I would like to thank Dr. Harry Cummings, who generous shares his unpublished data and findings. I would like to thank Mr. Campbell and Mr. Daneshfar from AAFC, who kindly explained the process of the Annual Cropland data collection process. I would like to thank Mr. Giuseppe Filoso, and Ms. Nancy Hofmann from Statistics Canada, who provided first hand information regarding their researches. I would like to thank Cindy Huang, an undergraduate student in the University of Guelph, who has helped me transcribe archived data to digital files.

I would like to thank my parents for always being supportive. I would like to thank my boyfriend Chi Fei for all the intellectual conversations. I also would like to thank Sylvia Hu, April Hu, Dayana Wong, Rita Jabbour, and Jerry Lin for the late night proof readings and encouragement.
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Chapter 1 Introduction

1.1 Background

The Greenbelt Plan (2005), Niagara Escarpment Plan (1990) and the Oak Ridges Moraine Conservation Plan (2002) are scheduled for review in 2015 (Government of Ontario, 2005). It has also been 35 years since Frankena and Scheffman (1980) published their comprehensive rigorous economic analysis of Ontario’s rural land policies. There have been different voices regarding what is going on in agricultural land since 1980.

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, Nov.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.

Frankena and Scheffman (Economic Analysis of Provincial Land Policies in Ontario, Chapter Five, 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.


1.2 The Economic Problem

The Ontario Ministry of Municipal Affairs and Housing is responsible for proposing the review of the above Plans (Government of Ontario, 2005). The two economic problems are: 1. The Ministry needs a factual basis for this 10th year review. 2. The review needs to include the economic theory of policy evaluation.

1.3 The Research Problems

There are two research problems for this study: 1. The data documentation of Ontario's rural land uses since 1980 do not include the best data we have so far. Frankena and Scheffman (1980) documented the Census data and relevant studies before 1980 their study. Some data sources other than the Census data were not included in Frankena and Scheffman's (1980) study, and others were available after 1980. A systematic documentation of different data sources will provide different angles to examine the question of how agricultural land has been changing. 2. Ontario's provincial rural land use policies have not been analyzed from an economic perspective since 1980. There have been major new Acts and Plans influencing the rural land use in Ontario since 1980.
The research of the above two questions are important, because they serve as the
evaluation basis of evidence-based policies. The Government of Canada and the Government of
Ontario have both committed themselves to a process known as evidence based policy making, an approach which originated in education and public health policy. This approach is offered by its advocates as an alternative to either policy making based on anecdotal evidence or policy making based on ideology, without regard to empirical analysis. Application outside of the contexts in which it was developed is a work in progress.

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. 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 a necessary but 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.

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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.
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 to the type and nature of empirical evidence required to get beyond public perceptions, anecdotes and ideology.

The scope of this study is limited to rural land use policy in Ontario, for the period 1951-2014.

1.4 Purpose

The three purposes of this study are: 1. To document changes in Agricultural land in Ontario since 1951, with focus on the period after 1976, which was the last year included in Frankena and Scheffman’s (1980) study. 2. To document and to compare changes in Ontario’s major rural land use policies since 1980. 3. To develop an economic framework for policy evaluation, and to apply that framework in an economic evaluation of policies since 1980.

1.5 Objectives

The objectives of this study are:

i) To document changes in rural land use patterns in Ontario using data from multiple datasources for comparison among these datasets, and for comparison with Frankena and Scheffman’s (1980) finding.

ii) To compare trends in Agricultural land uses in the pre-1976 period and the post 1976 period, and to compare farmland and cropland area inside and outside the Greenbelt area.

iii) To document the stated rationales, purposes, power assignments for the Greenbelt Plan (2005), the Niagara Escarpment Plan (1990), and the Oak Ridges Moraine Conservation Plan (2002) and the Provincial Policy Statement (various years).
iv) To identify the market failure implied in the stated purposes and rationales, and to identify possible non-market failure categories in authorized policy instruments in the Greenbelt Plan (2005), the Niagara Escarpment Plan (1990), and the Oak Ridges Moraine Conservation Plan (2002) and the Provincial Policy Statements (various years).

v) To develop an economic framework for policy evaluation from an economic perspective by asking questions with regard to implementation analysis.

vi) To apply that economic framework to evaluate the Greenbelt Plan (2005), the Niagara Escarpment Plan (1990), and the Oak Ridges Moraine Conservation Plan (2002) and the Provincial Policy Statements (various years).

vii) To evaluate the equity impact of the Greenbelt Plan (2005), the Niagara Escarpment Plan (1990), and the Oak Ridges Moraine Conservation Plan (2002) by identifying the acknowledgement of the implication of the Economic Calculation debate in the field of rural land use.

1.6 Chapter Contents

The contents of this study is listed as follows:

Chapter 1: Introduction

Chapter 2: Literature Review


Chapter 4: Major Provincial Land Use Policies and Policy Analysis

Chapter 5: Summary, Conclusions and Implications
Chapter 2 Literature Review

2.1 Introduction

It has been 35 years since Frankena and Scheffman (1980) published their economic rigorous analysis of Ontario’s rural land use policies. One of their principal findings was that land use planning was conducted with, at best, limited awareness of economic concepts. They analyzed the rationales for policy actions aimed at preventing the conversion of agricultural land to other uses from an economic perspective. They also compiled data documenting historical levels of farmland area in Ontario and how that area had changed from 1951 to 1976, and concluded that despite the fact that farmland has been decreasing, only one percent of the prime agricultural land has been converted to non-agricultural uses. However, in Frankena and Scheffman’s (1980) analysis, they did not take into account the economic calculation debate. The economic calculation debate is usually overlooked by agricultural economists, except Pasour (1983). The implication of the economic calculation debate is helpful in analyzing the policies in a later chapter. Also, there have been studies reviewing the Greenbelt Plan (2005) from different perspectives, and this chapter will also include these studies.

2.2 Frankena and Scheffman’s (1980) Study

2.2.1 Methods

Frankena and Scheffman used efficiency and equity criteria to evaluate Ontario’s rural land use policies. Their efficiency analysis took the form of cost-benefit analysis. Their equity analysis considered the distribution of benefits and costs among different groups in Ontario. The main focus of their welfare economic analysis was the critical examination of the claims that market failures exist in the markets for rural lands and the question of whether provincial land use policies were effective and efficient responses to those putative market failures.

Frankena and Scheffman (Chapter 2, 1980) did not consider the role of non-market failure, for example, as Wolf (1979) developed that concept, but their overall conclusions could be seen as an empirical confirmation of Wolf’s model. Like Wolf (1979), Frankena and Scheffman (1980) treated market failure as a necessary but not a sufficient condition for an economic justification for policy action by government, even though their wording was a bit different. They also argued that, even in the presence of market failures, without efficiency and equity
assessment, policy remedies may not be justified. One reason is that policy implementation costs can be high, and even can exceed benefits. If the costs associated with a certain rural land use policy are higher than the benefits it can bring, or if there is a better alternative which costs less but can achieve a more desired goal, this policy is not economically sound, because one makes the problem worse or creates a new problem.

Frankena and Scheffman (Chapter Two, 1980) also listed five categories of market failure, : market power, externalities, public goods, uncertainty, and, they incorrectly include in this list, distortionary government policies, which is a category of non-market failure, not market failure (Wolf, 1979). According to traditional market failure theory, an agent is defined to have market power if he or she is not a price taker. Typically, this category of market failure is associated with the theory of monopoly and the theory of imperfect competition and is not generally associated with market failure diagnoses in rural land markets. Externalities, a second category of market failure, arise when one person imposes costs (negative externality) or bestows benefits (positive externality) on another person or persons without the consent of the affected person(s). Positive and negative externalities can also create difference between marginal social costs and prices. In rural land markets, externalities have been cited frequently as sources of conflicts over amenities, pollution and congestion problems. Public goods are defined as goods that are non-rival in consumption and for which exclusion of non-contributors is either costly or impossible, Frankena and Scheffman only mention the non-rivalry part (Page. 24). Public goods are associated with free-rider problems. Frankena and Scheffman argued that agricultural land has some characteristics of public goods, such as benefiting passers-by for providing open-space. Uncertainty is a potential source of market failure, mainly because there are not sufficient markets or institutional settings for risk pooling. Frankena and Scheffman conflate market failure and non-market failure. However, the distortions created in a certain market due to policies should be defined as non-market failure, or government failure (Wolf, 1979). In the end of the method section, they also start an argument on the demand of intervention. They state that government interventions are generally not motivated to increase efficiency, but motivated to increase votes from interest parties. This is another reason for them to examine the actual efficiency of land use policies using cost-benefit analysis.

2.2.2 An Overview of Provincial Land Use Policies
In chapter three, Frankena and Scheffman (1980) provided a general overview of provincial land use policies and land use trends from 1960 to 1980. They concluded that there was an increasing trend in provincial intervention involved in local land use planning since early 1960. Their major purpose is to identify the extent to which provincial government has control of rural land use by examining provincial policies regarding local planning, regional planning and direct planning.

They notice three major features of these provincial land use policies: increasing intervention since early 1960, absence of clear policy ensuring policy implementation and preventing contradictory actions; and absence of economic analysis. More specifically, greater provincial government control was involved in land use and land allocation, which had previously been left to the private market and local government. However, a statement of the rationales and objectives of these land use policies had not been provided by the provincial government. After the implementation, the government provided no economic analysis regarding the nature of provincial interests of land use, or merits of these land use policies. These three features are the main concerns of this economic analysis by Frankena and Scheffman.

According to Frankena and Scheffman (1980), the *Ontario Planning Act* (1946) was to supervise local planning, and to ensure municipalities follow “the principle of good planning”. This Act authorized the Ministry of Housing to review and approve local land use decisions. Under this Act, the provincial government can exercise its power through the Plans Administration Division of the Ministry of Housing, the Ontario Municipal Board (OMB), and the cabinet.

Frankena and Scheffman (Chapter 3, 1980) also pointed out that the boundary of provincial supervision was unclear, because the scope of the provincial policies seemed not to be limited to achieving provincial land planning objectives, policy implementations, regulating inter-municipal spill-overs, protecting agricultural land, restricting urban development in rural areas. Frankena and Scheffman also noticed a new policy of direct provincial responsibility for comprehensive regional planning. It began with the *Metropolitan Toronto and Region Transportation Study* (1966) in the Design for Development program. The two authors argued that the Toronto-center region plan as one of the regional planning programs did not reflect the
provincial planning features, which led to the abandonment of Design for Development approach.

As for direct provincial planning, Frankena and Scheffman (Chapter 3, 1980) listed the powers authorized to various government agencies. They found that the Planning Act (1946) gave power to Ministry of Housing to impose zoning orders directly, though they have to conform with local official plans and OMB. They also saw that the Ontario Planning and Development Act (1973) gives power to the province over amendment of already approved municipal planning decisions if they do not conform with the provincial planning. They emphasized that this Act has implied the power of expropriation of any land within the “development area” as declared by the province, subject to consultations, hearings and reviews.

Frankena and Scheffman (Chapter 3, 1980) also listed the responsibilities of various government agencies. The development of new towns was also the responsibility of the province if there is a fast urban development outside of existing urban areas due to increase in employment since 1954. The result is that there was a large-scale provincial land acquisition for four major new towns up till 1979, and the doubt put forward by the authors was when would the actual development process would commence.

Frankena and Scheffman (Chapter 3, 1980) concluded that all these provincial policies reflect an increasing trend in land use planning and allocation since early 1960. However, beginning 1970s, provincial policies began to compromise issues with the parkway belt and escarpment planning area. Frankena and Scheffman (1980) argued that many policies were not fully implemented, because they counted that there has been a great number of actions approved by the provincial government, which are contradictory to policy provisions.

2.2.3 The Provincial Role in Municipal Planning

In Chapter four, Frankena and Scheffman (1980) explored the provincial role in municipal planning. They listed three sources of the provincial interest in municipal planning, which are the existence of non-local issues, such as non-local externalities; individual rights and minority interests protection; and policy failure in municipal planning. And to Frankena and Scheffman (1980), the purposes of this chapter were to examine major criticisms of provincial intervention,
and to evaluate the economic justification of existing provincial intervention as well as proposed changes in provincial power distribution.

Frankena and Scheffman (Chapter 4, 1980) argued that there had been excessive complicated and detailed provincial planning and subdivision approval process emphasizing “the principles of good planning”. They advocated for more municipal planning autonomy, because many matters only concerned local interests. They reviewed other studies to indicate that the provincial supervision causes higher housing prices and political unaccountability.

Frankena and Scheffman (Chapter Four, 1980) concluded that the provincial guidelines were vague, not coherent, and only contained a list of provincial interests without economic justifications. They reviewed rationales in policies and concluded that they lack clarity. Also, they searched to conclude that there was no cost-benefit calculation of these land use policies. They argued that before policy adoption, the government should calculate costs, benefits, distribution, and also publish of these evaluation.

Frankena and Scheffman (1980) listed two concerns arising from provincial control of the local development process: (1) different policies for new comers; and (2) efficiency implications of the control of development by municipalities. They found that there was no market power for small cities, which means that local development control policies had little impact on non-residents. Most cities were small cities in this sense, except Metropolitan Toronto Area. And they argued that the provincial intervention in local development control created more market power. In this case, there was a policy failure.

However, municipalities may not have the incentive to achieve efficient resource allocation, which becomes a necessary condition for the province to enhance efficiency. Frankena and Scheffman (1980) compared and contrasted the incentives of major interest groups. The sources of incentives of control policies can come from homeowner, which is a dominate source to support development control policies; developers, and business community, on the other hand, are against development control policies. The homeowners’ interests dominates the policy decision, which leads to more development control policies. However, the benefits or costs occurred to the relevant parties from such policies can result in further incentives to support or reject such policies. In this case, the authors doubted if provincial intervention in local planning on this ground will be appropriate.
Frankena and Scheffman (Chapter 4, 1980) advocated clearly defined, simplified and reduced provincial responsibility. When examining the recommendation by the Planning Act Review Committee, they did not agree on provincial development standards and requirements, because a unified standard is not suitable for all regions.

2.2.4 Rural And Agricultural Land Use in Ontario

In Chapter five, Frankena and Scheffman (1980) documented rural land use trends in Ontario, and reviewed assumptions and findings of previous studies. The purpose was to summarize existing data on rural land use to address the provincial concern of losing prime agricultural land. They concluded that the concern of non-farm residential development in rural areas and conversion of good agricultural land to urban and other uses were not based on empirical evidence.

And based on all the studies, two authors suggested that in aggregate, the rate of rural land conversion to built-up urban use was lower than productivity increase in agriculture, because only one percent of prime land was converted for urban use in 1970s. They also concluded that in aggregate, the rate of conversion of land to active rural non-farm residential use was even lower than the rate of conversion for built-up urban use. Moreover, for agricultural land converted to non-farm residential use, larger amounts of these lands are lower-quality agricultural land, rather than prime agricultural land.

2.2.5 Provincial Rural and Agricultural Land Use Policies

In chapter six, Frankena and Scheffman (1980) gave an overview of the existing agricultural land use policies, and examine the Niagara fruit belt boundary issues as a case study. They also provided a welfare economic analysis framework to evaluate the economic impacts of restricting agricultural land conversion to other uses. In this chapter, they argued that provincial policies restricting rural land uses impact land allocation and prices. Nonetheless, some provincial policies were only partially implemented, because there were numerous actions contradicting to the provisions and the purposes got approved.

Frankena and Scheffman (Chapter Six, 1980) examined the Niagara boundary issues as a test against the existing land use policies. According to Frankena and Scheffman, in early 1977, the province cut back the boundary of Niagara’s proposed official plan for urban development,
because it contained too much fruit land and agricultural land. When assessing the impacts, two authors found that reports prepared by the Regional Municipality of Niagara Planning and Development Department suggested that the 1977 urban boundaries already contain sufficient land for the next twenty years of urban development, even in absence of the cutbacks. Hence, the implication was that savings of agricultural land resulted in provincial intervention can lead to denser urban development or higher rent price.

To evaluate these policies, Frankena and Scheffman developed a model to analyze the welfare effects of policies restricting the conversion of agricultural land to other uses. The model consisted three main steps. In the first step, they made the assumption that the land in the model is homogeneous. And in the second step, they dropped the homogeneity assumption, and study the land allocation under the heterogeneous land assumption. Finally, they analyzed the rationale for restricting rural non-farm residential development.

In the first step, they tried to address the concern of the conversion rate of agricultural land to other uses. They assumed land to be homogeneous, so land can either be used for agricultural production or urban housing. They argued that the demand for agricultural land is derived from the demand for agricultural goods. And the demand from urban land is derived from the demand for housing and other goods and services produced in urban areas. Hence, anything affecting the demand for agricultural products or housing will affect the price (i.e, rent) and allocation of land. In this case, government policies affecting these factors can impact land use and rents. And land use policies have effects on not only land use allocation, but also land prices. So they argued that in a competitive market, without government regulation, the conversion would continue until the rents of agricultural land equal to urban land.

In the second step, Frankena and Scheffman (Chapter 6, 1980) changed the assumption to heterogeneous land, so some land are more suitable for agricultural productions and others less suitable. The provincial land use guidelines have adopted the idea that prime agricultural land should be preserved for now and for future agricultural uses, and urban uses should be restricted to inferior agricultural soils. However, Frankena and Scheffman (Chapter 6, 1980) pointed out two major weaknesses with this approach. The first one is that, a policy should not leave the aggregate amount of land perseverance to be determined by supply alone, which means to reserve all the prime agricultural land, but to ignore the opportunity costs of these lands. The
second one is that it ignores the fact that the opportunity cost of preserving different parcels of agricultural land varies. For instance, the location may not be important for agricultural production, but it is important for residential uses. Hence, they recommend that any decisions to preserve agricultural land should be based on cost-benefit analysis.

Frankena and Scheffman (Chapter 6, 1980) argued that efficient land allocation may have equity issues. They realized that the rate of conversion is related to this generation’s preference, and it may be unfair to the future generation because their preference is not known. They explained inefficiencies created by government policies. They suggested that zoning and development can lead to a price distortion between land approved to development and land not approved. This price difference, or the premium, may motivate people to convert the wrong piece of land. Lacking government intervention, only the inferior land can be converted if the price of the developed land is still a bit lower than the prime agricultural land. However, with government limiting the amount of land to be converted, the value for a developed land may be higher than the original prime land. In this case, both landowners will have the incentive to have their lands converted, which creates inefficiency. They suggested that a possible remedy will be tradable “development rights”, which allows the market to allocate land conversion.

Finally, Frankena and Scheffman (Chapter 6, 1980) examined the nature of rural development restrictions. They concluded that none of these rationales provided by the government to limit rural development had empirical evidence based on strong cost-benefit analysis.

2.2.6 The Toronto-Centred Regional Plan

In Chapter seven, Frankena and Scheffman (1980) provided an economic analysis of the Toronto-centred region (TCR) plan as a case study. The TCR plan was worthwhile to study because the outcome of this Plan was very different from what originally planed. The TCR plan was a product of the 1964 “Design for Development” program, and it was a policy option in mid 1960s, and was adopted in 1971. Two authors argued that the provincial government never followed closely to the TCR, and it even abandoned much of the “Design for Development” program. The purpose of this chapter was to analyze the actual implementation of the TCR program, and to understand why it did not achieve its objectives.
The main feature of the TCR plan was direct provincial involvement in comprehensive regional land use planning, which can be traced back to general terms in the White Paper Design for Development in 1966. The Regional Development Branch of the Ministry of Treasury and Intergovernmental Affairs had the responsibility for land use and development plans, and for this new program.

According to Frankena and Scheffman (Chapter 7, 1980), the rationales of this Plan are the existence of market failures. Land reservation for future use, for public recreational use and open space are sources of market failure. However, they insisted that without cost-benefit analysis, policies are not justified.

The land use objectives of the TCR plan are i) to have a size and spatial distribution of urban areas different from otherwise evolve; and ii) to preserve land for agricultural, recreation, and open space. More specifically, for the first objective, there are three detailed policies: 1) decentralization and “go east”; 2) Two-tier liner urban structure and parkway belt; and 3) Balanced growth.

Noticeably, a part of the policies are similar to the Greenbelt policy implemented today. The park belt was also expected to provide open space and to contain interurban transportation and utility services. Further actions were also taken to add details to the TCR plans. Simcoe-Georgian and Northumberland Task Forces were set up in 1975-1976. The Niagara Escarpment Act in 1970 and the Pits and Quarries Control Act in 1971 both help support the regulations. In 1972, the Niagara Task Force was also set up. The province also passed the *Niagara Escarpment Planning and Development Act* (1973), which appointed Niagara Escarpment Commission to do escarpment area land use planning. In 1973, the *Parkway Belt Planning and Development Act* was established, together with Ontario Planning and Development Act, to regulate the Parkway Belt Planning Area.

When examining the actions following these policies, Frankena and Scheffman (Chapter 7, 1980) noticed three actions contradicting the original TCR plan. Firstly, in 1971, the government allowed urban development in areas where initially were subject to restrictions: in Hamilton area, in and near Milton, and adjacent to Brampton. Secondly, the population allocation in Municipal of York were revised three times. And lastly, the introduction of the Go transit rail to Georgetown, northwest of Metro Toronto makes it hard to reach the “go-east” objective.
Frankena and Scheffman (Chapter Seven, 1980) also noticed that the implementation of the parkway belt policies differed from originally planned as well. In 1973, the actual parkway belt was much narrower than originally planned, which only serves the function of a utility corridor. In 1977, the report from the Hearing Officers suggests permissions of urban land use on the parkway belt, so a large area of the parkway belt was deleted.

In conclusion, Frankena and Scheffman (Chapter 7, 1980) suggested that the province moved away from comprehensive regional and province-wide planning as originally planned. After 1971, the government attitude towards the plan changed. The authors pointed out that the province as a whole did not adopt the plan; there was no implementation details after the adoption of the plan; and the government substituted the Regional Planning Branch by the Economic Development Branch in 1976. Frankena and Scheffman provided two explanations: The first one is that the government was not serious about the TRC plan. And the second one is that the government did not anticipate the scale of intervention, nor the opportunity costs of achieving the potential TCR objectives.

2.2.7 Summary of Frankena and Scheffman’s (1980) Major Findings and Implications

In the last chapter, Frankena and Scheffman summarized major findings of this economic analysis of provincial land use policies, and provided a discussion of the implications.

First of all, they concluded that government policies lack economic analysis — the analysis of cost and benefit. The existing problems to be addressed are economic in nature, so they argued that economic analysis should be conducted for socially optimal resource allocation. Secondly, they pointed out that government policies lack empirical researches, because the justification of government intervention needs empirical work as evidence. Following economic analysis, they recommended the government to form practice of preparing economic impact statements in the process of evaluating alternative policies. They also specified that personnels involving land use planning need to have basic economic analysis skills in order to implement the academic recommendations.

They also summarized the findings of their study of land use policies. Firstly, they found that there should be clearer policy statements and consistency of action, because the evidence suggested that there have been discrepancies between what the government claims to do and
what the actual action is. Provincial guidelines for municipal development controls obscures in political accountability and also in criteria to measure local decisions. All of these weaknesses lead to uncertainty in the development process.

Frankena and Scheffman also emphasize that general provincial policies designed to restrict development are inappropriate, because they do not have justified economic rationales. They find that only 1% of good agricultural land is converted to built-up use, and rural to urban conversion accounts only 10% of the decrease in census farms. Also, the decision to conserve prime and unique agricultural land implies two serious weakness-- supply as the only determining factor; and it ignores opportunity costs when aims at land preservation, as explained in chapter six.

Finally, Frankena and Scheffman suggest that other policies which do not involve land use planning may have indirect impacts on land use patterns. They give the example of agricultural subsidies, which can change the rate of farmland conversion. And they suggest that these policies must be taken into consideration when assessing the overall efficiency.

2.3 The Economic Calculation Debate

2.3.1 Theoretical Background of The Debate

The theoretical economic calculation debate occurred largely between 1920 and 1940. Lavoie (1981) argued that participants in the economic calculation debate adopted one of two competing and incompatible paradigms of economic theorizing. The economists who ended up adjudicating the debate generally all adopted one of these paradigms, making the adjudication less than impartial. The debate focused on the challenge posed by Mises, who argued that without market prices for goods of higher order, it is impossible to know relative scarcity of different components of the capital structure, and therefore allocation of those goods of higher order among their competing employments will be arbitrary (Lavoie, 1981). Mises was later joined by Hayek and Robbins, arguing that lacking market prices for goods of higher order, rational calculation is unfeasible under collective ownership of the means of production Lange and Lerner, among others, argued that a stimulated market model could be used to guide resource allocation under collective ownership of the means of production, making central planning feasible. Hayek refuted Lange’s model by emphasizing the knowledge problem: the
impossibility of gaining these crucial data for centralized calculation. By the mid-1950s, the consensus view of academic economists in the UK, the United States and Canada was that Mises and Hayek lost the debate. Samuelson suggested in his Economics (Chapter 32, 1988) that the economy of Soviet Union was no less efficient than the United States.

Public perception, however, began to change after 1989 when the Berlin Wall came down and western country journalists began to get an improved understanding of the economic chaos that had been hidden behind the iron curtain. Somewhat later, and generally grudgingly, academic economists began to consider the possibility that the prevailing consensus on central planning had been wrong, and some have even began to wonder if Mises, Hayek and Robbins had been correct. The consensus view among academic economists in the west today, and perhaps in society generally, is that central planning as a mode of social organization is not viable, from both theoretical and practical perspectives. However, the growing trend on rural land use planning really imposes an interesting question: why is land so special?

2.3.2 Implications of the Economic Calculation Debate

One of Frankena and Scheffman’s (1980) major findings was that rural land use policies in Ontario had been designed without regard to economic evidence and concepts. They pointed out that rural land use policies during the time period they studied did not seem to be based on empirical studies and that many policy rationales were not justified economically. For instance, data showed that only 1% of the good farmland was converted to built-up use during their study time, and rural to urban conversion accounted for only 10% of the decrease in census farms from 1951 to 1976. Also, they pointed out that policies generally assumed that there was a fixed supply of farmland, which was incorrect.

While they were generally critical of what they saw as the weak economic foundation of the land preservation policies that they studied, Frankena and Scheffman (1980) did not mention the economic calculation debate. In contrast, in the U.S. debate on rural land use planning, Pasour (1983) identified four important implications of the debate, which are the “use of knowledge in land-use decisions”, “problems due to time”, “public choice considerations”, and “inflexibility of land-use controls”. Pasour (1983) was critical of what had come to be called “scientific management” as a way to manage natural resources. He pointed that Hayek’s (1945) distinction between scientific knowledge and what Hayek called the knowledge of the particulars
of time and place meant that so-called scientific management could not deliver on what it promised.

Pasour (1983) acknowledged that a common rationale for land use policies is that there is an inadequate incentive for individuals to preserve farmland preservation because the benefits will only be realized in the future. Pasour (1983) argued that in fact expectations are reflected in current asset prices, including land prices, so the current land price can reflect the demand of this piece of land today and expected demand in the future. Demsetz (1967) made a similar point that current land owners serve as brokers for the interests of future generations. In addition, Pasour pointed out that, in the absence of market prices as a guide, land use planners would have to guess at the needs of future generations in any case. Pasour (1983) identified a systemic incentive problem arising from the separation of authority and responsibility which results in planners not bearing the costs or the benefits arising from their decisions. Misallocation of agricultural land thus will not have negative consequences for the government. In this case, there is no reason to believe the central planner will make efficient allocation decisions.

Lastly, Pasour (1983) noticed that planners and the elected officials who direct them are motivated by self-interest, and decisions are often short-run oriented due to the pressure to seek re-election. He points out that this contradicts to Hayek’s view of a rational economic calculation, which must take the interests and preferences of all affected parties into consideration.

2.4 Recent Studies Regarding Agricultural Land Inside and Outside the Greenbelt

Harry Cummings et al., (2010), documented the trend of farmland use and production of crops inside and outside the Greenbelt Area from 2001 to 2006. A sequential study on the same topic further includes the 2011 data.

Cummings et al. (2010) concluded that between 2001 to 2006: 1. farmland has been decreasing at a faster rate within the Greenbelt Area than rest of Ontario; 2. The rate of field crop area decline is higher, and involves more varieties of crops within the Greenbelt Area than the rest of Ontario; 3. The share of total gross farm receipts within the Greenbelt decreased from 12.4% to 11.4% of the province.
Cummings et al. (2010) found that the total area of farmland decreased by 8.5%, and the cropland area decreased by 8% within the Greenbelt Area from 2001 to 2006; while the decrease rate of both total area of farmland and cropland within the rest of Ontario is only 1%. For field crops, they reported that between 2001 and 2006, the area of 12 kinds of crops experienced decreases, while the area of 7 kinds of crops experienced decreases in the rest of Ontario. For major field crops, the area of soybeans, corn for silage, corn for grain, other tame hay or fodder hay experienced higher area decrease rates within the Greenbelt Area than the rest of Ontario.

Cummings’s new report (undated), he drew the following conclusions with added data from 2011: 1. The percentage of decrease of farmland area is still higher than the rate in the rest of Ontario. 2. Yet, the decreasing rate of farmland area within the Greenbelt Area was slower from 2006 to 2011 than from 2001 to 2006. For farmland area decreasing trend, he documented that farmland area decreased by 16% within the Greenbelt Area from 2001 to 2011; while the rest of Ontario experienced a 5.4% decrease.

In the report “Agriculture by Numbers” (JRG Consulting Group, 2014), the authors confirmed the trend that farmland area within the Greenbelt Area decreased at a higher rate than the rest of Ontario from 2001 to 2011. They also used a customized dataset from Statistics Canada, however, the numbers are a bit different, though the trend is similar. In this report, from 2001 to 2006, farm area declined by 4.2% within the Greenbelt Area, while the decline rate outside the Greenbelt Area was 1.3%; from 2006 to 2011, farm area declined by 6.5% within the Greenbelt Area, and the farmland area declined by 4.7% 2006 to 2011. Their results are different from Cummings et al. (2010, undated). And it is interesting to further investigate the discrepancies. Labbé et al. (2007) studied the farmland loss and urban growth, and they argued that the percentage of farmland loss depends on the point of reference, which is a source of discrepancy.

2.5 Existing Evaluation of The Greenbelt Plan

There are two important perspectives on reviewing the Greenbelt Plan (2005), one is a planner’s perspective, and the other one is a political perspective. Caldwell and Procter (2013) identified problems faced by planners and farmers when they apply the Greenbelt Plan (2005) to
solve planning issues. Caldwell and Procter (2013) listed 8 key issues relating to the Greenbelt Plan (2005). The first one is that planners and farmers both feel frustrated facing multiple layers of regulations, because different levels of governments are involved, which creates a complexity. The second one is inconsistency in interpretation. Caldwell and Procter (2013) found out that different layers of governments interpret the policy and regulations differently, which is mostly due to vague provisions. And their suggestion is to have more clear direction in policies rather than to have centralized decision makers. The third one is competing provincial and municipal mandates. There are competing interests among different parties within the province, and Section 1.2.1 Vision of the Greenbelt Plan (2005) set agriculture as a predominant use within the greenbelt area. Yet, Caldwell and Procter (2013) found that in policy implementation, the Natural Heritage policies seem to override agricultural production. And the authors call for further clarification. The fourth issue is lack of understanding. The authors (2013) argued that a better understanding of the agricultural sector by each level of planners and policy makers will be beneficial. The fifth issue is cost. The author (2013) argued that both farmers and planners have identified that the cost of time and money has been increased due to increased regulation. One example will be the time and money cost to obtain approvals and permits. The sixth issue is that the boundary of Natural Heritage boundary delineation, especially within the farmland area, has not been well explained or for public examination. The authors (2013) suggested a more detailed and clear delineation and should be open for public discussion. The seventh issue is integrating interests. This issue is due to multi-priorities of environmental and agricultural preservation. Authors identified that there are too many resources to be protected within the Greenbelt are, so that it is necessary to find a balance. The eighth issue is agricultural viability and sustainability. Caldwell and Procter (2013) argued that urban pressures have impacted the viability and sustainability of agriculture, and they believe that the Greenbelt Plan (2005) has helped establish a long term protection of land base.

In summary, the authors find that the Greenbelt Plan (2005) sometimes resulted in higher planning costs, centralized decisions, different interpretations, unclear priorities, and conflict interests. Some of the above issues can be explained by Pond in his two papers.

Pond (2009a) argued that Ontario’s Greenbelt Plan expropriates the private land owners’ rights, which will need reconstruction, and can be explained in the institutional setting of anti
urban sprawl regulation (2009b). Pond (2009a) explained that since most of the area within the Greenbelt is privately owned, the availability of open space and amenity provided by the Greenbelt aside from agricultural products is at the cost of private owners. Pond argued that the cost to the owners are two folds: first, they are not allowed to convert their farmland into other uses at the market; and second, they are forced to provide environment amenities. Based on these two arguments, Pond (2009a) further argued that the designation of the Greenbelt Plan needs restructure for the purpose of surviving electoral cycles. Furthermore, Pond (2009a) managed to provide a plausible explanation to the decrease in farm acreage. He suggested that the decrease in farmland area is likely due to a profitable agricultural economy. To maintain such a profitable agricultural economy, or, to balance the supply and demand of agricultural products, it is necessary for farmers to dispose land not needed in farm operation. However, the Greenbelt policy has prohibited the sell or conversion of farmland.

Pond (2009b) argued that it is the unique governing style in Canada, as understood in an institutional context, which has influenced the establishment of the Greenbelt policy. He (2009b) argued that direct regulation of privately owned land is a provincial responsibility, while the municipalities has no independent constitutional status, so that municipalities have to follow the province’s guidelines. In this case, municipalities have no rights to re-zone the designated land, and landowners will not be compensated under the provincial regulation. Pond (2009 b) further argued that provincial land use planning serves two purposes: one being a legal framework within which the private land market operates; and the other one being to be a flexible framework to accommodate changing political environment. He (2009) further explained his second point that the province then has to decide to what degree and to what details the province will intervene at the local level. To be flexible, provisions are thus usually general, and the *Greenbelt Act* (2005) has provided no detailed directions on how to achieve the stated objectives reflect this feature.

Pond (2009b) also pointed out the reason why the Greenbelt lacks cost-benefit analysis is that the private land owners will not be compensated under the regulation. This arrangement will incur minimal costs to the government comparing to land acquisition by the government, which results in low incentives of a cost-benefit analysis.
In conclusion, Pond (2009b) regarded the Greenbelt policy as a strategic tool of provincial intervention in local land use planning, rather than a policy instrument to preserve valuable agricultural land. He argued that this policy has given the provincial government the flexibility in terms of how much and what to control in municipality land use, because the coordination process is all in the hand of the provincial government.

2.6 Literature on Evaluation of Economic Outcomes from the Greenbelt Area

Deaton and Vyn (2010) found that farmland which are inside the Greenbelt and are closer to the Greater Toronto Area experiences value decline. And they argued that property values are impacted by zonings.

The Econometric Research Limited (2012) evaluated the Greenbelt Plan (2005) by evaluating the benefits generated to Ontario’s economy by the Greenbelt Area. The author applied a hybrid integrated model consisting the input-output analysis, location theory and relevant macroeconomic model, together with an impact model to calculate the economic impacts at different levels. The author (2012) concluded that the annual direct economic impact of Greenbelt associated activities exceeds $3 billion at the provincial level. And the sum of direct, indirect and induced economic impacts exceeds $9.1 billion at the provincial level. And the Greenbelt provides full time employment for 161,495 people in Ontario.

Similarly, Cummings and MacRae (2015) estimated the benefit generated from Southern Ontario’s Food System from an economic and an environment perspective. They found that the sales generated from Ontario’s food system amounts to $63 billion, and the number of employment generated from this system is more than 767,000 people. The agricultural sector, as the core of the food system, generates farm products amount to $11.5 billion. However, this study focused on Southern Ontario, rather than the Greenbelt alone, though it does provide an example of evaluating impacts under certain policy regimes.

Many other studies also evaluate the Greenbelt Plan (2005) based on its ecological outcome. Wilson (2008) argued that the carbon stored in the soil within the Greenbelt area is valued at $157 million annually if calculated based on the average cost of carbon emission. Wilson (2008) argued that the annual ecological service provided by the Greenbelt’s farmland, which includes cropland, idle land, hedgerows and orchards, amounts to $329 million.
2.7 Summary

In this chapter, I reviewed relevant literature regarding possible criteria or method of policy evaluation. Each study has provided evaluation covering certain aspects of the policy. Frankena and Scheffman's (1980) study for provide a basis for empirical evidence comparison for the next chapter. Pond (2009a, 2009b) provides some theories with regard to the political motivation and impact of the Greenbelt Plan. He put forward the concern of inequity, which will be discussed in a later chapter. The existing empirical studies attempting to evaluate the economic impact of the Greenbelt Plan generally cover only partial aspects of this issue. And there are many discrepancies among them. These discrepancies motivated me to draw on different datasets on Chapter 3 to examine different aspects of Ontario’s rural land use issue. In Chapter 4, I will also draw on the economic calculation debate, the market failure categories, and non-market failure categories to develop and apply an economic framework to analyze the more recent land use policies.

3.1 Introduction

This chapter addresses the question of how much agricultural land exists in Ontario and how this has changed over the time period from 1951 to 2014. The 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. One of the aims is to 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.

Much has changed in land use and land use policy in Ontario in the 35 years since Frankena and Scheffman (1980) published their study. It is timely to revisit the questions that motivated their research and to examine the empirical evidence on agricultural land availability in Ontario for the time period subsequent to their report. Frankena and Scheffman (1980) relied primarily on Census of Agriculture data in their research. I also use Census of Agriculture data, but I also incorporate four other data sources to complement Census data. By comparing data from five different data sources, a consistent pattern suggests that, over this time period, the amount of farmland in Ontario decreased while the amount of cropland increased. More specifically, based on data from Census of Agriculture (1951-2011), over the course of 1951 to 2011, farmland area has decreased by 39.33%, while cropland area has increased by 3.29%. Frankena and Scheffman (1980) focused on farmland area data from the Census of Agriculture, and they concluded that farmland area decreased by 29.4% from 1951 to 1976. The comparison implies a much slower decreasing rate of farmland area in the post-1980 period. And cropland area, which, in my view is a more meaningful measure related to food production, actually has increased.

Frankena and Scheffman (1980) relied primarily on data from the Census of Agriculture to document trends in the availability of agricultural land in Ontario between 1951 and 1976, the latter being the most recent year for which Census data were available in 1980. In addition to Census data (the Statistics Canada Census of Agriculture (1951-2011)), I consider data from Agricultural Statistics for Ontario (1951-1996), and, more recently Statistics (2003-2012) from

The additional data sources that I consider used different methods of data collection, cover different time periods and are collected at different frequencies and, to some extent, have different spatial coverage. But, collectively, they offer a more complex but richer perspective on the central question of this section of our report, namely “How much agricultural land exists in Ontario and how has that 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.

I will also discuss three studies that are relevant to our central question, *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 used data after 1980 to study Ontario’s rural land use in relation to soil classes. These studies are important empirical research efforts to estimate the rate at which agricultural land, especially prime agricultural land, has been and is being converted to non-agricultural uses in rural Ontario.

### 3.2 Boundaries of the Study Area

Some of these data sets report estimates for the whole province of Ontario. Others only 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 Yield and Production data collected by Statistics Canada 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, neither the fruits and vegetables category from the *Agricultural Statistics for Ontario* (1951-2013) or the *Production and Yield data* (2014) from Statistics Canada are reported at the county level.
For data sets which offer only partial coverage of the province, I focus on southern Ontario, western Ontario, central Ontario and Eastern Ontario, where most of the agricultural land and agricultural production is located. The Agricultural Resource Inventory (1982), only covers the 36 counties of the province which have the most significant share of agricultural production. In some comparisons I select data from provincial data sets for only these 36 counties.

The names and boundaries of counties and regional municipalities have, in many cases changed during the period from 1951 to 2014. My concern is with the total amount of agricultural land in the province, so 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.

The definition of regions in the province is based on Census Agricultural Region, which includes the Southern Region, the Western Region, the Central Region and the Eastern Region. These regions were defined by Statistics Canada in 1981 and are still being used today. The counties included in Western and Central Ontario were modified for the purpose of consistency due to boundary changes during 1970s within these two regions.

Southern Ontario includes Hamilton, Niagara, Haldimand-Norfolk, Brant, Oxford, Elgin, Chatham-Kent, Essex, Lambton, and Middlesex. Eastern Ontario includes Stormont, Dundas and Glengarry, Prescott and Russell, Ottawa, Leeds and Grenville, Lanark, Frontenac, and Lennox and Addington counties. Central Ontario includes York, Toronto, Prince Edward, Simcoe, Hastings, Northumberland, Peterborough, Kawartha Lakes and Durham counties. In the 2011 Census of Agriculture, Simcoe was included in the Western region as indicated in Census Agricultural Region. However, boundaries of Simcoe, Hastings, Northumberland, Peterborough, Kawartha Lakes and Durham changed dramatically in the 1970s. Ontario County was dissolved and Victoria County, with boundary changes, became Kawartha Lakes. To maintain data consistency, the approach in this study is to design a synthetic county: Central United Counties, which is to include the area of Simcoe, Hastings, Northumberland, Peterborough, Kawartha Lakes, and Durham as they were in 2011. Western Ontario includes Peel, Dufferin, Wellington, Halton, Waterloo, Perth, Huron, Bruce, and Grey.

From 1951 to 2013, boundaries of many counties have been realigned, and some counties
have their names and boundaries changed. The process of finding official documentation of some of these changes is extremely difficult. I used comparisons of maps to document municipal boundary changes over time, to the best extent possible. By laying the map of *1951 Census of Canada: Census Divisions* (Canadian Century Research Infrastructure, 2013) onto the map of *Cartographic Boundary Files 2011 Census* (Statistics Canada, 2011) on ArcGIS software, I was able to identify significant boundary changes—where boundary lines do not match. County boundary changes were documented in this study based on observations from the two maps. Sometimes, the boundary change of a county matters in this study, because the change of boundary involves the location of agricultural land across regions. Although at the regional level, the impacts are small.

### 3.3 The 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 (PPS, 2005).

The definition of agricultural land varies across the five data sets I examine and also in the three studies that I review. There is no aggregate measure or category called Agricultural Land. Estimates of two related categories, “farmland” and “cropland” area are available. 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 crops and hay, vegetables, sod, nursery products, fruits, berries and nuts. Farmland included cropland and adds pasture, summer fallow, woodlands, wetlands, and other land (i.e farm buildings, barnyards, etc.). 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.
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 not specified. To make datasets comparable, I 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, then field crop land or cropland area are the more relevant measures. If the viability of the agricultural economy is the primary focus, then cropland would be more relevant. If the concern is agricultural and horticultural production, for instance, in the Niagara Fruit Belt area, then the area of cropland is the best approach. If the concern is the total rural land area providing green space 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. I will discuss these limitations shortly.

### 3.4 Agricultural Census Data from Statistics Canada (1951-2011)

For the *Census of Agriculture* data, during census years, Statistics of Canada designs questionnaires, and sends them to eligible farmers. Eligible farmers refer to the farmers whose farmland meets the qualification as defined in the *Census of Agriculture*. However, the definition of a Census farm has changed several times since 1951. A summary of these changing definitions is provided in Appendix 1. Census data on agricultural land area in Ontario from 1951 to 2011 were downloaded from Ontario Data Documentation, Extraction Service and Infrastructure (ODEIS). For years 1951 and 1956, where digital data were not available, data were transcribed from the *Census of Agriculture* directly. Due to the printing quality limitation in 1951, some data for farm area are not clear. Questionnaires were also downloaded from ODEIS, and questionnaires before 1976 were obtained from the University of Guelph.

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

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2 The Census of Agriculture data are collected every five years.
Census Division level data. Only regional and provincial level data are presented in the Tables.

Table 3.1 and Table 3.2 report estimates of farmland area and cropland area for the whole province and for regions respectively from 1951 to 2011. Table 3.1 shows that farmland area has been decreasing since 1951, both at 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 last year Frankena and Scheffman (1980) included in their study. So farmland area has decreased by 2,188,152 hectares in 30 years. In 2011, farmland area was 5,126,653 hectares. In this case, farmland area has decreased by 1,135,052 hectares in 35 years, from 1976 to 2011. This is a slower decreasing rate than the rate from 1951 to 1961.

Table 3.2 reports that, at the provincial level, cropland area increased from 3,498,629 hectares in 1951 to 3,506,943 hectares in 1976, and it further increased to 3,613,821 hectares in 2011. However, trends vary in different regions. 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 area. Southern Ontario experienced the most significant increase, from 1,024,108 hectares to 1,337,269 hectares from 1951 to 2011.

Table 3.3 reports percentage changes of the total farmland area, with Ontario showing a 39% decrease in farmland at the provincial level from 1951 to 2011. Frankena and Scheffman (1980) reported a 29% decrease in farmland at the provincial level from 1951 to 1976. Hence, the rate of decrease in farmland area was much lower from 1976 to 2011 than from 1951 to 1976.

The cropland area tables, however, show a different pattern. Table 3.4 reports the percentage changes in cropland area. The Table indicates a 3.29% increase in cropland from 1951 to 2011, with an annual increase of 0.05% per year in cropland area. The Eastern and Central regions, where there is less Dependable Agricultural Land, experienced a slight decrease in cropland area.

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 firms in farming. 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 of the change can be attributed to the
rising opportunity cost of labour. I 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 I explain in Appendix 1, 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 database, 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 questionnaire of the larger farm. I suspect that the non-cropland area of these smaller farms has largely remained intact. But it is not being measured. Figure 3.1 shows the change of number of census farms by size, in terms of land area. The farms are categorized into three groups based on size. The green line represents the number of large farms, and it shows a slightly increasing trend. The red line represents the number of medium sized farms, which shows a decreasing trend. The number of medium sized farms went from 36130 farms in 1966 to 18233 farms in 2011, which is a decrease by 49%. The blue line represents the number of small farms, which decreased even sharply from 73506 farms in 1966 to 32170 farms in 2011, which is a decrease by 56%.
Table 3.1: Estimates of Provincial and Regional Farmland\(^1\) Area from the *Census of Agriculture* (1951-2011) (Hectares)

<table>
<thead>
<tr>
<th>Region(^2)</th>
<th>Census Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1951(^3)</td>
</tr>
<tr>
<td>Ontario</td>
<td>8,449,857</td>
</tr>
<tr>
<td>Southern Region</td>
<td>1,848,743</td>
</tr>
<tr>
<td>Eastern Region</td>
<td>1,842,812</td>
</tr>
<tr>
<td>Central Region</td>
<td>1,566,070</td>
</tr>
<tr>
<td>Western Region</td>
<td>2,216,117</td>
</tr>
<tr>
<td>Northern Region</td>
<td>976,115</td>
</tr>
<tr>
<td>---------------</td>
<td>------</td>
</tr>
<tr>
<td>Ontario</td>
<td>6,039,236</td>
</tr>
<tr>
<td>Southern Region</td>
<td>1,651,064</td>
</tr>
<tr>
<td>Eastern Region</td>
<td>1,153,950</td>
</tr>
<tr>
<td>Central Region</td>
<td>963,044</td>
</tr>
<tr>
<td>Western Region</td>
<td>1,778,684</td>
</tr>
<tr>
<td>Northern Region</td>
<td>492,495</td>
</tr>
</tbody>
</table>

Source: Statistics Canada (1951 to 2011).
Notes:
1. 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 Appendix 1 for a discussion of the changing definitions of Census farms.
2. Estimated farmland area for Ontario includes all regions.
3. In 1951, farmland area was defined as the sum of: area under crops for harvest in 1951, area of improved land for pasture or grazing, area of summer fallow, area in barnyards, lanes, roads and any improved land that will be idle in 1951, area of woodland, the area of all other land such as unimproved hay land, rough pasture, slough marsh, waste land, etc. (Census of Agriculture Questionnaire, 1951)

4. In 1956, 1961 and 1966 farmland area was defined as the sum of: area of cropland sown or to be sown for harvest in 1956, area of improved land for pasture or grazing (exclude areas to be cut this year for hay, silage or seed), area of summer fallow, area of other improved land (barnyards, lanes, home gardens, improved idle land, etc.), area of woodland, area of other unimproved land (unimproved hay land, native pasture, sloughs, marshes, etc.), area of unimproved Pasture, and area of unimproved land used for pasture. (Census of Agriculture Questionnaire, 1956)

5. In 1971, farmland area was defined as in 1956, but more explanations were added. For "improved land for pasture or grazing", an explanation of "improved by seeding, draining, irrigating, fertilizing, or brush or weed control" was added. For "other improved land", "greenhouses, mushroom houses" were added as examples. For "other unimproved land", "range land" was added as an example. (Census of Agriculture, 1971)

6. In 1976, farmland area was defined as in 1971, but "greenhouses" and "mushroom houses" were listed separately. (Census of Agriculture, Questionnaire, 1976)

7. In 1981, farmland area was defined as in 1971, so "greenhouses" and "mushroom houses" were not listed separately, but only as examples in "other unimproved land". And "summer fallow" was defined as "Land from which no crop will be harvested in 1981, but which instead will be cultivated, worked or sprayed to control weeds or conserve moisture. Do not include idle land which has not been worked or sprayed for more than one year". For "other improved land", "farm buildings" was added as an example. (Census of Agriculture Questionnaire, 1981)

8. In 1986, farmland area was defined as in 1981, but "other unimproved land" was modified as "unimproved land for pasture, grazing or hay (include native pasture, native hay, rangeland, grazable bush, etc.)", and a new category "all other unimproved land (include bogs, marshes, wasteland and all other non-productive areas)" was added. (Census of Agriculture Questionnaire, 1986).

9. In 1991, farmland area was defined as in 1981 with the exception that the explanation of "summer fallow" was changed to "report idle land that has not been worked or sprayed for more than one year in All Other Land". The category "other improved land" and "all other unimproved land" were replaced by the new category "All other land (include farm buildings, barnyards, lanes, home gardens, greenhouses and mushroom houses are located; improved idle land, woodlots, Christmas tree lots, sugarbush; tree windbreaks; marshes; bogs; sloughs; etc."). (Census of Agriculture Questionnaire, 1991)

10. In 1996, farmland area was defined as in 1991, with the exception of two name changes: "improved land for pasture or grazing"
was replaced by "tame or seeded pasture (land that has been cultivated and seeded, or drained, irrigated, fertilized or controlled for weeds or bush. Do not include areas to be harvested for hay, silage or seed"; and "unimproved land for pasture, grazing or hay" was replaced by "natural land for pasture", without changing the explanations. (Census of Agriculture Questionnaire, 1996)

11. In 2001, farmland area was defined as in 1996, however, some explanations were deleted or modified. The explanation of "natural land for pasture or grazing" was modified as "natural land for pasture", and the explanation was deleted. The explanation of "tame or seeded pasture" was modified as "Do not include areas to be harvested for hay, silage or seed". The explanation of "all other land" was simplified as "farm buildings, woodlots, etc". (Census of Agriculture Questionnaire, 2001)

12. In 2006, "woodland and wetland" was listed as a separate category, and the explanation “Examples: woodlots, sugarbush, tree windbreaks, bush, ponds, bogs, marshes, sloughs, etc." was added. For "summer fallow", it includes "chemfallow". The explanation for "all other land" was modified to become "Examples: idle land, land on which farm buildings, barnyards, lanes, home gardens, greenhouses and mushroom houses are located." (Census of Agriculture Questionnaire, 2006).

15. In 2011, farmland area was defined as in 2006, with one explanation added. For “natural land for pasture”, the explanation "Include woodland used as pasture" was added. (Census of Agricultural Questionnaire, 2011)
Table 3.2: Estimates of Provincial and Regional Cropland \textsuperscript{1} Area from \textit{Census of Agriculture} (1951-2011) (Hectares)

<table>
<thead>
<tr>
<th>Region\textsuperscript{2}</th>
<th>Census Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1951\textsuperscript{3}</td>
</tr>
<tr>
<td>Ontario</td>
<td>3,498,629</td>
</tr>
<tr>
<td>Southern Region</td>
<td>1,024,180</td>
</tr>
<tr>
<td>Eastern Region</td>
<td>644,359</td>
</tr>
<tr>
<td>Central Region</td>
<td>543,758</td>
</tr>
<tr>
<td>Western Region</td>
<td>1,060,258</td>
</tr>
<tr>
<td>Northern Region</td>
<td>226,074</td>
</tr>
</tbody>
</table>

\textsuperscript{1} Area includes land in the cropland category, which is used for planting crops.

\textsuperscript{2} Provinces and regions are defined in the context of the census data provided.

\textsuperscript{3} Census Year 1951 data.
<table>
<thead>
<tr>
<th>Region²</th>
<th>Census Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1981⁹</td>
</tr>
<tr>
<td>Southern Region</td>
<td>1,329,747</td>
</tr>
<tr>
<td>Eastern Region</td>
<td>517,873</td>
</tr>
<tr>
<td>Central Region</td>
<td>457,079</td>
</tr>
<tr>
<td>Western Region</td>
<td>1,165,156</td>
</tr>
<tr>
<td>Northern Region</td>
<td>162,871</td>
</tr>
</tbody>
</table>


Notes:
1. Cropland is defined to include area under field crops and hay, vegetables, sod, nursery products, fruits, berries and nuts. Farmland consists of cropland plus the additional categories identified in Table 3. 1.
2. Data cover Southern Region, Western Region, Eastern Region, Central Region, and Northern Region.
3. In 1951, Cropland was defined as "crop for harvest this year," the area of "fruit trees" is counted only if the plot reported had more than 25 fruit trees. (Census Questionnaire, 1951).
4. In 1956, cropland was defined as "area sown or to be sown for harvest in 1956" (Census Questionnaire, 1956).
5. In 1961, cropland was defined as in 1956, with specific categories listed: "grains, hay and fodder crops, oilseed crops, potatoes, roots, tobacco, other crops, cultivated small fruits, tree fruits, greenhouse and nursery products, and vegetables grown for sale, less double cropping" (Census Questionnaire, 1961).
6. In 1966, Cropland was defined as in as in 1961 (Census Questionnaire, 1966).
7. In 1971, Cropland was defined as in 1961, however, category "safflower" was not listed explicitly or as an example in "other crops" (Census Questionnaire, 1971).
8. In 1976, cropland was defined as in 1971, but types of vegetables and fruits are not listed explicitly. (Census Questionnaire, 1976).
9. In 1981, cropland was defined as in 1971 with the exception that the area of greenhouse and mushroom house are excluded (Census Questionnaire, 1981).
10. In 1986, cropland was defined as in 1981, however, it added "sod grown for sale" into the "sod and nursery products" category, which used to include only "nursery products". In the "grain" category, it had "hard red spring wheat" and "soft white spring wheat" instead of "spring wheat". It also adds "other semi-dwarf spring wheats". It also added "white beans", "other dry beans", "fababean", "lentils", "millet for grain", "triticale", "canary seed ", "caraway seed" and "forage seed" into the "other crops" category. It added "blueberry" and "cranberry" into the "cultivated berries and grapes (for sale)" category. For "tree fruits", it did not specify the minimal number of trees on the lot in order to be included. It added more specifications: "pepper", "rutabagas", "squash", "zucchini", "pumpkins", "green onions", "radishes", "rahrb", "parsnips", and "cantaloupes and melons" into the "vegetable" category. The "berries and grapes" recorded both "area to be harvested" and "area under cultivation" (Census Questionnaire, 1986).
11. In 1991, cropland was defined as in 1986. "Hard red spring wheat" or "soft white spring wheat" was renamed "spring wheat". Category "utility wheat" is deleted. Categories of "Chinese Cabbage", "brussels sprouts", and changed "rutabagas" to "rutabagas (turnips)" were added. (Census Questionnaires, 1991).
12. In 1996, cropland was defined as in 1991. In the category of "field crops", "dry coloured beans" replaced "other dry beans". It deleted "millet for grain". (Census Questionnaire, 1996).
13. In 2001, cropland was defined as in 1996, but more specific: "include all hay and field crops to be harvested or used as green manure in 2001, even if they were sown or planted in an earlier year." Chick pea" replaced "fababean". "Other dry beans" replaced "other coloured beans". "Ginseng" was added to "hay and field crops". "Saskatoons" was added to the "fruits, berries and nuts" category. It recorded both "producing area" and "non-producing area" in the "fruits, berries, and nuts" category. The total area of "fruits, berries and nuts" refer to the total area both producing and non-producing. (Census Questionnaire, 2001).
14. In 2006, cropland was defined as in 2001. Even though in the questionnaire, surveyees were asked to fill out the total cropland as defined before plus Christmas tree area, the notes on data sets indicate that Christmas tree area was not included. "spring wheat" is specified to include utility and prairie spring wheats. " Cranberry beans" have been added as an example under "other dry beans". "Chemfallow" is included under "summerfallow", "Woodlands and wetlands" have been added as a separate category. "All other land" has been expanded to include barnyards, lanes, home gardens, greenhouses and mushroom houses.(Census Questionnaire, 2006)
15. In 2011, cropland was defined as in 2001. "spring wheat" no longer lists the other wheat types to include, but reminds respondents to report "Durum wheat" in the space below. "Flaxseed" does not stipulate that "solin" should be reported in the "other field crops" category. "Tobacco" is no longer a stand-alone field crop, but is an example of a crop to include in the "other field crops" category. There are now four fields in which to report" other field crops." New examples of other field crops to report are tobacco, hemp and spelt. Solin and safflower were removed. (Census Questionnaire, 2011)
Table 3.3: Provincial and Regional Percentage Change of Farmland Area\(^1\) from *Census of Agriculture* (1951-2011)

<table>
<thead>
<tr>
<th>Region(^2)</th>
<th>Census Year</th>
<th>Total % Change</th>
<th>Annual % Change(^3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ontario</td>
<td>-4.79</td>
<td>-6.55</td>
<td>-4.05</td>
</tr>
<tr>
<td>Southern Region</td>
<td>-1.57</td>
<td>-2.42</td>
<td>-1.68</td>
</tr>
<tr>
<td>Eastern Region</td>
<td>-5.79</td>
<td>-6.78</td>
<td>-4.59</td>
</tr>
<tr>
<td>Central Region</td>
<td>-7.83</td>
<td>-6.80</td>
<td>-6.83</td>
</tr>
<tr>
<td>Western Region</td>
<td>-2.23</td>
<td>-3.88</td>
<td>-3.35</td>
</tr>
<tr>
<td>Northern Region</td>
<td>-9.97</td>
<td>-20.78</td>
<td>-5.56</td>
</tr>
</tbody>
</table>

Source: Government of Canada, (Statistics Canada, *Census of Agriculture*, various years)

Notes:
1. Farmland area is defined in the notes to Table 3.1. The changing definitions of Census farms are discussed in Appendix 1.
2. Calculations at the provincial level include all regions.
3. Annual percentage change is calculated by dividing the total change from 1951 to 2011 by 60 years.
Table 3.4: Provincial and Regional Percentage Change of Cropland\(^1\) Area from *Census of Agriculture* (1951-2011) (percent)

<table>
<thead>
<tr>
<th>Region(^2)</th>
<th>Census Year</th>
<th>Total % Change</th>
<th>Annual % Change(^3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ontario</td>
<td>-4.93</td>
<td>-2.82</td>
<td>4.64</td>
</tr>
<tr>
<td>Southern Region</td>
<td>2.75</td>
<td>0.46</td>
<td>7.72</td>
</tr>
<tr>
<td>Eastern Region</td>
<td>-10.45</td>
<td>-4.01</td>
<td>2.86</td>
</tr>
<tr>
<td>Central Region</td>
<td>-10.72</td>
<td>-5.26</td>
<td>1.79</td>
</tr>
<tr>
<td>Western Region</td>
<td>-6.02</td>
<td>-1.73</td>
<td>5.09</td>
</tr>
<tr>
<td>Northern Region</td>
<td>-4.88</td>
<td>-15.29</td>
<td>-2.98</td>
</tr>
</tbody>
</table>

Source: Government of Canada, (Statistics Canada, *Census of Agriculture*, various years)

Notes:
1. Cropland includes area under field crops and hay, vegetables, sod, nursery products, fruits, berries and nuts. Refer to notes under Table 2 for details of the crop categories included. Please refer to Appendix 1 for a discussion of the changing definitions of a Census farm.
2. Calculations for Ontario include all five regions.
3. Annual percentage change is calculated by dividing the total change from 1951 to 2011 by 60 years.
Figure 3.1 Number of Census Farms\(^1\) by Size\(^2\) in Ontario from *Census of Agriculture* (1996-2011)

Source: Government of Canada, (Statistics Canada, *Census of Agriculture*, various years).

Notes:
1. See Appendix 1 for discussion of changes in definition of Census Farms. The lines represent our calculations using data on number of Census Farms of different sizes published at the provincial level, reported in the *Census of Agriculture*, from 1996 to 2011.
2. Small farms are defined as up to 179 acres (72.4 hectares). Medium sized farms are defined as from 180 to 1119 acres (72.8 hectares to 452.8 hectares). Large farms are defined as 1120 acres (453.2 hectares) or more.
3.5 Agricultural Statistics for Ontario and Statistics from OMAFRA

*Agricultural Statistics for Ontario* (Government of Ontario, various years) reports annual estimates of farm area, production and other related data. These data are obtained from multiple sources. According to OMAFRA (2013), data for field crops are collected based on a probability survey and other administrative sources. For fruits and vegetables, data are collected from various marketing boards, growers’ organizations, Seasonal Fruit and Vegetable Annual Summary Reports and Fruit and Vegetable Production.

The *Agricultural Statistics for Ontario* data were collected and published every year by the Ministry from 1951 to 1995. However, paper publication stopped after 1995. More recent data published on the OMAFRA website under *Statistics* and county data are available since 2003. I was able to obtain data for the intervening years from statisticians at OMAFRA. 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. In this study, county level data — the Field Crops data, Fruits and Vegetables data, and Nursery Data from 1951 to 1995 were transcribed from paper publications. And data were transcribed from *Statistics* online from 2003 to 2013. In some years, data were missing for certain crops at the county level. However, OMAFRA reports provincial level Historical Provincial Estimates of field crops under *Statistics* from 1981 to 2013.

The three datasets do not report total farmland area or total cropland area, but only area for individual agricultural products. I added these individual product areas to construct estimates of cropland area. Not all data are available at the regional or county level. Fruits and Vegetables data are only available at the provincial level. Nursery and sod data are only available for few years. Field Crops area is a major component of cropland area and is regularly reported in detail. Provincial Field Crop area data are available from 1981 to 2014. Field crops include grain corn, soybeans, winter wheat, spring wheat, buckwheat, oats, barley, rye, flaxseed, mixed grain, dry white beans, coloured beans, fodder corn, hay and canola.

Figure 3.2 presents regional field crop harvested area. Figure 3.3 presents provincial field crop harvested area. Figure 4 presents provincial cropland harvested area. Notice that Figure 3.3 and Figure 3.4 contain two series of dataset, the *Agricultural Statistics for Ontario data* were collected at the county level, and we summed up these data to obtain a trend at the provincial
level; and the Historical Statistics data were summed up before publishing. These two series have inconsistencies.

In Figure 3.2, at the regional level, Southern Ontario and Western Ontario have followed a steadily increasing trend in Field Crops Area, while Eastern Ontario and Central Ontario remained relatively constant in field crop harvested area. Both Southern Ontario and Western Ontario started with 900,000 hectares of field crop harvested area in 1951, with Southern Ontario reached above 1,200,000 hectares and Western Ontario reached 1,000,000 hectares in 2013.

In Figure 3.3, the Agricultural Statistics for Ontario and Statistics field crops data show a consistent gradual increasing trend in field crop area from 1951 to 2013. This dataset were collected at the county level and data for some crops are missing during certain years, which means that this dataset can underestimate the real field crop harvested area. The lowest point is 3 million hectares in 1992, when the area of Fodder Corn and Soybeans suffered from a sudden drop. In 1993, the increasing trend resumed. The area of Field Crops reached 3.5 million hectares by the year 2014. There has been considerable variation in areas planted to individual crops over time. Canola was widely grown before 1983. Even in 1983, the Canola area was only 6900 hectares. After 1983, Canola area increased around 20000 to 30000 hectares, with a pronounced decrease in 2006. Buckwheat decreased from 5200 hectares in 1981 to 2000 in 2003, and there have been no records since 2003. Flaxseed area decreased from 4500 hectares in 1981 to 900 hectares in 1991, and there have been no data records since 1991.

The historical field crop data were collected at the provincial level from 1981, which contain field crop data available at the provincial level but not at the county level. This dataset differs a little from the Agricultural Statistics for Ontario and Statistics field crops data, and presents a more obvious increasing trend in field crop harvested area after 1990. In this dataset, field crop area was 3243.6 thousand hectares in 1981, and was 3611.1 in 2013, which implies an increase of 11%.

In Figure 3.4, the provincial cropland area trends are similar for both datasets, and are also very similar to the trends presented in Figure 3.3, because fruits and vegetables do not add too much land to the field crop area. From the Agricultural Statistics for Ontario data, cropland area was 3,400,138 hectares in 1951, and it increased to 3,452,417 hectares in 1981. It further increased to 3,488,482 hectares in 2013. From the historical statistics, the cropland area was
3,340,151 hectares in 1981, and it increased to 3,685,975 hectares in 2013.

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. And fodder corn and hay production are correlated with livestock production.
Figure 3.2 Estimates of Regional\(^1\) Field Crop\(^2\) Harvested Area based on *Agricultural Statistics for Ontario* (1951-1995) and *Statistics*\(^3\) (1996-2013), (thousand hectares)


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\(^1\) Regional refers to the geographical regions of Ontario, Canada.

\(^2\) Field crop refers to crops cultivated for harvest, such as wheat, corn, and soybeans.

\(^3\) Statistics refers to official government publications that compile data on various aspects of agriculture, population, economy, etc. in Ontario.
Notes:
1. Refer to text for boundary definitions for regions.
2. 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. The lines represent our calculations using data on field crop harvested area published at the county level, reported in Agricultural Statistics for Ontario data and Statistics.
3. 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 create the problem of underestimating field crop harvested area.
Figure 3.3 Estimates\textsuperscript{1} of Provincial\textsuperscript{2} Field Crop Harvested Area\textsuperscript{3} from *Agricultural Statistics for Ontario* (1951-1996), *Statistics* (1997-2013). (thousand hectares)

Notes:
1. The blue dotted line represents our calculations using data on field crop harvested area published at the county level, reported in *Agricultural Statistics for Ontario* data and *Statistics*, from 1951 to 2013. The red triangle line represents data on field crop harvested area published at the provincial level, reported in the table “Historical Provincial Estimates” from 1981 to 2013.
2. Data cover the southern, western, eastern, central and northern region and some data at the provincial level were not reported at the county level.
3. Field Crops include grain corn, soybeans, winter wheat, spring wheat, buckwheat, oats, barley, rye, flaxseed, mixed grain, dry white beans, coloured beans, fodder corn, hay, and canola, which are categories listed in *Statistics, Field Crops*. 
Figure 3.4 Estimates\(^1\) of Provincial\(^2\) Cropland Harvested Area\(^3\) based on *Agricultural Statistics for Ontario* (1951-1996), and *Statistics*\(^3\) (1996-2013) (thousand hectares).

Notes:

1. The blue dotted line represents our calculations using data on field crop harvested area published at the county level, reported in *Agricultural Statistics for Ontario* data and *Statistics*, from 1951 to 2013. The red triangle line represents data on field crop harvested area published at the provincial level, reported in the table “Historical Provincial Estimates” from 1981 to 2013.

2. Data cover Southern Region, Western Region, Eastern Region, Central Region, and Northern Region, and some data at provincial level were not collected at the county level.

3. Cropland area includes harvested field crop area, vegetables and fruits area.
3.6 Agricultural Resource Inventory (1981-1982)

Agricultural Resource Inventory (ARI) data were collected by the Ontario Ministry of Agriculture, Food, and Rural Affairs in 1982 and 1983. Data were collected by mapping crews with approximately 200 people doing in-field observations. A revision of this data set took place in 2010, which merged county level data into a provincial ARI data set in Geospatial format. The original data, however, were not changed. This data set will not be updated (OMAFRA, 2010) The data set maps all types of land use in 36 Ontario counties.

I obtained these data from Scholar Geoportal. The original ARI data set is processed using ArcGIS. The projected coordinate system used is NAD_1983_Ontario_MNR_Lambert. And the geographic coordinate system used is GCS_North_American_1983. This dataset classifies land use data into four major categories: Field Crop System, Fruit and Grapes System, Specialty Agriculture and Non-System Land Uses. There are seven subcategories defined under Field Crop System: Continuous Row Crop, Corn System, Mixed System, Grain System, Hay System, Pasture System, and Grazing System. There are eight subcategories defined under that Fruit and Grapes System: Peaches, Cherries, Peaches-Cherries, Orchard, Vineyard, Orchard-Vineyard, Vineyard-Orchard and Berries. Category Peaches refers to the area which is dominated by peach production, meaning more than 50% are peaches, and less than 20% are cherries, the rest percentage includes mixed other fruits and grapes. Similar definition applied to Cherries. And when neither is dominant, the area falls into the category of Peaches-Cherries. Orchard is defined to be area where more than 90% is Orchard. And similar definition applied to Vineyard. Orchard-Vineyard is defined to be area where hardy fruit occupied more than 40% but less than 90%, peaches or cherries are less than 50%, and the remaining are grapes. Similar definition applies to Vineyard-Orchard. There are four subcategories under Specialty Agriculture: Extensive Field Vegetables, Market Garden/Truck Farms, Tobacco System and Nursery. There are twelve subcategories under Non-System Uses: Idle Agricultural Land (five to ten years), Idle Agricultural Land (more than ten years), Woodland, Pastured Woodland, Reforestation, Built-up Area, Swamp, Marsh or Bog, Extraction Type 1, Extraction Type 2, Sod Farm, Recreation and Water.

For convenient data comparison, land use data were tailored according to the census boundaries at the Census Division level. The boundary file was laid out on top of the ARI map.
This is similar to laying a transparent map with boundaries drawn on another map, so you can see the political boundaries on the ARI map. The map used to define boundaries is named \textit{Census Division - Cartographic Boundary Files, for Census 2011}. This map comes with a table reporting area for each map unit. However, because I needed a customized county level dataset, area of each category must be calculated individually at the county level. For each county, the total area of a certain type of land use is calculated and presented.

There is no definition of farmland or cropland in this data set. Hence, I added land use types into the categories of farmland or cropland to correspond to the approach in the Census. For example, I calculated cropland area as the area sum of: continuous row crop, corn system, mixed system, grain system, hay system, peaches, cherries, peaches-cherrries, 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 \textit{Agricultural Resource Inventory} (1982-1983). Farmland is calculated as the sum of cropland, pasture, grazing, idle agricultural land, woodland, pastured woodland, swamp or marsh, and reforestation. Table 3.5 reports the results at the regional level.

Based on the \textit{Agricultural Resource Inventory}, 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 possesses the largest amount of cropland of 1,586,482 hectares, yet, its farmland area is 1,605,779 hectares, which is smaller than 2,029,173 hectares in Western Ontario. Western Ontario had the second largest area of cropland, which is 1,309,789 hectares. Central Ontario and Eastern Ontario had only 814,770 hectares and 611,153 hectares of cropland, respectively. And Ontario, excluding the Northern Region, had 4,322,194 hectares of cropland and 6,935,400 hectares of farmland.
Table 3.5 Estimates of Ontario Cropland Area\(^1\) and Farmland Area\(^2\) Based on the *Agricultural Resource Inventory*\(^3\) (1981-1982) (hectares)

<table>
<thead>
<tr>
<th>Regions</th>
<th>Cropland</th>
<th>Farmland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southern Ontario</td>
<td>1,586,482</td>
<td>1,605,779</td>
</tr>
<tr>
<td>Western Ontario</td>
<td>1,309,789</td>
<td>2,029,173</td>
</tr>
<tr>
<td>Central Ontario</td>
<td>814,770</td>
<td>1,691,719</td>
</tr>
<tr>
<td>Eastern Ontario</td>
<td>611,153</td>
<td>1,608,729</td>
</tr>
<tr>
<td>Ontario Total(^4)</td>
<td>4,322,194</td>
<td>6,935,400</td>
</tr>
</tbody>
</table>


Notes:
1. Cropland in *Agricultural Resource Inventory* (1981-1982) is 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, which are categories listed in the *Agricultural Resource Inventory* (1982-1983). Cropland is calculated in a manner consistent with definition of cropland in the *Census of Agriculture*.
2. Farmland includes cropland, pasture, grazing, idle agricultural land, woodland, pastured woodland, swamp/marsh, and reforestation.
3. Data were collected by study teams using field surveys from 1981 to 1982.
4. Ontario Total excludes northern Ontario.
3.7 Crop Inventory from Agricultural and Agri-Food Canada (2011-2013)

This *Annual Crop Inventory* dataset (2011-2013) was compiled using remote sensing technology, though the equipment used were changed during the period. This data set is available from AAFC *Annual Crop Inventory* for year 2011, 2012 and 2013 for Ontario. This dataset exists in the form of projected geospatial data, with a map projections developed by AAFC. To check the accuracy of this dataset, AAFC cooperates with provincial crop insurance agencies to validate the crop inventory data. Where the insurance data are not available, ground-truth data were acquired by AAFC staff and from other resources. These data were collected annually and it is expected that there will be new datasets in the future (AAFC, 2013). The results of the validation suggests that, for Ontario, the overall accuracy of the interpretation of the remote sensing data was 82% for 2011, 76% for 2012 and 87% in 2013 (AAFC, 2013). According to AAFC, 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. I used a procedure similar to what I used with the *Agricultural Resource Inventory* to construct these aggregates. The dataset comes in two GIS maps (within geographic zones UTM 17 and UTM 18), which means that three counties: Peterborough, Northumberland, and Hastings, were cut in half, and were on two maps. I stitched data from these counties together, but this may have resulted in a small over-estimate.

Table 3.6 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. Central Ontario. Despite that all other three regions experienced a drop in cropland area in 2012, Southern Ontario actually experienced an increase of 58,902 hectares of cropland in 2012.
Table 3.6 Estimates of Ontario Cropland\(^1\) Area Based on *Crop Inventory* (2011-2013) (hectares)

<table>
<thead>
<tr>
<th>Regions (^2)</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2011(^3)</td>
</tr>
<tr>
<td>Southern Ontario</td>
<td>1,332,532</td>
</tr>
<tr>
<td>Western Ontario</td>
<td>853,551</td>
</tr>
<tr>
<td>Central Ontario</td>
<td>363,924</td>
</tr>
<tr>
<td>Eastern Ontario</td>
<td>298,687</td>
</tr>
<tr>
<td>Ontario Total(^6)</td>
<td>2,848,693</td>
</tr>
</tbody>
</table>

Source: Government of Canada, (Agricultural and Agri-food Canada, *Crop Inventory*, various years)

Notes:
1. 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* (2011-2013) 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 boundary was placed as an upper layer on the *Crop Inventory* (2011-2013) 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* (2011-2013) 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* (2011-2013) 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.
2. Refer to text for boundary definition.
3. 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.
4. 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.

5. 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.

6. Ontario Total excludes Northern Ontario Region. Refer to text for boundary definition.
3.8 Soil Survey Complex Data from OMAFRA (2009)

The Canada Land Inventory System: Dependable Agricultural Land in Ontario

One common concern regarding rural land use is the loss of high quality agricultural land to urban uses. Provisions aiming at prime agricultural land can be found in the Provincial Policy Statement (2014) and the Greenbelt Plan (2005). These policies reflect an increasing concern regarding the use of prime agricultural land. This concern can be expressed in two ways: Are we losing good agricultural land to urban uses? And, is rural-urban conversion the main reason of the loss of prime farmland? This section tries to find evidence to address these questions.

The Canada Land Inventory System (AAFC, 2013) classifies agricultural land into 7 categories based on physical land and soil attributes and climatic information. Table 3.7 lists the definitions of each major soil class. The major soil classes describe to what extent a plot of land is suitable for agriculture. The minor soil classes describe the factors contributing to the soil’s ability to accommodate agricultural production. Any individual land parcel can consist of several different major and minor soil classes. In this study, only the major classes, class 1 to class 7, are discussed.

The Soil Survey Complex database for southern Ontario has been produced by Ontario Ministry of Agriculture and Food, 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 continuously. According to Rabe (2014), this dataset is the most updated dataset on Ontario’s Soil Classes. Each map unit, or “polygon”, representing a parcel of land on the map, can have up to three soil classes recorded. Nevertheless, the number of soil classes to be included in the dataset is up to the surveyor’s professional judgment. 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, he or she can estimate the major three types of soils and their percentage. The first layer is the predominant soil class, meaning this soil class has the highest percentage in this piece of land and the third layer is the least predominant soil class. And the percentages of the three layers add up to 100%. The survey data were later consolidated and mapped on a county basis to produce a stitched and standard map based on the best knowledge of GIS specialists, who relied
on GIS and NRVIS (Natural Resource Value Information System).

This database was accessed by downloading from GeoPortal. Area of Dependable Agricultural Land was calculated at the county level. The procedure is as follows. The boundary file was placed on top of the Soil Survey Complex map and each county was processed individually. The map applied to define boundaries is Census Division - Cartographic Boundary Files, for Census 2011. The Projected coordinate system used is NAD_1983_Ontario_MNR_Lambert. And the geographic coordinate system used is GCS_North_American_1983. To calculate the area of Dependable Agricultural Land in each county, the Soil Complex Survey data map was cut out into counties and the area of each polygon (map unit) was calculated. The area of each soil class was calculated by multiplying its percentage by the total area of this polygon. Soil falling in the same class was added up. For the purpose of this section, only the areas of class 1 to class 3 were calculated and presented. Table 3.8 presents the area of Dependable Agricultural Land at the regional level.

One issue with this dataset is that once a piece of land has been occupied by built-up area, the soil classes contained in that land are no longer be updated. From Table 3.8, Southern Ontario possesses the third largest area of class 1 land, which is 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 3.7: Canada Land Inventory Definitions: Soil Capability for Agriculture (Major Classes)

<table>
<thead>
<tr>
<th>Class Number</th>
<th>Definitions and Explanations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>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 origin 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.</td>
</tr>
<tr>
<td>Class 2</td>
<td>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.</td>
</tr>
<tr>
<td>Class 3</td>
<td>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.</td>
</tr>
<tr>
<td>Class 4</td>
<td>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.</td>
</tr>
<tr>
<td>Class 5</td>
<td>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.</td>
</tr>
<tr>
<td>Class 6</td>
<td>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.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Class 7</td>
<td>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.</td>
</tr>
<tr>
<td>Class 0</td>
<td>Organic Soils (not placed in capability classes).</td>
</tr>
</tbody>
</table>

Source: Agricultural and Agri-Food Canada (2013).

Notes:
1. 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 placed in capability classes.
Table 3.8: Estimates of Total Class 1, Class 2 and Class 3 Land Area in Ontario, Based on the Soil Survey Complex\(^1\) (hectares)

<table>
<thead>
<tr>
<th>Region(^2)</th>
<th>Class 1 Land Area(^3)</th>
<th>Class 2 Land Area</th>
<th>Class 3 Land Area</th>
<th>Total Area of Classes 1, 2 and 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southern Ontario</td>
<td>275,453</td>
<td>1,034,369</td>
<td>536,661</td>
<td>1,864,483</td>
</tr>
<tr>
<td>Eastern Ontario</td>
<td>32,522</td>
<td>414,363</td>
<td>317,898</td>
<td>764,783</td>
</tr>
<tr>
<td>Central Ontario</td>
<td>452,080</td>
<td>286,810</td>
<td>301,977</td>
<td>1,013,867</td>
</tr>
<tr>
<td>Western Ontario</td>
<td>878,364</td>
<td>347,050</td>
<td>276,117</td>
<td>1,501,532</td>
</tr>
<tr>
<td>Ontario Total(^4)</td>
<td>1,611,420</td>
<td>2,082,592</td>
<td>1,432,654</td>
<td>5,126,667</td>
</tr>
</tbody>
</table>


Notes:
1. 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.
2. Refer to text for boundary definitions.
3. The figures in the Table were calculated by applying the boundary definitions onto the soil data using ArcGIS. Refer to Table 3.7 for soil class definitions.
4. Ontario Total excludes northern region. Refer to text for boundary definitions.
3.9 Other Estimates of Agricultural Land Area in Ontario

Besides the datasets I have examined above, I examine other empirical studies to confirm or contrast our findings regarding the question of “how much agricultural land exists in Ontario and how does it changed over time?”

Hofmann (2001) and Hofmann et al. (2005) reported the estimates of Dependable Agricultural Land for Ontario, and the estimates of the cumulative amount of class 1 agricultural land that has been converted to urban uses since the beginning of European settlement. Dependable Agricultural Land is defined as class 1, class 2, and class 3 land (Hofmann, 2001). Hofmann (2001) estimated that 6.8% of the land area of Ontario is dependable agricultural land. Hoffman (2001) reported that 13% of class 1 land had been converted to urban uses by 1971, 14% by 1981, 17% by 1991 and 19% 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% of Ontario’s land area is Dependable Agricultural Land, up from the previous estimate of 6.8%. The 2005 report shows that the conversion rate of class 1 agricultural land to urban uses since the beginning of European settlement was 5% by 1971, 7% by 1981, 9% by 1991, and it reached 11% by 2001. In contrast to Hoffman (2001), this study has been generally ignored in the research literature and the press.

The two studies used separate data sources. The data sources for the 2001 report are McCuaig and E.W (1982) and the Environment Accounts and Statistics Division under Statistics Canada. The data sources for the 2005 report are the Canada Land Inventory and the Environment Accounts and Statistics Division under Statistics Canada. The method used to calculate settlement areas are different as well. The settlement area was calculated by generating circles around the urban area in the 2001 report, it was calculated by generating squares around the urban area in the 2005 report. The second approach generated much lower estimates and arguably more realistic estimates of urban area.

---

3 Filoso (2014):
The reports used urban enumeration area (EA) points from the census years (71 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.
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 Plain ecozone. The Mixedwood Plains ecozone is defined as Southern Ontario and Western Quebec (Gagnon et al., 2014). Table 3.9 presents 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).

Table 3.9 suggests that there are 6,991,637 hectares of Dependable Agricultural Land in the Mixed Wood Plain. The farmland area on Dependable Agricultural Land was 4,567,559 hectares in 2000, and it was 4,360,662 hectares in 2011, which was a 4% decrease from 2000 to 2011. Settled area on Dependable Agricultural Land increased by 128,030 hectares, or 27%, 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 within the Ontario Greenbelt was higher within the Greenbelt Area, which was 16%, than the rest of Ontario, which was 5.4%. However, I 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) with us to enable us to calculate changes in cropland area from 2001 to 2011. Table 3.10 shows the area of cropland and the percentage change of cropland area from 2001 to 2011 within the Greenbelt and in the rest of Ontario. From 2001 to 2006, cropland area within the Greenbelt Area decreased by 7.8%. From 2006 to 2011, the cropland area within the Greenbelt Area decreased by 3.79%. The total decrease in cropland area within the Greenbelt Area from 2001 to 2011 was 11.3%, from 278,570 hectares to 247,120 hectares. The trend for the rest of Ontario is different. There was a minor increase of 0.77% increase in cropland area from 2001 to 2006, followed by a decrease of 1% from 2006 to 2011. From 2001 to 2011, the total decrease of cropland was 0.3% for the rest of Ontario.
Table 3.9 Farm Area and Settled Areas in Relation to Canada Land Inventory by ecozone adapted from *Human Activity and the Environment -Agriculture in Canada* (hectares)

<table>
<thead>
<tr>
<th>Region</th>
<th>Dependable Agricultural Land¹</th>
<th>Land with Important Limitations for Agriculture²</th>
<th>Farm on Dependable Agricultural Land</th>
<th>Farm Area on Land with Important Limitations for Agriculture</th>
<th>Settled Area on Dependable Agricultural Land³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada Total</td>
<td>50,534,922</td>
<td>74,413,254</td>
<td>36,796,533</td>
<td>35,826,731</td>
<td>23,410,939</td>
</tr>
<tr>
<td>Mixed Wood Plains</td>
<td>6,991,637</td>
<td>2,812,461</td>
<td>4,567,559</td>
<td>4,360,662</td>
<td>1,297,333</td>
</tr>
</tbody>
</table>


Notes:
1. 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.
2. 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).
3. 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 Map 1, Appendix C in Statistics Canada, 2013, "Measuring ecosystem goods and services in Canada," *Human Activity and the Environment*, Catalogue no. 16-201-X for geographic coverage).
5. Total settled area on dependable agricultural land presented here differs from that in Hoffman et al. (2005), due to the use of 2001 Census Enumeration Area (EA) files for the estimate of total settled area in Hoffman et al. (2005), while this study mainly
used 2000 AAFC 30 m satellite imagery. See note 3 for further details.
6. Mixed Wood Plain ecozone covers the Quebec City – Windsor corridor, including Southern Ontario.
Table 3.10 Cropland Area in Ontario, in the Greenbelt and in the Rest of Ontario (2001 to 2011) (Hectares)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ontario(^1)</td>
<td>3,656,705</td>
<td>3,660,941</td>
<td>3,613,821</td>
<td>0.11584%</td>
<td>-1.28710%</td>
<td>-1.17275%</td>
</tr>
<tr>
<td>Greenbelt Area(^2)</td>
<td>278,570</td>
<td>256,824</td>
<td>247,102</td>
<td>-7.80629%</td>
<td>-3.78555%</td>
<td>-11.29633%</td>
</tr>
<tr>
<td>Rest of Ontario</td>
<td>3,378,135</td>
<td>3,404,117</td>
<td>3,366,719</td>
<td>0.76912%</td>
<td>-1.09860%</td>
<td>-0.33793%</td>
</tr>
<tr>
<td>(Excluding the Greenbelt Area)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source:
2. Data obtained from Cummings (Undated), customized data request from Statistics Canada.
3.10 Comparisons among Datasets and Studies

3.10.1 Farmland Area

The Census dataset and the Agricultural Resource Inventory dataset both provide estimates of farmland area. For the Census data, first, as presented in the discussion of Table 1 and Table 3, farmland area experienced an annual decrease of 0.66% per year, a total decrease of 39.33%, from 1951 to 2011. Second, the annual rate of decrease was 0.54% per year in farmland area from 1976 to 2011, and it was 0.86% from 1951 to 1976. The absolute amount of farmland area was 6,935,400 hectares in the Agricultural Resource Inventory data, while it was 5,280,888 hectares in the Census in 1982.

3.10.2 Cropland Area

Up to 1991, the Census of Agricultural data and the data from Agricultural Statistics for Ontario provide similar estimates of cropland area, but they diverged after 1991. In 1996, cropland area was 3,544,927 hectares as recorded in the Census, and was 3,272,076 hectares as recorded in the Agricultural Statistics for Ontario. In 2011, the cropland area was 3,613,821 hectares in the Census, and it was 3,361,214 hectares in the Agricultural Statistics for Ontario.

For inter-census years, between 1976 and 1981, cropland experienced a minor increase of 1% every year. Over the period of 1980s, the annual change ranged from -0.76% to 2.93%, except in 1986. In 1986, there was a sudden decrease of 6% in cropland. During 1990s, there was an increasing trend in cropland, but the annual range increased — from -3.7% to 4.42%. From 2000 to 2010, the data show a steady increasing trend. After 2010, there was a decrease in 2011, and the increasing trend resumed in 2012. From 2011 to 2013, data from Agricultural Statistics for Ontario showed a 2.6% increase in cropland.

Cropland area in Ontario was estimated as 4,322,194 hectares in the Agricultural Resource Inventory dataset, which was higher than 3,393,787 hectares, or 3,452,417 hectares, which were the numbers recorded in the 1981 Census and the Agricultural Statistics for Ontario dataset, respectively. From 2011 to 2013, the annual Crop Inventory data showed a 44,351 hectare or 1.56% increase in cropland area. The Statistics data, for the same 36 counties, indicated an increase in cropland area of 127,268 hectares or 3.76% between 2011 and 2013. Again, for the same 36 counties, cropland area reported in the 2011 Census was 3,391,959 hectares in 2011,
which is higher than the *Crop Inventory* estimate by 543,226 hectares. In Southern Ontario, the *Crop Inventory* data showed a 2.09% increase in cropland from 2011 to 2013. For the *Agricultural Statistics of Ontario* data, the field crops data, whose trend is very close to the cropland trend as suggested in Figure 3 and 4, showed a 2.6% increase. The estimated annual conversion rate of class 1 agricultural land to urban uses was 0.3% per year from 1971 to 2001 as shown in the Hofmann *et al.* (2005) study, which was close to the prime agricultural land to urban uses conversion rate of 0.36% per year from 2000 to 2011 as shown in the Gagnon *et al.* (2005) study.

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 the data on cropland area of dependable agricultural land area, two additional considerations should be taken into account in any assessment of the urgency of the need to limit the conversion of agricultural land to non-agricultural uses. The first factor is the ongoing trend toward higher crop yields. From a food production point of view, higher yields mean that more production can be obtained from a given land base. The second consideration is the ongoing investment by farmers in tile drainage. Tile drainage is used to remove excess water from agricultural soils, particularly at the beginning of the crop-growing season. Removing excess water during planting and germination reduces what can be a locally significant limitation to crop production. Tile drainage improves that quality of land, as opposed to its quantity.

### 3.10.3 Yield Data (1980-2014)

Yield for major crops data 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). These data were collected six times a year by surveys. Figure 3.5
presents Provincial Selected Crop Yields from 1980 to 2014, with years indicated on the x-axis, and yield indicated on the y-axis.

In Figure 3.5, trends of yield for four major crops, winter wheat, grain corn, soybeans, and hay, are presented. Grain corn presents a fast increasing trend of yield, and the yield started off at 6000 kilograms per hectares in 1981, and ended above 10,000 kilograms per hectare in 2014, which was a 60% increase. The yield of winter wheat has increased by 48%, and the yield of soybean has increased by 40% from 1980 to 2014. This means that if the area of these cropland remain constant, production will still be increasing.

3.10.4 Tile Drainage Area Data from Ministry of Natural Resources (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. 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. The question of how much agricultural land there is in Ontario needs to take changes in the extent of tile drainage into account.

The Tile Drainage Area data were obtained from the Ministry of Natural Resources based on information of licensed agricultural tile drainage area up to year 2012. Contractors who plan to install tile drainage are required to inform OMAFRA of the installation location. The area of tile drainage is calculated in various ways: GIS, GPS, Tile Drainage Record and Other. Tile drainage area at the county level was processed for each county individually. The data processing method is similar to the one applied to the Soil Complex data. The regional area was calculated by adding up county areas within the region. And the provincial area is calculated as the sum of regional area. Table 3.11 presents the tile drainage area at the regional and provincial level.

Up to 2012, in Ontario, excluding Northern Region, the amount of tile drainage area reached 1,646, 624 hectares. Southern Ontario has 882,554.49 hectares of tile drainage area. Western Ontario has the second largest tile drained area at 517, 502.09 hectares. When comparing this dataset to the cropland area based on the Crop Inventory data in 2012, with the same boundary definition, the amount of tile drainage area is 62.3% of the cropland area. Comparing this dataset to the Statistics dataset, with the same boundary definition, the tile
drainage area is about 50% of the cropland.
Figure 3.5 Estimates\(^1\) of Provincial Average Yields for Selected Crops from *Statistics* (1981-2014)

Note: 
1. The lines represents data on yield published at the provincial level, reported in the table “Historical Provincial Estimates” from 1981 to 2013.

Table 3.11 Estimates of Provincial and Regional Cumulative Tile Drainage Area\(^1\) based on *Tile Drainage Area* (hectares)

<table>
<thead>
<tr>
<th>Region(^2)</th>
<th>Hectares</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southern Ontario Region</td>
<td>882,554</td>
</tr>
<tr>
<td>Western Ontario Region</td>
<td>517,502</td>
</tr>
<tr>
<td>Central Ontario Region</td>
<td>70,934</td>
</tr>
<tr>
<td>Eastern Ontario Region</td>
<td>175,634</td>
</tr>
<tr>
<td>Ontario(^3)</td>
<td>1,646,624</td>
</tr>
</tbody>
</table>


Notes:
1. 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 others.
2. Refer to text for boundary definitions for regions.
3. Ontario total excludes northern region.
3.11 Summary

The purpose of this chapter was to answer the question “How much agricultural land is there in Ontario and how has that changed over time?” To answer this question, I examined datasets from five different data sources and reviewed four empirical studies from the literature. I examined the farmland area, cropland area as well as field cropland area to achieve my purpose. Farmland area has been decreasing since 1951. However, the rate of decrease was lower in the period 1976 to 2011, which was after the study period of Frankena and Scheffman’s (1980) study. I argued that cropland is a clearer indicator of the availability of agricultural land, because it measures the food security, and the viability of the agricultural economy. I found that cropland area has increased slightly since 1951. I also summarized data on crop yields and on tile drainage. Increasing in major crop yields can address the food security concern.

I also found that there are information gaps and some inconsistencies among datasets produced by different agencies using different definitions for different purposes and at different times. Clearly, further research would be useful to explore these gaps and inconsistencies in more details and to identify ongoing research needed to improve our estimates of the amount of agricultural land in Ontario. I also recommend that future research should undertake spatial econometric analysis with the available data to provide an empirical understanding of the factors influencing changes in agricultural land use in the province.
Chapter 4. Major Provincial Land Use Policies and Policy Analysis

4.1 Introduction

The purpose of this chapter is to review major provincial rural land use policy changes that took place in Ontario subsequent to Frankena and Scheffman’s (1980) assessment for the 1951-1980 time period, and to assess the extent to which their finding that rural land use policy had been developed with only limited regard for the role of economic analysis holds for the more recent time period. Our review suggests that their finding for the pre-1980 period is confirmed for the post 1980 period. Land use policies have become even more restrictive since 1980. Yet, most Ontario land use policies lack cost-benefit analysis or implementation analysis to justify rationales and implementation, and they have 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 which indicates an implicit reliance on an economic theory of absolute, rather than comparative, advantage.

First, I present the economic theory of policy, including the theories of market and non-market failure and non-market failure and a description of what Wolf (1979) called implementation analysis. Then, I 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, I also 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. I also describe any evidence that was offered in support of the stated rationales for each of the major policy change. I 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. I identify possible non-market failures associated with the policy changes. Finally, I discuss alternative approaches to rural land use policy that have been applied in other contexts.

4.2 Background

In the report prepared by the Niagara Escarpment Task Force (1972), 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.

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* (White, 2004):

> 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.

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 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.

### 4.3 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. Wolf 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) also began their examination of policies by identifying potential market failures in rural land markets. A general list of categories of market failure might include the following:

a. Public Goods  
b. Externalities  
c. Excessive Discounting  
d. Uninsurable Risk  
e. Market Power  
f. Adverse Selection and Moral Hazard  

(a) Public Goods

According to Samuelson (1954), Public Goods have two attributes. They 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. In welfare economics, 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.

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 examples of public goods satisfy the non-rival in consumption requirement.
Barlowe (1986) and others have argued that open space is a public good. Rural land, including farmland, provides scenic amenity services. These 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 no 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 (Chapter 7, 1980) identified public good market failure rationale related to the provision of open space as a possible rationale for policy. However, they argued that even if the market failure category is present, without a cost-benefit analysis, it cannot be known if the action of restrict land development will increase efficiency.

(b) 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. In welfare economics, externality is a source of inefficiency due to unaccounted costs or benefits, which relates to over or under production. Usually, the negative externality is commonly concerned. For negative externalities, if the negative impacts 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 of negative externalities. Regulations, emission taxes, emission quotas and tradable emission permits are common remedies to negative externality.

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, eventually, will object to the noise, dust and odors associated with farming practices and take steps, including potentially litigation for trespass or nuisance, to restrict the agricultural practices giving rise to noise, dust and odors. 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.

The concern of urban expansion and development on prime agricultural land and pollution fall into the category of negative externality. Urban expansion is closely connected to car dependent life, traffic jams, and carbon emissions.

(c) 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 social discount rate of zero, meaning that future benefits and costs were not discounted at all relative to present benefits and 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, or 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, page 113) noted the concern, which is:

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 generation.

This report implies the belief that the individuals today overly discount the future benefits of preserving land for agriculture. On the other hand, Demsetz (1967) made a counter-argument that present land owners act as brokers for future generations and have a strong incentive to exercise stewardship.

Journalists, particularly journalists in the farm press, have also offered rationales for government intervention in rural land markets. Alex Binkley (2014), who writes for *Ontario Farmer*, quoting Larry Davis, from the Ontario Federation of Agriculture:

( 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.

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

(d) 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 (1983, page 134) offered an insurance perspective as a commonly started rationale for farmland protection policy:

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.”

(e) Market Power

The market failure category of market power refers to a situation when either the buyer or the seller has the ability to influence prices in the market. It mostly refers to the seller being able to charge prices above marginal costs. Monopoly is one example possessing the market power. In theory, a monopoly usually raises the market price to where its marginal revenue intersects with its marginal cost. The inefficiency arises as the output quantity is lower than what could be at an equilibrium price in a perfect competition market, which creates an economic deadweight loss. This category does not commonly apply to the rural land use context. One example can be the existence of a single land developer within a town, and he or she is able to influence the housing market.

(f) Adverse Selection and Moral Hazard

Adverse selection and moral hazard are market failure problems generally associated with insurance markets. Under adverse selection, only individuals with subject to above average risks participate in an insurance pool. If premia are calculated on a population average basis, the risk sharing pool will not be financially sustainable. Moral hazard occurs when individuals engage in more risky behavior after they receive insurance coverage than they otherwise would have
without coverage. Adverse selection and moral hazard have not been used generally as economic rationales for rural land use policy.

4.4 Available Policy Measures Addressing Market Failures

The economic theory of government policy maintains that the identification of a market failure is a necessary condition for the justification for government action. Frankena and Scheffman (Chapter 2, 1980) 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, which is always in the form of zoning and planning control (Frankena and Scheffman, Chapter 2, 1980). Tax-subsidy schemes, in principle, can achieve desired certain resource allocation pattern by the government to procure taxes or give subsidies. In Ontario, for example, 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. Prior to 1973, this was the approach used in Ontario to protect what today we might call environmentally sensitive lands. Frankena and Scheffman (Chapter 2, 1980) stated that the government leasing or purchasing probably is 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 (1980) discussed this method briefly, and they 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.
4.5 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. These attributes can give rise to non-market failures. He identified four features on the supply side, and three features on the demand side, in the non-market sector. On the supply side, Wolf (1979) pointed out that, firstly, the quantity of non-market outputs is difficult to define and measure. Secondly, the quality of non-market outputs is also difficult to measure. Thirdly, the agency producing the non-market output is usually not subject to competition, generally be legislative requirement. Finally, there is generally no objective measure of revenues, costs and profits available for non-market outputs.

On the demand side, Wolf (1979) argued that, firstly, the increasing public awareness of the market failures has shifted the demand for non-market outputs to the right. Secondly, the political process rewards politicians for articulating and publicizing problems and for being seen to take actions to confront those problems, but does not necessarily apply accountability for results. Finally, Wolf argues that the political discount rate is higher than private discount rates, in that costs and benefits expected after the next election are given a much lower weight in political calculations than costs and benefits expected before that election. According to Wolf (1979), these distinct characteristics of the supply and demand of non-market products lead to Four sources of non-market failures, namely Internalities and Private Goals, Redundant and Rising Costs, Derived Externalities, and Distributional Inequalities.

(a) Internalities and Private Goals

Internalities and private goals, according to Wolf (1979), occur when the original mission of a government agency, which typically would be to remedy some category of market failure, gets modified over time. In the literature, this is sometimes referred to by other authors as capture theory. The mission of the agency becomes captured, either by its own employess or by the industry groups that the agency is intended to regulate and the mission of the agency becomes serving the career plans of the employees or the interests of the industry.

In the context of rural land use policies in Ontario, Frankena and Scheffman (Chapter 4, 1980), while not making specific reference to Wolf’s theory, did describe a concern over internalities and private goals in their discussion of power exercised by the local and provincial
governments. They argued that homeowners have incentives to be against new development, because it will affect their overall well-being, such as congestion. Developers and business communities are likely to be for development, because the developers get benefit from developing new areas, and business communities get large market and labour supply. Frankena and Scheffman (1980) further pointed out that since the homeowners are the largest in number, their preference dominates the policy direction to create development control policy. In a system of representative government, if a government want to be re-elected, it is likely to implement policies which are in favour of the majority.

There is also a potential problem with planners substituting 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-emphasizes 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.

(b) Redundant and Rising Costs

According to Wolf (1979), 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 overtime due to demand of remedial actions to the previous unsatisfying policy outcomes.

(c) 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 can be higher housing prices, less land for transportation infrastructure, for commercial and industrial use, less land for recreation and even amenity services and also lower farmland prices. 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.

(d) Distributional Inequities

Wolf (1979) suggested that non-market activities, even if they are made to address inequalities, may themselves generate distributional inequities in the forms 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.

4.6 Implementation Analysis

Wolf’s (1979) contribution to the economic theory of government policy is important in several respects. His analysis indicates 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 that he suggests should be followed in policy development, in light of his theory of non-market failure. Implementation analysis consists of first, applying the categories of market failure to an issue, to determine if one or more of the categories 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 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.

Frankena and Scheffman (1980) did not consider Wolf’s (1979) framework in their report, and did not evaluate non-market failure specifically. Benson (1981), however, did adopt 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 certain regulation can be the result of the effort of a small strong interest group, rather than the interest of the majority. What is more, he is also aware of three other factors affecting the demand for regulations as follows. The first one is more than one interest group may benefit from a certain policy; the second one is that the regulators may also benefit from their policies; the third one is that one interest group
may be forced to demand for regulations to avoid the loss resulted from certain policies which benefit other interest groups.

4.7 The Economic Calculation Debate: Implications for Rural Land Use Policy

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 Lang on the other. 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 goods of higher order it is impossible to know the relative scarcity of those goods and therefore allocation of those goods among competing uses will be arbitrary (Lavoie, 1981). With the exception of Pasour (1983), agricultural economists 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 (1983) linked the economic calculation debate to the failure of American’s Scientific Management Movement, where he explained that allocating land at the central level cannot avoid the knowledge problem identified by Hayek.

4.8 The Theories of Absolute and 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. To use a typical classroom example, 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 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 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. I will return to this issue later in this report.

4.9 Identification and Documentation of Major Policy Change Since 1980

Several major changes in rural land use policy have been implemented since Frankena and Scheffman completed their economic assessment of provincial land use policies in 1980. Major policy changes are described in Table 4.1.

Table 4.1 Major Changes in Land Use Policies in Ontario since 1980

<table>
<thead>
<tr>
<th>Policy and Subsequent Major Amendments</th>
<th>Significance of the Act or the Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ontario Planning Act (1980)</td>
<td>In different versions of the Planning Act, Section 3 of the Planning Act 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.</td>
</tr>
<tr>
<td>-------------------------</td>
<td>----------------------------------------------------</td>
</tr>
<tr>
<td>Red Tape Reduction Act II (2000)</td>
<td>Greenbelt Act (2005)</td>
</tr>
<tr>
<td>Oak Ridges Moraine Protection Act (May 1st, 2001)</td>
<td>Oak Ridges Moraine Conservation Act (Nov.1st 2001)</td>
</tr>
</tbody>
</table>
In this section, “power” and “authority” are treated as synonyms. In the Acts to be documented, “authority” generally refers to a political agency who is able to make decisions. On the other hand, “power” generally refers to the ability to make concrete types of decisions by an agency. I 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. I discuss the power assignment and shifts as in the *Niagara Escarpment Conservation Act* (1990), and the *Oak Ridges Moraine Act* (2001), and the *Greenbelt Act* (2005) from the implementation of the Acts to the present.

### 4.9.1 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**

The *Planning Act* serves as the provincial land use guideline for municipalities. It is also the legislation under which the *Provincial Policy Statements* were developed.

In the amended *Planning Act* of 1994, Subsection 3 (5) states that:

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).

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 as follows:
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.

The Provincial Policy Statements


The stated purposes are “to promote strong communities, a strong economy, and a clean and healthy environment” (Government of Ontario, 2015). Municipalities also develop their official plans under the instructions of Provincial Policy Statement.

Table 4.2 compares provisions regarding agricultural land use in different versions of the 1995, 1996/1997, 2005 and 2014 Provincial Policy Statements. Notice in Table 4.2, except in the 1996/1997 version of the Provincial Policy Statements, other versions all adopt the wording “shall be consistent with”, rather than “shall have regard to”.

Table 4.3 to Table 4.6 present the agricultural land use provisions of the 4 Provincial Policy Statements. In Table 4.3, noticed that in the preamble, the mentioning of “avoid the the need for costly remedial measures” is a unique feature among all the versions of Provincial Policy Statements. In Table 4.5, notice under 2.3.3 of the Provincial Policy Statements (2005), provisions began to emphasize that within the prime agricultural area, all types, sizes and
intensities of agricultural uses will be promoted and protected. Notice in Table 4.6, the *Provincial Policy Statements* (2014), in Section 2.3, explicit instructions were given to planners to designate prime agricultural land.
### Table 4.2. Comparisons of Provincial Planning Statements – 1995-2014

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>“have regard to” vs “be consistent with”</td>
<td>“shall be consistent with” (Section G, Interpretation and Implementation, p. 18)</td>
<td>“shall have regard to” (1996, Preamble, p. 1 and also in 1997 revision)</td>
<td>“shall be consistent with” (Part II, Legislative Authority, p. 1)</td>
<td>“shall be consistent with” (Part II, Legislative Authority, p. 1)</td>
</tr>
<tr>
<td>General Structure</td>
<td>No preamble, statement of principles or vision statement. Section G “Interpretation and Implementation”</td>
<td>Preamble (p. 1) and 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 . .</td>
<td>Preamble (p. 1), Legislative Authority (p. 1), How to Read the Provincial Policy Statement (pp. 1-2) and Vision for Ontario’s Land Use Planning System (pp. 2-3) Vision makes specific reference to <em>Niagara Escarpment Planning and Development Act</em> and the <em>Oak Ridges Moraine Conservation Act, 2001</em>, for further articulation of Vision</td>
<td>“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)</td>
</tr>
<tr>
<td>The Protection of Prime Agricultural Land</td>
<td>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. (Page 13.)</td>
<td>1. Protection of Prime Agricultural land for Agricultural uses. This is similar to the 1995 policy provision.(Section 2.2.1)</td>
<td>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)</td>
<td>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. (Section2.3.2) 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)</td>
</tr>
<tr>
<td>Lot Creation on Prime Agricultural Land</td>
<td>1. Permits new lot created for agricultural uses, agricultural related uses, farm retirement lot, a residence surplus to farming operation, residential infilling and infrastructure. (Page 13.)</td>
<td>1. Adds permission for farm retirement lot (2.1.2).</td>
<td>1. Deletes the permission for farm retirement lot and residential infilling. (2.3.4.1).</td>
<td>1. More restrictions on size regarding the use of residence surplus to farming operation. (2.3.4.1 (c)).</td>
</tr>
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<td>------------------------------------------------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>Remove Land from Prime Agricultural Land Area</td>
<td>Not discussed in this set of Provincial Policy Statement.</td>
<td>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)</td>
<td>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. What does this mean? Other allowed removal cases are similar to the ones in the 1996 Policy Statement. (Section 2.3.5.1)</td>
<td>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)</td>
</tr>
<tr>
<td>Number of Pages</td>
<td>38</td>
<td>18</td>
<td>37</td>
<td>50</td>
</tr>
<tr>
<td>Number of Agricultural Land Provisions</td>
<td>5</td>
<td>5</td>
<td>13</td>
<td>11</td>
</tr>
<tr>
<td>Number of Agricultural Land Related Provisions</td>
<td>0</td>
<td>4</td>
<td>6</td>
<td>7</td>
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<tr>
<td>-----------------------------------------------</td>
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</tr>
<tr>
<td>Number of Economic Awareness Appeared in Preamble or Principles</td>
<td>0</td>
<td>7</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Source:
Table 4.3 Summary of Agricultural Land Use Provisions in the 1995 Provincial Policy Statement

<table>
<thead>
<tr>
<th>Section G Interpretation and Implementation</th>
<th>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)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section D Agricultural Land Policies (Page 13-14)</td>
<td>To protect prime agricultural area for long-term agricultural uses.</td>
</tr>
<tr>
<td>Goals</td>
<td>To protect prime agricultural area for long-term agricultural uses.</td>
</tr>
</tbody>
</table>
| 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.

Table 4.4 Summary of Agricultural Land Use Provisions in the 1996 Provincial Policy Statement

<table>
<thead>
<tr>
<th>Element</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preamble (page.1)</td>
<td>Section 3 of the Planning Act requires that, in exercising any authority that affects planning matters, planning authorities &quot;shall have regard to&quot; 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.</td>
</tr>
<tr>
<td>Principles (page.1)</td>
<td>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.</td>
</tr>
<tr>
<td>1.1 Developing Strong Communities (page.2-3)</td>
<td>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)).</td>
</tr>
</tbody>
</table>
### 2.1 Agricultural Policies (page. 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:

4. 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;
5. new lots may be permitted for agriculture-related uses; and
6. 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:

16. an expansion of an urban area or rural settlement area, in accordance with policy 1.1.1c);
17. extraction of mineral resources, in accordance with policy 2.2; and
18. 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>
<thead>
<tr>
<th>2.2 Mineral Resources: Mineral Aggregates, Minerals, Petroleum Resources (page.7)</th>
<th>Extraction of minerals and petroleum resources is permitted in prime agricultural areas, provided that the site is rehabilitated. (Section 2.2.2.4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>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)</td>
<td></td>
</tr>
</tbody>
</table>
## Table 4.5 Summary of Agricultural Land Use Provisions of the 2005 Provincial Policy Statement

| Part I: Preamble (page.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. |
<p>| Part II: Legislative Authority (page.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. |</p>
<table>
<thead>
<tr>
<th>Section</th>
<th>Content</th>
</tr>
</thead>
</table>
| 1.1.3 Settlement Areas  (page.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:  
4. 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 (page.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 (page.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 (page.16) | Nothing in policy 2.1 is intended to limit the ability of existing agricultural uses to continue. (2.1.7) |
| 2.3 Agriculture (page.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) |
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.3.2 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)</td>
<td></td>
</tr>
<tr>
<td>2.3.3 Permitted Uses</td>
<td>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)</td>
</tr>
<tr>
<td>2.3.3.2 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)</td>
<td></td>
</tr>
<tr>
<td>2.3.3.3 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)</td>
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</tr>
<tr>
<td>2.3.4 Lot Creation and Lot Adjustments</td>
<td>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)</td>
</tr>
<tr>
<td>2.3.5 Removal of Land from Prime Agricultural Areas</td>
<td>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)</td>
</tr>
<tr>
<td>2.4 Minerals and Petroleum (page.18-19)</td>
<td></td>
</tr>
<tr>
<td>2.4.4 Extraction in Prime Agricultural Areas</td>
<td>Extraction of minerals and petroleum resources is permitted in prime agricultural areas, provided that the site is rehabilitated. (2.4.4.1)</td>
</tr>
<tr>
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</tr>
<tr>
<td>2.5 Mineral Aggregate Resources (page.19-20)</td>
<td></td>
</tr>
<tr>
<td>2.5.4 Extraction in Prime Agricultural Areas (page.20)</td>
<td>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: 7. 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; 8. 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 19. agricultural rehabilitation in remaining areas is maximized.</td>
</tr>
</tbody>
</table>

### Table 4.6 Summary of Agricultural Land Use Provisions of the 2014 Provincial Policy Statement

<table>
<thead>
<tr>
<th>Part I: Preamble (page.1)</th>
<th>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.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part II: Legislative Authority (page.1)</td>
<td>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.</td>
</tr>
<tr>
<td>1.1.3 Settlement Area (page.8)</td>
<td>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)</td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1.1.4 Rural Areas in Municipalities (page. 10)</td>
<td>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)</td>
</tr>
<tr>
<td>1.1.5 Rural Lands in Municipalities (page.11)</td>
<td>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)</td>
</tr>
<tr>
<td></td>
<td>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)</td>
</tr>
<tr>
<td></td>
<td>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)</td>
</tr>
<tr>
<td>1.7 Long Term Economic Prosperity (page.20)</td>
<td>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))</td>
</tr>
<tr>
<td>2.1 Natural Heritage (page.22)</td>
<td>Natural heritage systems shall be identified in Ecoregions 6E &amp; 7E1, recognizing that natural heritage systems will vary in size and form in settlement areas, rural areas, and prime agricultural areas. (2.1.3)</td>
</tr>
<tr>
<td></td>
<td>Nothing in policy 2.1 is intended to limit the ability of agricultural uses to continue. (2.1.9)</td>
</tr>
<tr>
<td>2.3 Agriculture (page.24-26)</td>
<td>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)</td>
</tr>
<tr>
<td></td>
<td>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)</td>
</tr>
</tbody>
</table>

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### 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

**2.3.4.1** 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:

- 9. Extraction of minerals, petroleum resources and mineral aggregate resources, in accordance with policies 2.4 and 2.5; or PROVINCIAL POLICY STATEMENT 26
- 20. 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 Mineral and Petroleum (page.26-27) | Extraction of minerals and petroleum resources is permitted in prime agricultural areas provided that the site will be rehabilitated. (Section 2.4.4.1) |
| 2.4.4 Extraction in Prime Agricultural Areas | |
| 2.5.4 Extraction in Prime Agricultural Areas (page.28-29) | 2.5.4.1 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) |

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

The Niagara Escarpment Planning and Development Act was passed in 1973. It was revised in 1980 and 1990 (Revised Statutes of Ontario (R.S.O)). Clauses in this Act were amended from time to time by different Acts. The Niagara Escarpment Planning and Development Act currently in use is the R.S.O 1990.

Table 4.7 highlights the summarized major powers of different planning authorities assigned by the Niagara Escarpment Planning and Development Act, and its change since the 1973 original version.

The Niagara Escarpment Plan was first implemented in 1985. A revised version was implemented in 2005. Frankena and Scheffman (Chapter 7, 1980) 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) and the Niagara Escarpment Plan (2005) focus on natural environment preservation. The Niagara Escarpment Planning and Development Act (1990) states that the “Niagara Escarpment Plan” (Section 1, 1990) is “designed to promote the optimum[sic] economic, social, environmental and physical condition of the Area”.

Section 2 of the Niagara Escarpment Planning and Development Act (1990) states that the purposes of the Act, and these purposes have remained same since the original version 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.

Section 8 of the Niagara Escarpment Planning and Development Act (1990) 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 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; and

(g) to support municipalities within the Niagara Escarpment Planning Area in their exercise of the planning functions conferred upon them by the Planning Act

Policy Instruments

There are three types of instruments used, land acquisition, land designation, and limited development rights. Frankena and Scheffman (Chapter 7, 1980) documented the dispute between municipalities and the province regarding land acquisition, which resulted in a promise to give back land to municipalities from the province. There have been several land acquisition cases by the Escarpment Biosphere Conservancy and various agencies outlined in Section 3.3 Municipal Parks and Open Space. The land acquisition was funded by donation and taxes.

Land designation began to be a common instrument as suggested in the beginning of the chapter. And land designation criteria are based on ecological attributes. For the agricultural part, the Plan (2005) 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, Niagara Escarpment Plan, 2005), and the authorities can enter into agreement with the property owners as outlined in the Niagara Escarpment Planning and Development Act (1990).
<table>
<thead>
<tr>
<th>Authority</th>
<th>Current Version of the NEPD Act</th>
<th>Previous Version(s) of the NEPD Act</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Minister of Rural Affairs and Housing and/or the NEP Commission</td>
<td>1. The Act authorizes the Minister or the Commission to initiate amendments to the Niagara Escarpment Plan. (1990, R.S.O., S6.1 (2)&lt;br&gt;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).)&lt;br&gt;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)).&lt;br&gt;4. (i) Recommendation Power to the Commission to offer recommendations to the Minister. (1990, R.S.O., S.10 (9)).&lt;br&gt;(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).)</td>
<td>1. Provision added in 2005.&lt;br&gt;2. The “Amendment to Plan” section added by the <em>Red Tape Reduction Act</em> (1999).&lt;br&gt;3. Provision added by the <em>Red Tape Reduction Act</em> (1999).&lt;br&gt;4. Amended by the <em>Red Tape Reduction Act</em> (1999). Before that amendment, this section is provisions of making the Niagara Escarpment Plan.</td>
</tr>
</tbody>
</table>
| The Role of Municipalities | (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)).
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)).
6. The power to the Minister to conduct reviews of the NEP.
7. The power to the Minister to propose amendments to the NEP. (1990, R.S.O., S.17 (3)).
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))
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)). |
| --- | --- |
|  | 5. Same power since the original version (1973).
6. Same power since the original version (1973).
7. Same power since the original version (1973).
8. Same power since the original version (1973).
| 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).) | 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 |
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)).

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)).

<table>
<thead>
<tr>
<th>The Legislative Assembly</th>
<th>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)),</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>1. The power to approve, revoke and change the order or the amendments made by the Minister. (1973, S.3(3))</td>
</tr>
</tbody>
</table>

Sources:
4.9.3 The Oak Ridges Moraine Conservation Act (2001) and The Oak Ridges Moraine Conservation Plan (2002)

The Oak Ridges Moraine Act (2001) is the legal authority for the Oak Ridges Moraine Conservation Plan (2005). Table 4.8 highlights the summarized major powers of different planning authorities assigned by the Oak Ridges Moraine Conservation Act (2001).

The Oak Ridges Moraine Conservation Plan (2002) is a regulation under the Oak Ridges Moraine Conservation Act (2001). There have been no amendments to the Plan yet.

Stated Purposes, Objectives, Rationales

The stated objectives of the Oak Ridges Moraine Conservation Plan (2002):

(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;

(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. 2001, c. 31, s. 4.

Policy Instruments

The policy instrument used is land designation. The Oak Ridges Moraine Conservation Plan (2002) 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 Lieutenant Governor in Council

1. The ORMC 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

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)).

The Role of Municipalities and the Public

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)).

4.9.4 The Greenbelt Act and The Greenbelt Plan


Stated Purposes, Objectives, and Rationales

The stated purposes of the Greenbelt Plan (2005) is:

The Greenbelt Plan identifies 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.

There are stated goals of the Greenbelt Plan (2005) are organized in 5 areas:

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

Four stated objectives are 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.”
The general stated rationale to protect the greenbelt is under Section 1.1 of the *Greenbelt Plan* (2005), 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 Description. In Subsection 3.1.1, the first two paragraphs state that:

The 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 used is land designation, which is similar to the *Oak Ridges Moraine Conservation Plan* (2002), where each designation has its own permitted uses and not permitted uses. In the *Greenbelt Plan* (2005), prime agricultural land is basically only allowed for agricultural purposes. And settlement area is not allowed to expand into Specialty Crop Area and Natural Heritage Area.
Table 4.9 Powers and Authorities Under the Greenbelt Act (2005)

<table>
<thead>
<tr>
<th>Authority</th>
<th>Current Version of the Greenbelt Act</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Lieutenant Governor in Council</td>
<td>1. The power to designate the Greenbelt area, and the power to amend a designation. (S.O. 2005, C.1, S.2)</td>
</tr>
<tr>
<td></td>
<td>2. The power to establish the Greenbelt Plan. (S.O. 2005, S.3)</td>
</tr>
<tr>
<td></td>
<td>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&amp;2)).</td>
</tr>
<tr>
<td>The Minister of Municipal Affairs and Housing</td>
<td>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)).</td>
</tr>
<tr>
<td></td>
<td>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)).</td>
</tr>
<tr>
<td></td>
<td>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)).</td>
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<tr>
<td></td>
<td>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)).</td>
</tr>
<tr>
<td></td>
<td>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)</td>
</tr>
<tr>
<td></td>
<td>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)).</td>
</tr>
<tr>
<td></td>
<td>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).</td>
</tr>
<tr>
<td>The Role of Municipalities</td>
<td>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)</td>
</tr>
<tr>
<td></td>
<td>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)</td>
</tr>
</tbody>
</table>

4.10 Analysis of Major Changes in Rural Land Use Policy in Ontario Since 1980

In our analysis of the major policy changes identified in the previous section, I gave specific consideration to the following issues:

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?

I addressed each of the questions above for each of the Provincial Policy Statements and for the Acts and Plans described above. In addition to the Statements, Acts and Plans, I search related Task Force Reports and Staff discussion reports. I reviewed the stated rationales, purposes and objectives of the Statements, Acts and Plans, to identify latent market failure rationales. I evaluated the authorized policy instruments in light of the categories of non-market failure. I looked for evidence of implementation analysis being conducted before policies were implemented. I looked for awareness of the issues examined in the economic calculation debate, with specific reference to Hayek’s knowledge problem: Does the policy suggest that it has all the knowledge needed to do land use planning at the provincial level? And, if not, does the policy allow local participation in the decision making process? I also searched for the awareness of comparative advantage, in the form of indicators measuring economic performance. In the end, I document the direction of transfer of power and the number of powers assigned to different level of agencies, the number of agricultural land use provisions in different version of policies to identify a trend of centralization or decentralization.
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?

I have identified three categories of market failure on which the policy rationales are probably based. They are public goods, externalities and excessive discounting.

Provisions to maintain the ecological feature area, open space and natural heritage area appear frequently in the policies I reviewed. For instance, the introduction in the Oak Ridges Moraine Conservation Plan (2002) recognizes the moraine’s unique environmental, geological and hydrological features, and this introduction leads to objectives (a) to (d), which are intended to protect these features. In the Greenbelt Plan (2005), Goal Number 2 is environment protection, to protect, maintain and enhance the natural heritage, hydrologic and landform features, open pace, and water within the Greenbelt Area. These statement are broadly consistent with the theory of public goods. These ecological features are non-rival in consumption, and the Ontario public will benefit from these ecological features. 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 then the public goods should be available to the public with no extra costs. Designation of land use imposes the cost and the benefits disproportionally on the land owners, which is not 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 besides 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 I reviewed. These statements are consistent with the market failure category of externality. Objective (f) in the Oak Ridges Moraine Conservation Plan (2002) is intended to limit urban expansion or urban sprawl. Urban sprawl will create noise and traffic congestion. Also, residents living at the edge of the urban area will be negatively impacted by odour and dust from farming operation. Land designation is one method to address externality. However, reform of liability rules and restrict covenants are also alternatives to designation.
Objective (d) in the *Oak Ridges Moraine Conservation Plan* (2002), and the Vision Statement (1.2.1) in the *Greenbelt Plan* (2005) are also consistent with the excessive discount rate and uninsurable risk categories. The rationale implies that if land is converted from agricultural uses to non-agricultural uses today, and the demand of agricultural land rises due to an increase of food demand, this will be inefficient. Demsetz (1967), however, has argued that land owners have a strong incentive to take future market conditions into account.

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

I identified two potential categories of non-market failures in the policies I reviewed, namely distributional inequity and derived externalities.

Land designation has become the preferred method to protect agricultural land. Landowners within the designation areas have limited land use options, suggesting that their rights to the land are taken away, and they shall bear the cost of not being able to do things with their land. The benefits resulted from such designation are borne disproportionately by different groups. In this case, the non-market failure category of distributional inequity applies. The *Niagara Escarpment Planning and Development Act* (1990), the *Oak Ridges Moraine Conservation Act* (2002), and the *Greenbelt Act* (2005) do not provide compensations to land owners for losses.

In addition, there is potential for the policies I reviewed to created derived externalities. In the policy documents I reviewed, provisions restricting development on the agricultural land will likely result in increases in prices of surrounding housing, infrastructure, and recreation uses of the land. O’Toole (2007, 2012) has documented these types of derived externality effects from rural land use policies in the United States, but there has been little empirical work on this topic in the Canadian context to date.

3. **Was implementation analysis applied before policy implementation?**

Wolf (1979) argued that the implementation analysis should be conducted before the implementation of any policies to address market failures. I found limited evidence of awareness of the need for the implementation analysis in the policy documents I reviewed, and I was unable to find evidence of implementation analysis performed in related reports or literature.
Awareness of implementation analysis appeared in some of the policy documents I reviewed. For example, in the Preamble of the 1996 *Provincial Policy Statement*, there is a paragraph discussing “A healthy economy”, “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 and 2014.

The awareness of cost-benefit appears once under Subsection 2.12.2 in the *Niagara Escarpment Plan* (2005), which states that “Existing 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) ) Water Budget and Conservation Plans in the *Oak Ridges Moraine Conservation Plan* (2002), which requires that the cost and benefit analysis of water conservation measures and practices to be implemented. However, I found no evidence that this has been done.

In the *Greenbelt Act* (2005), 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.

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 demographics compositions across Ontario. On the other hand, the *Provincial Policy Statements* stipulate that the principles in these *Provincial Policy Statements* should apply among all regions. Similarly, if conflicts arise between the local plans and the *Niagara Escarpment Plan* (2005), *the Oak Ridges Moraine Plan* (2002) and the *Greenbelt Plan* (2005), the provincial plans prevail over local plans. Under 18 (1) of the *Greenbelt Act* (2005), the provision stipulates the appeals to Ontario Municipal Board or joint boards of matters relating to land within the designated area to be deferred, which is to limit the role of municipalities in such decision makings. One of the implementation of the economic calculation debate is that the knowledge of particular time and places are not available centrally, so local adaptation and experimentation will be needed.
One exemption is that, the approval of development permits is the responsibility of the Commission under the *Niagara Escarpment Act* (1990), which would represent case-by-case decision making.

**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. This stipulation is typically based on the objective physical characteristics of land, such as those outlined 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 theory of comparative advantage bases optimal resource use on opportunity costs. As I 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.

In Table 4.2, all *Provincial Policy Statements* contain provisions regarding the protection of prime agricultural land. In the 2014 *Provincial Policy Statements*, prime agricultural designation becomes a requirement. In the *Oak Ridges Moraine Conservation Plan* (2002), 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* (2005) 1.1.2 Goals, 1(b) is intended to protect prime agricultural land. There are 37 places mentioning the term of prime agricultural land or area within the Plan. In the *Niagara Escarpment Plan* (2005), provision under Section 1.5 (8) states that “Transportation and utility facilities; however only linear facilities may be permitted in prime agricultural areas.”

**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, the changes in authorities from local governments to provincial governments all indicate a trend towards centralization of rural land use policy.

For the Niagara Escarpment Development and Planning Act (1990), among the 2 powers assigned to the municipalities, 1 power was modified to reduce municipality representation, because the committee consisting “people of the planning area” is no longer as a requirement for one advisory committee.

One features of the Niagara Escarpment Development and Planning Act (1990), which is different from the other two Acts, is that the Act (1990) 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.

4.11 Alternative Approaches to Rural Land Use Policies

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 (1945) knowledge problem. How can planners ever hope to obtain sufficient knowledge of “the particulars 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 mathematics, law, political science and economics, seeks to understand the origins and the nature of incentives in the policy process. Pennington draws on several important findings in the public choice literature in his analysis of land use planning. 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 are 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 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 (p. 102-103) is 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.

In addition to the alternative approaches described by Pennington, other strategies loosely 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 conditional donations of land from current owners, with the condition being 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 make such a donation. 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 (ALUS) program is an example of this approach that is being used in Ontario and in other provinces. Again, because the participation decision rests with the land owner, this approach avoids the takings problem and the associated fairness concerns.

4.12 Summary

I have reviewed four Provincial Policy Statements, three Acts and associated Plans in this section. Table 4.10 presents a summary of our review.
In these policies I reviewed, I looked for consistency for economic theory of policy development. I also looked for the trend towards centralization or decentralization of rural land use planning. I found some implicit evidence of the economic theory of development, others are neglected. In general, I confirmed Frankena and Scheffman’s (1980) finding that more effective use could be made of the economic theory of development in rural land policies. I also confirmed their finding of a trend towards centralization.
Table 4.10 A Policy Analysis Summary Chart

<table>
<thead>
<tr>
<th>Policy</th>
<th>What was the stated purpose of the policy?</th>
<th>What policy instruments were authorized?</th>
<th>Any change in power and authorities?</th>
<th>Market Failure Diagnosis</th>
<th>Non-Market Failure Diagnosis</th>
<th>Did it acknowledge the Economic Calculation Debate?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Niagara Escarpment Development and Planning Act</td>
<td>Maintenance of natural environment - Development compatible with nature</td>
<td>- Land purchasing</td>
<td>- 3 powers to the Lieutenant Governor in Council, 2 were 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</td>
<td>- Public goods, and externality implied by the rationales - No supporting evidence given</td>
<td>- Redundant rising costs - Distributional Inequality - No implementatio n analysis performed</td>
<td>- No, or to very limited extent</td>
</tr>
</tbody>
</table>

Niagara Escarpment Development and Planning Plan
| The Oak Ridges Moraine Conservation Act | - To protect the ecological and hydrological integrity of the Oak Ridges Moraine Area | - Land designation | - 1 designation power to the Lieutenant Governor in Council | - Public goods, externalities, and excessive discounting implied by the rationales | - Derived externalities, and distributional inequalities. | - No implementation analysis performed | - No |
| The Greenbelt Act | - Permanent protection of Agricultural land, and to limit urban sprawl | - Land designation | - 3 powers to the Lieutenant Governor in Council | - Public goods, externalities, and uninsurable risks implied by the rationales | - Derived externalities, internality and private goals, and redundant rising costs. | - No implementation analysis performed | - No |
Provincial Policy Statement

- To provide guiltiness 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

N/A
N/A
- No

The 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.

N/A
N/A
- No

Source:
Chapter 5 Summary, Conclusions and Implications

5.1 Summary of Contents

The purposes of this study were: 1. To document changes in Agricultural land in Ontario since 1951, with focus on the period after 1976, which was the last year included in Frankena and Scheffman’s (1980) study. 2. To document and to compare changes in Ontario’s major rural land use policies since 1980. 3. To develop an economic framework for policy evaluation, and to apply that framework in an economic evaluation of policies since 1980.

To achieve these purposes, first, I collected data regarding farmland area, cropland area, and field crop area from five data sources: the Census of Agriculture (1951-2011) from Statistics Canada, Agricultural Statistics for Ontario (1951-1996), later Statistics (2003-2012) from Ontario Ministry of Agriculture, Food, and Rural Affairs, the Annual Crop Inventory from Agriculture and Agri-Food Canada (2011-2013), Agricultural Resources Inventory (1983) and Soil Survey Complex (2009) from the Ontario Ministry of Agriculture, Food, and Rural Affairs (OMAFRA). I also collected data regarding soil classes, production, yield, and tile drainage. Among these datasets, I processed and calculated the data in the GIS form, which are the Agricultural Resource Inventory data, the Annual Crop Inventory data, and the Soil Complex data.

Second, I documented and interpreted each dataset, and provided a comparison among these datasets as well as datasets provided by Frankena and Scheffman (1980) to identify trends and inconsistencies. The use of different datasets provides a more complete perspective on trends in farmland and cropland area. Instead of relying on a single dataset to reach a conclusion, the comparisons have focus on different aspects of Ontario’s agricultural economy. Once data are double checked, policies based on the data become more evidence-based, and are more likely to contain clearer objectives. These datasets do not only provide comparisons to validate claims regarding rural land, but they also provoke discussions regarding the sources of inconsistencies within data series. For instance, the pattern of decline in farmland area may be resulted from the changing definition of farmland. Professionals whoever need to make policies with regard to that dataset must fully take into account the issues associated with the dataset.
Third, I documented major rural land use policies since 1980, among which are the Planning Act, the four Provincial Policy Statements, the Niagara Escarpment Development and Planning Act and its Plan, the Oak Ridges Moraine Act (2001) and its Plan (2002), the Greenbelt Act (2005) and its Plan (2005). For each documentation of the policy, I listed the power assignment over years among different amendments, as well as stated purposes, objectives, and rationales. Fourth, I evaluated the documented policies by identifying potential sources of market failure and non-market failure, looked for evidence of implementation analysis having been conducted, for evidence of appreciation of the implications of the economic calculation debate.

5.2 Major Findings and Implications

Below are the major findings and implications of this study, and the details of each finding have been discussed in its relevant chapter.

1. Farmland area decreased by 39% at the provincial level from 1951 to 2011, while cropland area has increased by 3.29% from 1951 to 2011 at the provincial level, according to the Census of Agriculture. Moreover, the rate of decrease in farmland was slower during the period of 1976 to 2011 than the period of 1951 to 1976. It declined by 29% between 1951 and 1976, and 10% between 1976 and 2011 according to the Census of Agriculture. The alarming concern that Ontario is losing agricultural land reflected by various policies is not true at the provincial level. Hence, the motivation of provincial policies aiming at protecting farmland should be reviewed further in future policy reviews.

2. Cropland is a more meaningful measure of agricultural land if one is concerned about food security and the viability of the agricultural economy. Instead of posing rationales concerning losing farmland in various policies and reports, provisions regarding a more clearly defined cropland will be more helpful for local implementation.

3. The annual conversion rate of class 1 agricultural land to urban uses is low: about 0.3% per year from 1971 to 2001 in Ontario. The low conversion rate of prime agricultural land to non-agricultural uses requires further studies to find out the area being converted and the reasons behind the conversions. Non-uniformed conversions within Ontario may require non-uniformed polices regarding development in order to successfully achieve policy objectives.
4. Productivity has been increasing over years, and the installation of tile drainage to improve soil quality has become common in Ontario, which further assures the food security concern.

5. Provincial rural land use policies after 1980 show a trend of more centralized land use planning at the provincial level in Ontario. In this case, a more local oriented policy may be desirable, because one often complained issue among municipalities is that they need to consult the relevant Ministry for clarification of provisions. The provincial policies can be general and contain principles, but it should allow local variations depending on local conditions.

6. There are some implicit evidence of the economic theory of policy development, others are neglected. Land use policies or its Task Force report contains little empirical economic evidence to support policy rationales. After 38 years, Frankena and Scheffman’s (1980) finding that policies lack the economic theory of policy development still holds true. There are theories why economic analyses were not cooperated into policies. Politicians, planners and economists should find a way to reach mutual understanding.

7. Land designation has become the preferred method of rural land use planning since the establishment of the Niagara Escarpment Plan in late 1970, and the designation is usually based on physical attributes, which ignores the theory of comparative advantage. Land leasing and purchasing, which is a land use planning tool recommended by Frankena and Scheffman (1980), has been largely abandoned.

5.3 Limitation and Recommendations for Future Researches

The limitations on data sets need attention of the data collection agencies. First, it will eliminate the impacts of county boundary changes to the accuracy of Census of Agricultural data if all the Census data can be converted into the GIS form, which can be examined and manipulated on a digital map. The study of boundary change has been time consuming, and often literatures are hard to find. Following that, it will be beneficial to have a complete document of county boundary change histories for all future studies. Second, for the AAFC annual crop data, it will be more helpful if the crop identification method is available in a more accessible form. Third, for the Agricultural Resource Inventory data, it will be beneficial to extend the boundary of study to the whole province. And an update of this dataset will provide a valuable comparison
of how agricultural land has changed over years. Fourth, for the *Agricultural Statistics for Ontario* data from OMAFRA, it will be beneficial to reconcile all the datasets available online under different titles, and to provide a best explanation of the differences. Last but not least, it will be beneficial to offer a spatial data product containing information regarding the agricultural land on different soil classes for the whole province.

There are also recommendations for relevant future studies based on this study. First, it will be beneficial to find out the sources of inconsistencies among different datasets. Second, it will be beneficial to study the relationships among prime agricultural land area, urban land area, productivity, and population growth over years. Last, with all the best available datasets provided in this study, together with all detailed analysis of possible policy influences outlined, an econometric spatial analysis of the factors influencing changes in agricultural land should be undertaken.
Reference


Binkley, A. (2014) “In one decade, Canada Lost a Million Ha of Farmland”, *Ontario Farmer*.


Canadian Century Research Infrastructure (2013) *Census of Canada: Census Divisions*.

Cummings, H. (Undated), Unpublished Report, University of Guelph, Guelph.


Government of Ontario (1983), *Agricultural Resources Inventory*, Ontario Ministry of
Agriculture, Food, and Rural Affairs, Guelph.


Appendix:

Appendix 1  The Changing Definitions of Census Farms

The definition of a census farm has changed over 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, 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).
Appendix 2 Regional Boundary Definitions and Adjustments 1951-2013

<table>
<thead>
<tr>
<th>Region</th>
<th>Definition and Adjustments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern Ontario Region</td>
<td>Stormont, Dundas, and Glengarry, Prescott and Russell, Ottawa, Leeds and Grenville, Lanark, Frontenac, Lennox and Addington. Adjustment was made to exclude Renfrew.</td>
</tr>
<tr>
<td>Central Ontario Region</td>
<td>York, Toronto, Prince Edward, Hastings, Northumberland, Peterborough, Kawartha Lakes, and Durham. For the purpose of this study, adjustments were made to include Simcoe, but to exclude Muskoka, Haliburton, and Parry Sound.</td>
</tr>
<tr>
<td>Western Ontario Region</td>
<td>Dufferin, Wellington, Halton, Waterloo, Perth, Huron, Bruce, Grey. For the purpose of this study, adjustment is made to exclude Simcoe.</td>
</tr>
</tbody>
</table>


Notes:
1. These regions were categorized based on the definition of Census Agricultural Region (or Agricultural Region before 1996), which was first defined in the 1986 in Census of Agriculture. Adjustments were made to taken out certain counties within a region, because they were not included in the Agricultural Resource Inventory data (Table 4.18), and do not have intensive agricultural activities.
## Appendix 3: Southern Ontario County Boundary Definitions and Historical Changes 1951-2011

<table>
<thead>
<tr>
<th>Municipal Units</th>
<th>Historical Name and Boundary Change Notes¹</th>
</tr>
</thead>
</table>
| Hamilton        | 1973: Wentworth county became Hamilton-Wentworth  
                  1974: Hamilton-Wentworth became Regional Municipality of Hamilton-Wentworth  
                  2001: Regional Municipality of Hamilton-Wentworth became City of Hamilton  
                  Clyde was transferred to Waterloo, which is field crop land and woodland.  
                  Bridgeview Survey was transferred to Halton, which is half built-up area, and half woodland and idle agricultural land. |
| Niagara         | 1970: Lincoln and Welland merged to become Regional Municipality of Niagara. |
| Haldimand-Norfolk | 2001: East half became Haldimand, West half became Wentworth  
                  The boundary between Oxford and Norfolk extends to where used to belong to Norfolk, near Tillsonburg, which is mostly built-up area. |
| Brant           | 1999: Excludes the city Brantford, which is distinct from this new municipality. |
| Oxford          | 1998: East-Zorra Tavistock was added from Perth, which is mostly built-up area.  
                  The boundary between Oxford and Norfolk extends to where used to belong to Norfolk, near Tillsonburg, which is mostly built-up area. |
<table>
<thead>
<tr>
<th>Region</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elgin</td>
<td>Part of Belmont was added from Middlesex, which is mostly agricultural land.</td>
</tr>
<tr>
<td>Chatham-Kent</td>
<td>1998: County of Kent joined City of Chatham to become Regional Municipality of Chatham-Kent. Part of Tilbury and Wheatley were added from Essex, which is mostly built-up area. Minor area was added from Lambton, which was half agricultural land, and half unknown land uses.</td>
</tr>
<tr>
<td>Essex</td>
<td>Part of Tilbury and Wheatley became part of Chatham-Kent, which is mostly built-up area.</td>
</tr>
<tr>
<td>Lambton</td>
<td>A part of Grand Bent were added from Huron, which is agricultural land. Minor area was added to Chatham-Kent, which was half agricultural land, and half unknown land uses.</td>
</tr>
<tr>
<td>Middlesex</td>
<td>Transferred Belmont to Elgin, which is mostly agricultural land.</td>
</tr>
</tbody>
</table>

Documentation is based on the following sources:
3. Canadian Century Research Infrastructure (2013)

Notes:
1. Historical boundary changes are identified by comparing the 1951 and 2011 boundary maps based on best knowledge available. If the change cannot be found in official documents, the change can be identified, but the time of change cannot be found in official documents. If the exact time of change cannot be found, the point of time, when this change is reflected in the Census is documented. *Agricultural Resource Inventory* map was applied to examine if the land impacted in the boundary change involves agricultural land as a part of documentation, even though the amount of land involvement is not calculated.
## Appendix 4 Eastern Ontario County Boundary Definitions and Adjustments 1951-2013

<table>
<thead>
<tr>
<th>Municipal Units</th>
<th>Historical Name and Boundary Change Notes&lt;sup&gt;1&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stormont, Dundas and Glengarry</td>
<td>Three counties merged to become a single municipality called Stormont, Dundas, and Glengarry. This change was shown in the Census beginning 1986, but no territory change in total.</td>
</tr>
<tr>
<td>Prescott and Russell</td>
<td>Prescott and Russell merged to become Prescott and Russell. This change was shown in the Census beginning 1986. Area adjacent to Russell was added to Ottawa, which is mainly agricultural land.</td>
</tr>
<tr>
<td>Ottawa</td>
<td>1968: Carleton became Ottawa-Carleton. 2001: Regional Municipal of Ottawa-Carleton became City of Ottawa. Area adjacent to Russell was added to Ottawa, which is mainly agricultural land.</td>
</tr>
<tr>
<td>Leeds and Grenville</td>
<td>Minor area transferred to Lanark, which is built-up area and woodland.</td>
</tr>
<tr>
<td>Lanark</td>
<td>Minor area added from Leeds and Grenville, which is built-up area and woodland.</td>
</tr>
<tr>
<td>Frontenac</td>
<td>No boundary changes during the period.</td>
</tr>
<tr>
<td>Lennox and Addington</td>
<td>No boundary changes during the period.</td>
</tr>
</tbody>
</table>

Documentation is based on the following sources:

Notes:
1. Historical boundary changes are identified by comparing the 1951 and 2011 boundary maps based on best knowledge available. If the change cannot be found in official documents, the change can be identified, but the time of change cannot be found in official documents. If the exact time of change cannot be found, the point of time, when this change is reflected in the Census is documented. *Agricultural Resource Inventory* map was applied to examine if the land impacted in the boundary change involves agricultural land as a part of documentation, even though the amount of land involvement is not calculated.
### Appendix 5 Central Ontario County Boundary Definitions and Adjustments 1951-2011

<table>
<thead>
<tr>
<th>Municipal Unit</th>
<th>Historical Name and Boundary Change Notes¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>York</td>
<td>1953: Excludes Toronto</td>
</tr>
<tr>
<td>Toronto</td>
<td>1998: Municipality of Toronto became the City of Toronto</td>
</tr>
<tr>
<td>Prince Edward</td>
<td>1998: Prince Edward County became City of Prince Edward County</td>
</tr>
<tr>
<td>Central United County</td>
<td>This is a synthetic region designed for this study for the purpose of data consistency. This region includes Simcoe, Hastings, Northumberland, Peterborough, Kawartha Lakes, and Durham. The boundaries of these counties changed dramatically in 1973: The United Counties of Durham and Northumberland separated to become Regional Municipal of Durham and Northumberland. Manyers was transferred from Durham county to Victoria County. Cavan was transferred from Durham county to Peterborough county. South Monaghan was transferred from the United Counties to Peterborough county. Southern Ontario county was transferred to Regional Municipality of Durham. Mara and Rama were transferred to Simcoe county. 2001: Victoria County became City of Kawartha lakes.</td>
</tr>
</tbody>
</table>

Documentation is based on the following sources:
3. Canadian Century Research Infrastructure (2013)

Notes:
1. Historical boundary changes are identified by comparing the 1951 and 2011 boundary maps based on best knowledge available. If the change cannot be found in official documents, the change can be identified, but the time of change cannot be found in official documents. If the exact time of change cannot be found, the point of time, when this change is reflected in the Census is documented. *Agricultural Resource Inventory* map was applied to examine if the land impacted in the boundary change involves agricultural land as a part of documentation, even though the amount of land involvement is not calculated.
Appendix 6 Western Ontario Boundary Definitions and Historical Changes 1951-2011

<table>
<thead>
<tr>
<th>Municipal Units</th>
<th>Historical Name and Boundary Change Notes¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peel</td>
<td>1973: Peel became Peel Regional Municipality. Part of Orangeville and some area Purple Hill were transferred to Dufferin, which were pasture and built-up area.</td>
</tr>
<tr>
<td>Dufferin</td>
<td>Orangeville and some area Purple Hill were added from Peel, which were pasture and built-up area.</td>
</tr>
<tr>
<td>Wellington</td>
<td>Area near Mount Forest added from Grey which is field crop area. Area near Palmerston was transferred to Perth, which is field crop land. Part of Eden Mills was added from Halton, which is half built-up area and half agricultural land.</td>
</tr>
<tr>
<td>Halton</td>
<td>Bridgeview Survey was added from Hamilton, which is half built-up area, and half woodland and idle agricultural land. Part of Eden Mills was transferred to Wellington, half built-up area and half agricultural land.</td>
</tr>
<tr>
<td>Waterloo</td>
<td>Clyde was added from Hamilton, which is field crop land and woodland.</td>
</tr>
<tr>
<td>Perth</td>
<td>Tavistock was added from Oxford, which is built-up area. Area near Palmerston was added from Wellington, which is field crop land.</td>
</tr>
<tr>
<td>Huron</td>
<td>A part of Grand Bent was transferred to Lambton, which is agricultural land. Lucknow was transferred to Bruce, which is built-up area.</td>
</tr>
<tr>
<td>Bruce</td>
<td>Lucknow was added from Huron, which is built-up area. 1999: Hanover was transferred to Grey. Area near Hepworth and Wiarton were added from Grey, which is mainly built-up area and idle agricultural land.</td>
</tr>
<tr>
<td>Grey</td>
<td>Area near Mount Forest was transferred to Wellington, which is field crop area. 1999: Hanover was added from Bruce. Area near Hepworth and Wiarton was added from Bruce, which is mainly built-up area and idle agricultural land.</td>
</tr>
</tbody>
</table>

Documentation is based on the following sources:
3. Canadian Century Research Infrastructure (2013)  
Notes:
1. Historical boundary changes are identified by comparing the 1951 and 2011 boundary maps based on best knowledge available. If the change cannot be found in official documents, the change can be identified, but the time of change cannot be found in official documents. If the exact time of change cannot be found, the point of time, when this change is reflected in the Census is documented. Agricultural Resource Inventory map was applied to examine if the land impacted in the boundary change involves agricultural land as a part of documentation, even though the amount of land involvement is not calculated.