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Green lights in the Greenbelt? A qualitative analysis of farm investment decision-making in peri-urban Southern Ontario

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ABSTRACT

The survival of farms requires innovative adaptation and investment to take advantage of the characteristics of the peri-urban environment. In Ontario, Canada, the Provincial Government passed in 2005 the Greenbelt Act that delimits Ontario's Greenbelt—an area of 1.8 million acres where land is protected from development around the metropolitan region of the Greater Golden Horseshoe. This paper presents research on farm-level analysis of farmers' investment decision-making aiming at understanding the impact of Ontario's Greenbelt on farm investment. We interviewed 21 peri-urban farmers from Southern Ontario and 3 Greenbelt experts. Three sources of data are used to understand farm investment decision-making: farmers' mental maps, the interview transcriptions, and the information provided by a complementary questionnaire. The results demonstrate that Ontario's Greenbelt, designed to make agriculture the primary land use in the designated area through farmland preservation, is not sufficient. Protecting a sustainable and efficient agricultural sector requires the presence of the other actors in the whole food chain in order to supply farmers and help them access markets for their products, as well as provide information and technical services.

1. Introduction

The spatial growth of metropolitan areas results from a demographic increase and the willingness of urban residents to live in land-consuming types of housing (Heimlich and Anderson, 2001; EEA, 2006; Beesley, 2010). As a result, edges of metropolitan areas – *a.k.a.* peri-urban areas – have become blurred, not completely urban but not yet rural. In Canada, the province of Ontario produced 38% of Canada's GDP in 2010[1] with 2/3 originating from the Greater Golden Horseshoe (GGH), contributing to the economic attractiveness of the GGH (Ontario Ministry of Infrastructure, 2012). Demographic forecasts predict a population increase of 4.4 million inhabitants by 2036 in Ontario, 2/3 of whom will locate in the GGH (Ontario Ministry of Finance, 2012). Consequently, the rural/urban fringe of Metropolitan Toronto is characterized by urban sprawl (Ontario Ministry of Infrastructure, 2012; Environmental Commissioner of Ontario, 2011). In 2005, the Ontario Ministry of Infrastructure passed the Places to Grow Act to promote a more focused urban growth across Southern Ontario. The Places to Grow Act defines places where growth and related development should be prioritized, emphasizing the role of diversified mixed-use areas. Twenty-six cities have been designated to provide for both population growth and job opportunities (Ontario Ministry of Infrastructure, 2012). The impact of this act on farmland protection and farm viability is difficult to assess since it simultaneously implies developing denser urban areas, constructing new infrastructure, targeting urban development to cities outside of the GTA, and protecting agricultural land.

Maintaining agriculture in proximity to urban centres has been a worldwide concern, which has resulted in distinctive sets of initiatives (Carter-Whitney, 2008; Inwood and Sharp, 2012; Darly and Torre, 2013; Paül and McKenzie, 2013; Pribadi and Pauleit, 2015). As an example, around Barcelona, Spain, the establishment of a farmland conservation policy has resulted in the development of local food networks, which permit farmers to take advantage of the proximity of the city (Paül and McKenzie, 2013). In North America, several policies rely on the zoning of land resulting in the creation

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[1] http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/econ15-eng.htm.

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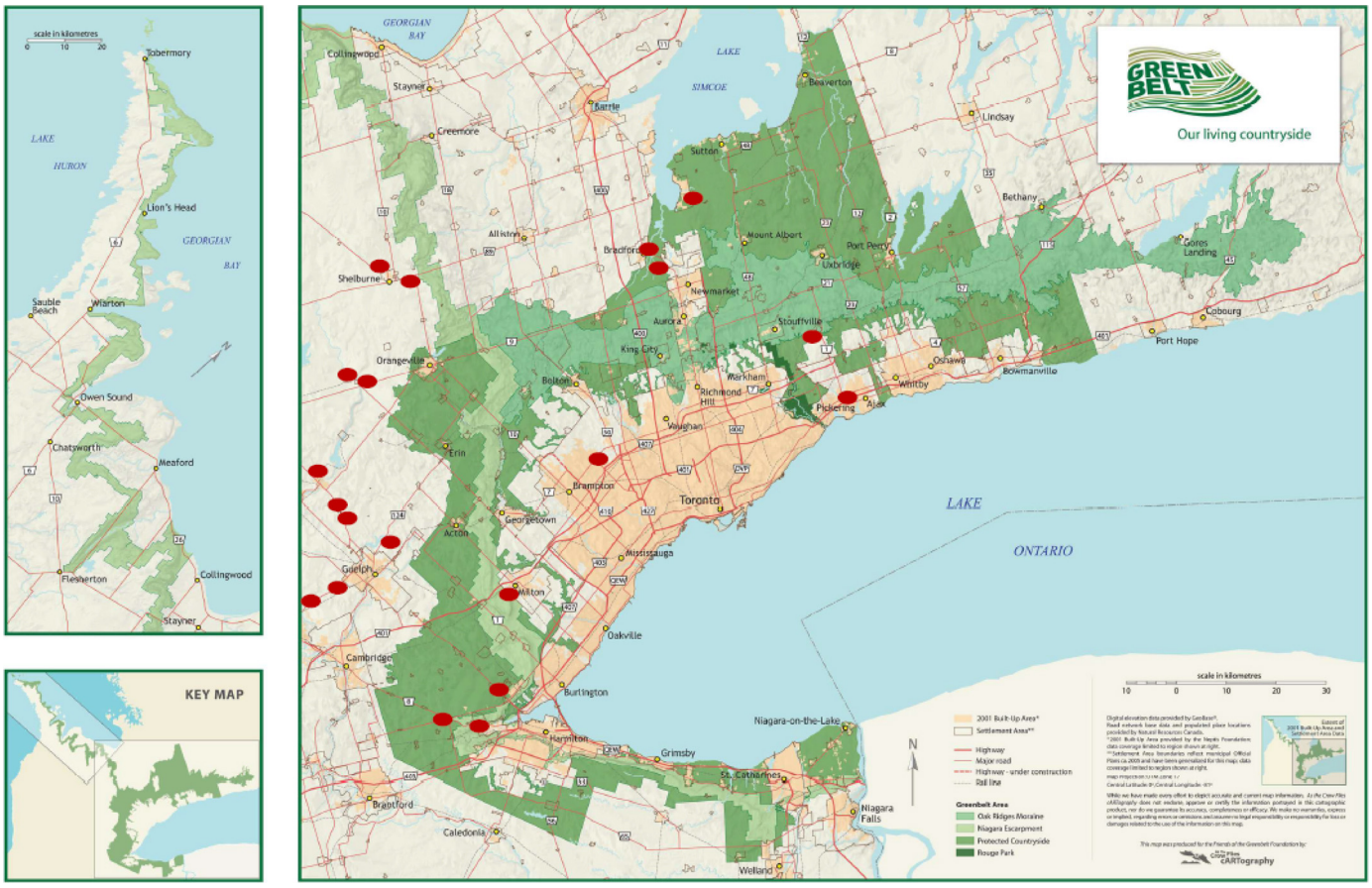

Fig. 1. Location of interviewees' farm operations in Southern Ontario.

of areas where land uses are severely restricted. In Oregon, USA, the City of Portland has been delimited by the Urban Growth Boundary since 1979, which consists of an area of more than 250,000 acres. The preservation of land from urban sprawl is the bottom-line of both these initiatives, which have different objectives in terms of agricultural protection. In Canada, the British Columbia Agricultural Land Reserve dates back from 1973, one of the oldest such policies. It consists of flexible zoning that protects an area of approximately 716,000 acres; this zoning can be modified to allow for development or extended land protection. In addition, in 2009 the Province enacted the Sea to Sky Greenbelt, a more stringent zoning dedicated to environmental and recreational land uses. On the other hand, Quebec's Farmland Protection Zone, another major Canadian policy enacted in 1978, focuses specifically on farmland protection. This is the largest protected area, covering fifteen million acres. More recently, Ontario's Greenbelt, an in-between-scaled policy, excluded approximately 1.8 million acres of land from potential development with the original objective to promote agricultural and environmental land uses.

In 2005, Ontario's Government passed the Greenbelt Act that delimits Ontario's Greenbelt in the fast-growing Greater Golden Horseshoe (Ontario Ministry of Municipal Affairs and Housing, 2005). It includes the Oak Ridges Moraine, the Niagara Escarpment, and an additional Protected Countryside Area encompassing prime agricultural land, Ontario specialty crops areas, and other rural areas. Previous zoning policies – *i.e.,* the Oak Ridges Moraine Plan and the Niagara Escarpment Plan – are maintained and incorporated into the Greenbelt legislation. However, instead of introducing new regulations about land development, the Greenbelt strengthens existing regulations – *e.g.,* regulations for lot severances. Ontario's Greenbelt Act is interpreted at the municipal level where municipal plans shall comply with the Provincial Act. Therefore, the implementation of land use regulations at different levels can result in heterogeneous interpretations of Ontario's Greenbelt Plan and has the potential to hinder the transparency of Ontario's Greenbelt objectives. Ontario's Greenbelt can be understood as a means to delimit boundaries for urban growth, to preserve agriculture, to protect natural heritage and water resource systems, and to provide a diverse range of economic and social activities. Although Ontario's Greenbelt has been created to preserve a non-developed multi-purpose land use area in the GGH, one of the main objectives of Ontario's Greenbelt is to maintain agriculture as the predominant land-use within the protected area through farmland preservation. A subset of objectives aiming at achieving Ontario's Greenbelt agricultural goals are promoted: to maintain and further develop local food systems, to preserve prime agricultural land, and to provide investment certainties for farmers. The agricultural part of the plan is thus clearly concerned with the evolution of the agricultural sector and the necessary adaptation processes that farm systems experience.

The survival of farms requires innovative adaptation and investment to take advantage of the new constraints and opportunities that characterize the peri-urban environment (Alasia et al., 2009; Evans, 2009; Inwood and Sharp, 2012; Clark and Munroe, 2013). Adaptation is commonly achieved by investing, the purchase of factors that are used in the future in order to create wealth. In this paper, we consider investment in three types of factors: land, equipment, and human capital. In peri-urban areas, investment is constrained by farmland shortages, the high price of farmland, the uncertainty for future farmland uses, and the conflicts resulting from the proximity of farm operations with non-farming residents. The difficulties in increasing farm size may make expen-

sive equipment that generates positive returns on large farms less profitable (Bryant and Johnston, 1992). The high prices of farmland may generate liquidity shortages that can decrease farmers' future capacities to invest (Cavailhès and Wavresky, 2003). The uncertainty surrounding future farmland uses may also complicate investment planning (Bryant and Johnston, 1992). Conflicts can arise with non-farming residents – *e.g.,* frequent trespassing on agricultural properties or concerns about farm practices. As well, the increasingly-urban characteristics of the environment – *e.g.,* higher-level road construction – may cause variable production costs to increase (Nehring et al., 2006; Darly and Torre, 2013). Nevertheless, peri-urban farmers can also take advantage of the proximity of urban markets by diversifying their income sources (Inwood and Sharp, 2012; Pribadi and Pauleit, 2015). Finally, peri-urban landscapes are of interest to numerous stakeholders, which results in the emergence of a multifunctional area. In the end, the performance of Greenbelt policies is uneven and contingent on the degree to which these policies are seen to support or thwart the interests of stakeholders (Beesley, 2010; Fitzsimmons et al., 2012).

Recent research on Ontario's Greenbelt has shown that: (i) the average farm size in Ontario's Greenbelt is catching-up with farm size in the rest of Ontario (Akimowicz et al., 2013a,b); (ii) Ontario's Greenbelt has a negative effect on the farmland values of properties located within 10 km of its border (Deaton and Vyn, 2010); and (iii) misunderstandings between farmers and residents, resulting from differences in values and preferences, have resulted due to the use of the term *countryside* (Cadieux et al., 2013). Nevertheless, Ontario's Greenbelt remains a tool with great potential to protect near-urban agricultural landscapes if coordination is improved amongst stakeholders, consistency is improved amongst municipalities, and agricultural knowledge is used to help coordinate actions (Caldwell and Procter, 2013; Kubursi et al., 2015). The success of Ontario's Greenbelt is consequently correlated to the perception of targeted stakeholders – *i.e.,* farmers – whose investment behaviour is, in the end, the observable outcome of their perceptions of the Greenbelt's capacity to support their businesses.

This paper presents a farm-level analysis of farmers' investment decision-making, designed to understand the impact of Ontario's Greenbelt on farm investment. The interest in this approach is to capture the multiple layers that influence farmers' decision-making. Despite the role that social factors play in family farmers' decision-making, due to the blurred boundary between the farm business and the farm household, few investigations have undertaken an empirical analysis of these two factors simultaneously (Moran et al., 1993; Celio et al., 2014; Huber et al., 2015). We aim to contribute to reducing this gap by using in-depth interviews in conjunction with mental mapping. Additionally, this paper provides interesting conclusions for decision-makers to help adjust their strategy in order to protect agriculture in Ontario's Greenbelt.

This paper is structured as follows: in the following section, we present the collected data and detail the method of analysis based on a grounded theory approach. In the third section, we highlight the relevant theory underpinning our analysis of farm investment and adaptation in near urban areas. In the fourth section, we analyse the data and present our results, which are then discussed in the fifth section. Finally, we conclude and discuss future research.

2. Material and methods

2.1. Material

We interviewed 3 Greenbelt experts and 21 peri-urban farmers in Southern Ontario (Fig. 1). The peri-urban characteristic of a farm is the result of its geographical proximity to fast-growing urban centres. In order to understand the impact of the Greenbelt Plan on farmers' investment decision-making, the farmer sample was composed of the three main types of Southern Ontario farmers: fruit and vegetable growers (FVG), animal farmers (AF), and cash-croppers (CC). Fruit and vegetable growers are farming on smaller acreages and can more easily sell their produce directly to consumers. On the other hand, animal farmers and cash-croppers are farming on much larger areas and both may have conflictual relationships with non-farming residents because of traffic and/or odours.

Additionally, interviewees with diverse profiles were investigated by including part-time and full-time farmers, a range of ages, and farmers who are planning to transfer their farm soon and others who are not. Our sample is not designed to be representative of the Southern Ontario peri-urban agricultural sector but instead catches the diversity of investment decision-making processes of peri-urban farmers operating in or in proximity to Ontario's Greenbelt. Table 1 summarizes the diversity of farm operations and households that were included in our sample. In this paper, we use three sources of data collected during in-depth interviews to understand farm investment decision-making: farmers' investment decision-making mental maps, interview transcripts, and responses to a questionnaire designed to collect information about farm structures and farm households. These three sources are used in a complementary way, as interviewees' narratives allow us to articulate their rationales and the responses to the questionnaire permit contextualization of their decision-making.

2.2. Method

We collected data at the farm household level since professional and private lives are intertwined on family farm operations, which is the dominating farm organization in Southern Ontario. Indeed, for family farmers, production and consumption decisions may overlap, time spent on farm may be shared between family and farming, and the investment dynamic may depend on the existence of an heir to take over the farm (Boehlje, 1992; Gale, 1994; Weiss, 1999; Lobley and Potter, 2004; Inwood and Sharp, 2012). Additionally, farmers make decisions according to their own goals, values, and beliefs, which emphasizes the importance of the farm household as a relevant decision-unit (Hansson et al., 2013).

We have extracted stakeholders' knowledge by using mental modelling, a method used by anthropologists since the 1960s (Hage and Harary, 1983). This is a grounded theory approach that relies on stakeholders' tacit knowledge (Isaac et al., 2009; Van Winsen et al., 2013). Theoretically embedded – *i.e.,* graph theory – it is flexible enough to permit cross-model comparisons of stakeholders' mental representations (Hage and Harary, 1983; Carley and Palmquist, 1992; Gray et al., 2012). At the same time, this method permits the researchers to deal with a variety of research goals, from exploratory research to predictive research. Lynam et al. (2007: p. 3) classify such approaches into three classes; the first class coincides with our objective to "extract knowledge, values, or preferences from a target group to understand local issues more effectively." Indeed, following Mathevet et al. (2011: p.4), we assume that for "a given knowledge domain where a common (socially or culturally defined) truth exists, informant responses are likely to be correlated with this truth to the extent that they may know this truth." Therefore, mental modelling reveals the dynamics of a system, even if the rules affecting the system remain unclear (Groumpos, 2010; Jones et al., 2011). The theoretical benefits of such a method were emphasized by some of the interviewees, who confided that they enjoyed taking the interview since they had never been asked about their investment decision-making before; they asked us to forward their mental maps to them to further critically reflect on their investment decisions.

Recently, mental modelling has been used for natural resource management (Özesmi and Özesmi, 2004; Isaac et al., 2009;

Table 1
Characteristics of the farm operations.

Farm type	Greenbelt[a]	Farm size (acres)	Share of rented land	Diversified income	Age of the farm manager	Identified successor
Animal	No	80	0%	Yes	19	N/A
Animal	No	200	0%	No	29	N/A
Animal	No	80	0%	Yes	48	Son or daughter
Animal	No	310	23%	Yes	38	N/A
Animal	No	10	0%	Yes	60's	–
Animal	No	300	67%	Yes	63	–
Animal	Yes	910	99%	No	30's	N/A
Animal	Yes	325	0%	No	60	Son
Animal	Yes	360	17%	Yes	63	Daughter
Cash-crop	No	470	55%	Yes	40's	N/A
Cash-crop	No	85	38%	Yes	45	N/A
Cash-crop	Yes	550	55%	Yes	64	–
Fruit and Vegetables	No	340	0%	Yes	44	Son
Fruit and Vegetables	No	83	0%	Yes	25	N/A
Fruit and Vegetables	No	50	0%	Yes	81	Son
Fruit and Vegetables	No	500	13%	Yes	59	Son
Fruit and Vegetables	No	3	100%	Yes	55	N/A
Fruit and Vegetables	Yes	90	0%	Yes	55	–
Fruit and Vegetables	Yes	400	0%	Yes	61	–
Fruit and Vegetables	Yes	550	84%	Yes	71	–
Fruit and Vegetables	Yes	40	38%	Yes	50	Children
Sample average		273	28%	–	–	–
Average in Ontario[b]	–	244	29%	–	–	–

[a] A farm is considered in the Greenbelt if the farmstead is located in the Greenbelt.
[b] Source: values for 2011 from StatsCan (http://www.omafra.gov.on.ca/english/stats/census/summary.htm).

Mathevet et al., 2011; Vanwindekens et al., 2014 Isaac et al., 2009; Mathevet et al., 2011; Vanwindekens et al., 2014) and risk management (Wood et al., 2012; Van Winsen et al., 2013). In our case, farmers' mental maps are graphical representations of the causal relationships that structure farmers' investment decision-making. Consequently, it is possible to understand the factors that farmers take into account when they plan an investment. Eliciting these mental maps is a critical step for adjusting policies dealing with the sustainable management of natural resources, such as the Ontario Greenbelt Plan. The mental maps were collected during in-depth interviews with farmers and with Greenbelt experts[2] involved in agricultural management.

Each interview lasted two hours, on average. During the interview, interviewees were asked to create a mental map of farm investment decision-making by using a list of 47 predetermined variables, earlier identified by a focus group composed of researchers and actors from agricultural organizations. This list enabled us to compare interviewees' mental maps because the same variables were used from one interview to another. During the interviews, interviewees had to sort variables into three categories first: important, somewhat important, and not important variables. At any time, they could ask for definitions. Then, they had to build a mental map using the important variables only. They had to connect the different variables with arrows representing the causal relationships. The primary strength of mental modelling is that if farmers do not know how a variable can affect another one, but believe there is a causal relationship, they can link the two variables without any extra explanation. Therefore, mental maps reveal interviewees' perceptions of a problem, such as investment decision-making, and permit an understanding of an interviewee's behaviours. Interviewees were free to explain their thoughts and ask for support in order to connect the variables according to their opinion. They also had the opportunity to switch a variable from one category to another if necessary. Once confident with the resulting map, interviewees had to assess the strength of the causal relationships with a number ranging from −10 (lowest negative impact) to 10 (highest positive impact), with 0 being a neutral relationship (no effect). Fig. 2 shows a mental map as generated by an interviewee at the end of the interview: variables are connected with arrows and the strength of the causal relationships is assessed by writing down a number on each arrow.

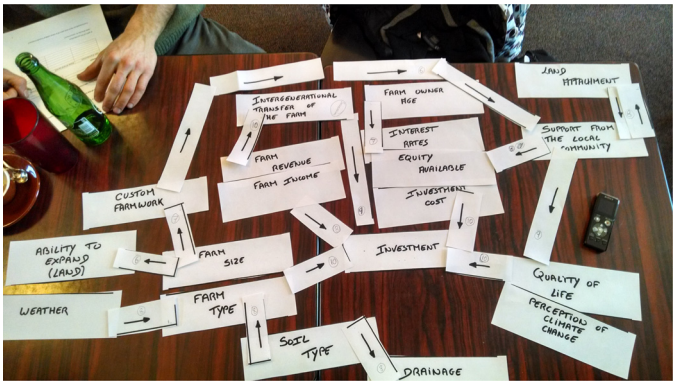

Fig. 2. FVG-NGB1's mental map at the end of the interview.

Finally, they had to complete a questionnaire designed to collect information about the structure of the farm, the characteristics of the household, and farm investment planning. Interviews were recorded and transcribed. In order to track interviewees, acronyms are used. Each interviewee is identified by the type of farm (CC for cash-croppers, AF for animal farmers, and FVG for fruit and vegetable growers) and the farm location (GB for farms located in the Greenbelt and NGB for farms located outside the Greenbelt), and by the use of GE for Greenbelt experts.

3. Theory

In this section, we define the theoretical concepts framing our analysis. The economic literature traditionally identifies scale, size, and scope economies as traditional factors guiding farm adaptation since they permit an increase in farm efficiency through specialization or diversification of the activity (Chavas and Kim, 2010;

[2] The Greenbelt experts are within different institutions operating at different scales: the Ontario Ministry of Agriculture, the Agricultural Adaptation Council, and the Greenbelt Foundation.

Blancard et al., 2016). Factors such as market conditions and public support have been identified as other major drivers of farm investments – for instance, see Zimmermann et al. (2009) for a review. Nevertheless, in this review these factors are not detailed since most interviewees were not aware of the many support programs they could have taken advantage of or intentionally did not apply for them. Furthermore, interviewees explicitly stated that they have adapted their farming system in order to cope with market and natural conditions; aware of their lack of control over these factors, they have developed solutions to minimize the negative impacts of unpredictable market and natural conditions over the long term.

In the agricultural sector, a farm can leverage scale, size, and scope economies to increase efficiency (Hallam, 1991; Chavas and Kim, 2010). Scale economies bring about a decrease in the long-term average production costs as the production increases faster than the quantity of inputs used in the production process. Size economies, or pecuniary economies, result in a decline in average production costs as farm size grows, since larger farms can negotiate volume discounts. On the other hand, scope economies result in lower long-term average production costs, as the simultaneous production of two goods by the same production unit generates lower production costs than the production of the same two goods by two different production units.

The investment process has been described as a treadmill, since the economic rent resulting from increased efficiency exists only in the short run (Cochrane, 1958). For Cochrane, farmers invest in technologies to decrease production costs, and thus increase profit margins. In the long run, as more farmers adopt the technology, production increases and prices decrease. Profit margins are then back to their initial levels, creating an incentive for adopting new technology. In addition, Levins and Cochrane (1996) pointed out that if prices are stable – for instance due to government interventions – and land resources are limited, the economic rent is usually captured by landowners due to farmers' competition in accessing the limited land resources.

Specialization coupled with farm size growth is usually part of a strategy aimed at increasing margins by reducing costs due to the existence of economies of scale and economies of size (Mishra et al., 2004; Chavas and Kim, 2010). The literature highlights several factors influencing farm size growth or specialization (Hansson et al., 2010; Akimowicz et al., 2013b; Huber et al., 2015). In particular, there is consensus that farm size, a recent increase in farm size, the economic size of the farm, the existence of sunk costs, and the ability to transfer the farm have positive effects on the intent/likelihood[3] to increase the size of the farm. However, the age of the farmer or the absence of a person to take over the farm has a negative effect. Interestingly, the role of off-farm income remains unclear. Whether used to support farm investment or the farm household, predicting its impact is not straightforward and the variable is non-significant.

Nevertheless, the existence of scale economies has been challenged by Boussard (1986), who explained the heterogeneity of farm structures through the non-existence of economies of scale due to an homogeneous production function of degree one. For Boussard, there is an adjustment of agricultural techniques, fixed factors, savings, and prices. In line with this, Hallam (1991) and Chavas (2001) showed that the empirical distribution of average cost curves in agriculture is not U-shaped but L-shaped. These observations suggest that only smaller farms generate economies of scale when increasing size, not larger ones where farming systems and farm practices are adjusted to farm size. Furthermore, Alvarez and Arias (2004) concluded that the growth of farm size can lead to significant diseconomies of size if managerial abilities are kept constant.

Another adaptation strategy relies on diversifying the farm activity and taking advantage of economies of scope. Diversification has received more attention with the rise of multifunctionality issues in the public debate. The concept of diversification is defined in multiple ways in the literature (Ilbery, 1991; McNally 2001; Barbieri and Mahoney, 2009; Hansson et al., 2010; Northcote and Alonso, 2011; Meraner et al., 2015). For Hansson et al. (2010), the cause of these divergences is to be found in the degree of conceptualization of the process of diversification (Table 2). Indeed, the debate mainly focuses on the range of activities that should be considered, starting with crop diversification and ending with pluriactivity – *i.e.,* allocating farm labour to an off-farm activity. In this paper, since our goal is to understand farmers' investment decision-making in a region dominated by family farms – that is to say, taking into account the characteristics of the farm households – we consider diversification to be the development of any activity that results in the diversification of the farm household's income.

Barbieri and Mahoney (2009) point to the existence of overlapping types in their own 2009 typology, which, actually, is more of an empirical classification. On the other hand, the two other typologies oppose different trends (agricultural side versus rural side) and diverge on the issue of the inclusion of off-farm incomes. For this research, the overwhelming share of family farms and their proximity to urban markets, where off-farm jobs can be found relatively easily, has influenced our choice to work with Van Der Ploeg and Roep's (2003) definition.

Farmers may decide to diversify for various reasons. There is a consensus that financial and psychological stress, market structure, and lifestyle objectives are also common drivers in the decision to diversify their sources of incomes and activities (Northcote and Alonso, 2011; Huber et al., 2015). Other common factors include structural factors, social factors and regional factors. Livestock, dairy, and pig farms are less diversified than grain, crop, and mixed farms (McNally, 2001; Hansson et al., 2010). Additionally, smaller farm size and larger farm size, respectively, decrease and increase the likelihood of farm diversification (McNally, 2001). Diversification towards value-adding activities has been found to be significantly more likely when a female farmer is involved in the decision-making process (Hansson et al., 2010). Higher education has been found to significantly increase the likelihood of farm diversification (Chaplin et al., 2004). Finally, the impact of the proximity to urban centres on the decision to diversify remains unclear (Ilbery, 1991; Mishra et al., 2004; Barbieri and Mahoney, 2009; Lange et al., 2013). Recent results suggest that the factors driving the decision to diversify farm activities also affect resilience pathways at the farm level (Garcia-Arias et al., 2015).

4. Results

The mental maps and the interviews revealed the existence of a trade-off between specialization and diversification, the two types of strategies noted in the literature review above. In our sample, we have not noted the existence of one strategy dominating over the other. Instead, the strategy choice seems to be correlated with farmers' financial capacities, resources, expectations in terms of way of life, and beliefs. Interviewees are facing a set of issues, which can be grouped into five subsets corresponding to access to (1) agricultural information and services, production factors such as (2) land, (3) labour, and (4) capital, and (5) the multiplication of conflicts with neighbouring stakeholders. In this section, we analyse these factors individually. Two types of information are provided: Tables 3 and 4 summarize the variety of strategies adopted by inter-

[3] The references cited earlier used different dependent variables, which results in a slight difference in the interpretation of the results.

Table 2
Typologies of farm diversification.

References	Types	Definition
Ilbery (1991)	Agricultural	Technical diversification focusing on-farm food and fibre production activities
	Structural	Oriented towards the non-farming community, takes into account the inclusion of farms in their regional environment
Van Der Ploeg and Roep (2003)	Deepening	Results in an increase of food and fibre production activities and includes value-adding activities
	Broadening	Results in the development of rural activities independent from food and fibre production activities – *e.g.*, agro-tourism, care farming, and nature conservation
	Regrouping	Re-orientation of factors towards non-farming activities – *e.g.*, off-farm income, low-external input farming
Barbieri and Mahoney (2009)	Non-traditional farming	New crops or livestock, or unusual agricultural practices
	Alternative marketing schemes	Access new markets through original marketing strategies
	Recreational activities	Tourism and hospitality enterprises (includes on-site purchases)
	Lease and rental of resources	Lease, rental, easements and timeshares of the farm and its resources
	Contract services	Custom farm work
	Value-added	Packaging, processing
	Historic preservation	Restoration of buildings and farm equipment in order to generate an income
	Education	Organisation of tours and educational sessions

Table 3
Diversification activities on interviewees' farm operations.

Farm	Direct sale	Produce	Value-adding activity		Custom farm work	Off-farm job	Other
			Description	Importance in the farming system			
AF-NGB1	On-farm, CSA[a], and markets	Vegetables and meat	Bakery and restaurant	Central	Hire	Manager	–
AF-NGB2	–	–	–	–	Hire/Provide	–	–
AF-NGB3	On-farm, CSA, and markets	Vegetables and meat	Bakery and restaurant	Central	Hire	Manager	–
AF-NGB4	On-farm	Turkey and maple syrup	–	Central	Hire/provide	Spouse	–
AF-NGB5	On-farm and markets	Meat and eggs	Farm tours	Central	Hire	–	–
AF-NGB6	On-farm	Meat	–	Marginal	Hire/provide	Spouse	–
AF-GB1	–	–	–	–	Provide/hire	–	–
AF-GB2	–	–	–	–	Hire	–	–
AF-GB3	Market	Eggs and flowers	–	Marginal	Hire	Spouse	–
CC—NGB1	Retail and on-farm	Sweet corn and eggs	–	Marginal	Provide	Spouse	–
CC—NGB2	On-farm	Sweet/pop-corn, pumpkins, and Haskap berries	Bakery	Central	Hire	Manager and spouse	Recreational activities
CC-GB1	–	–	–	–	Hire/Provide	Spouse	Solar panels and renting out land
FVG-NGB0	Retail, markets, and pick-your-own	Apples, berries, and sweet corn	–	Marginal	–	–	–
FVG-NGB1	CSA and restaurant sales	Vegetables	–	Central	Hire	–	40 acres rented out and 23 acres in conservation
FVG-NGB2	On-farm	Lavender and essential oils	Processing	Central	–	Spouse	–
FVG-NGB3	On-farm	Fruits and vegetables	Bakery	Marginal	Hire	Spouse	Wind turbines
FVG-NGB4	Markets and CSA	Fruit and vegetables	–	–	–	Spouse	–
FVG-GB1	–	–	–	–	Hire	Manager	Solar panels
FVG-GB2	On-farm	Trees, eggs, and vegetables	–	Central	–	–	–
FVG-GB3	On-farm, pick-your-own, and markets	Vegetables and fruits	Bakery, winery	Central	Hire	Spouse	Recreational and educational activities
FVG-GB4	CSA and markets	Vegetables and meat	–	Central	Hire	–	Real estate assets, agri-tourism

[a] CSA stands for Community Supported Agriculture. Following the definition of the Ontario CSA farm directory, a CSA is a partnership between farmers looking for stable markets and consumers who want good quality, safe food. Farmers and consumers share uncertainty as farmers offer food boxes of freshly picked farm-raised produce on a weekly basis to their CSA members who commit to buy food boxes every week for a set period of time, accepting whatever the farmer has to offer that week.

viewees while direct quotes are used to give voice to the rationale for choices and allow farmers to share their experiences in living in or near to Ontario's Greenbelt.

4.1. A trade-off between two types of strategies

In line with the literature (Chavas and Kim, 2010; Blancard et al., 2016), our sample is composed of farmers who have developed a variety of strategies. On the one hand, some of them have decided to rely on their integration in the food chain as food and fibre pro-

Table 4
A diversity of labour management arrangements.

Farm characteristics			Custom work characteristics		
Farm	Farm size (acres)	Farm type	Hired custom work	Provided custom work	Payment for custom work
AF-NGB1	80	Mixed farm	Hay baling	–	Cash
AF-NGB2	200	Dairy farm	Corn planting, fertilizing, spraying, combining, forage harvesting	Hay cutting, baling, and wrapping	Cash
AF-NGB3	80	Mixed farm	Hay baling	–	Cash
AF-NGB4	310	Mixed farm	Harvesting	Hay baling	Shared help during harvest and cash
AF-NGB5	10	Mixed animal farm	Manure spreading and seeding	–	Cash
AF-NGB6	300	Beef farm	Hay baling, spraying, fertilizing, silage wrapping,	Hay cutting	Cash
AF-GB1	910	Beef farm	Corn planting and combining	No till planting and hay baling	Trade for services and cash
AF-GB2	325	Dairy farm	Hay/straw baling	–	Cash
AF-GB3	360	Chicken farm	Spraying and combining	–	Cash
CC—NGB1	470	Cash-crop farm	–	Harvesting	Cash
CC—NGB2	85	Cash-crop farm	Combining	–	Cash
CC-GB1	550	Cash-crop farm	Spraying	Machinery work	Cash
FVG-NGB0	340	Apple farm	–	–	–
FVG-NGB1	83	Vegetable farm	Ploughing and planting	–	Trade for services
FVG-NGB2	50	Aromatic plant farm	–	–	–
FVG-NGB3	500	Mixed farm	Combining	–	Cash
FVG-NGB4	3	Vegetable farm	–	–	–
FVG-GB1	90	Vegetable farm	Hill-seeding	–	Cash
FVG-GB2	400	Tree farm	–	–	–
FVG-GB3	550	Vegetable farm	Fertilizing, planting, harvesting, and spraying	–	Cash
FVG-GB4	40	Mixed farm	Hay baling	–	Cash

ducers. These farmers produce commodities and usually market their production to a wholesaler or a processor. For them, price uncertainty is a triggering issue. As FVG-GB1 states, "in the food industry, you don't control the prices. (. . .) In most business, (. . .) you're telling the customers what they're gonna pay. In farming, everybody else tells the farmers what they're willing to pay and you just say yes or no." Most of the time, for these farmers, farming is the only source of income, so they focus on reaching an amount of production compatible with a satisfying level of income, whatever the adverse events are. Since farm size is their only adjustment variable, this parameter is more important than prices. As CC-GB1 explained, "it's just like Walmart. Walmart goes by volume. Farm size is a much bigger factor because of the Walmart idea and they can make less by bushel. The more you can get paid by bushel makes everybody happy." However, some of them, such as CC-NGB1, try to increase the value of their production by growing crops with bigger margins, such as soybean seed or other superior quality beans (*e.g.,* Romano beans). For these farmers, Supply Management Systems that guarantee prices, and Ag programs such as AgriInvest and AgriStability that aim at stabilizing farm income, are supported and commonly adopted. Additionally, long-term objectives usually underlie each decision. For instance, CC-NGB1 explained that, even if it affects his income, he does not want to change his rotation cycle in the short-run since his strategy is economically satisfying in the long-run.

On the other hand, farmers can take advantage of proximity to urban centres. Indeed, there is a demand from urban residents for more transparency about farm practices and the origin of food. For AF-NGB4, "most people (. . .) want to make that connection back to the farmer. They wanna know where their stuff comes from. Like I've always told people that, if you have problems about a product or a question, ask me." CC-NGB1 has developed a sweet corn direct-sale activity because "there has been a big push from customers to know the farmer and know where the food comes from and build that trust." AF-NGB1 thinks that nowadays the length of the food chain has created anxiety about food production, and that can benefit farmers: "The more separated people get, the more an operation like this becomes valuable because people can come here and see what we're doing." So, for these farmers, "the skill set is being able to get to the right consumer, how good you market yourself" (FVG-G4).

Peri-urban farmers often perceive advantages in direct-sales since they may exert some control over prices and get higher margins: AF-NGB4 "was trying to get more value and that's why I [he] went to the direct-marketing." By restoring the power balance between producers and buyers, direct-sales permit farmers to negotiate prices that better take into account production costs. As FVG-NGB0 says, "when you retail, your revenue is always better. Your profit margin is a lot better on retail product if there is something worthwhile." In addition, regular contact with customers may make farmers feel proud of their activities. FVG-GB2 "love[s] the local people's faces when they taste something fresh." Or AF-NGB4 who "take[s] pride in what I'm [he's] doing, putting on the other hat and becoming a salesman to get the value-added to the customer." Contacts with customers also generate feedback on the product, which can be used to anticipate evolving trends from the ethnically diverse population of the Toronto Metropolitan Area. For instance, FVG-NGB0 markets apples that suit his Asian customer base and AF-NGB1 supplies the goat milk market whose demand is increasing due to lactose-intolerant customers and the ethnic demand for goat products.

Whereas activities that take advantage of urban proximity are sometimes considered complementary to the main farming activity, they can also be the raison d'être of the farm (Table 3).

A variety of strategies across a spectrum have emerged, the two extreme types being volume versus quality. The first type relies on consolidating a land base large enough to make a livelihood from selling small margin products. The opposite type relies on designing a farming system based on complementary activities with larger margins. This is not a black and white situation; the trade-off between these two strategies depends on farm capacities, farmers' values, and famers' willingness to engage in such activities. As FVG-NGB0 says, "value-adding, our eyes are certainly open for such opportunities." AF-NGB4 concluded the interview stating: "we're not looking at getting bigger, we're looking at getting smarter."

4.2. Difficulty in accessing agricultural services and information

The proximity to other actors in the food chain, to access services or information, can influence farmers' investment decision-making. In peri-urban areas, the plummeting number of farm operations (Cummings et al., 2010) has resulted in scarce service and information providers such as extension services, processing facilities – *e.g.,* slaughterhouses or packing units – or support services like large-animal vets. FVG-NGB0 noticed the disappearance of government extension offices, "when I started farming, we had government agricultural offices all over the place and there is hardly any now." AF-GB1 is preoccupied by the distance to slaughterhouses and vet services; "our vet support just let us know that they won't be doing large animal work anymore. (. . .) If there was enough people using it, then it would be able to sustain the slaughterhouse." But she feels lucky that an equipment retailer is still available in the near landscape. "Here in S., we have a John Deere and a Case dealership. So we're just lucky that there is one that close." Consequently, some farmers are investing in their own facilities, such as AF-NGB5 who invested in an egg-grading facility or FVG-NGB3 who has his own packing unit.

Simultaneously, farmers have created diversified relationships to extract the information they need to support their decision-making. For FVG-NGB0, "if you're not digging out the information nobody is gonna hand it to you on a plate anymore." Some of them are dealing with up/down-stream actors in the food chain. Sharing information within the farming community appears to be more precarious. As CC-NGB1 says, "farmers are rather funny as well. If I have an idea, I don't share it as much as I should (. . .) some farmers are like that." In our sample, FVG-GB1 and CC-NGB1 also expressed their motivation to attend meetings provided by agricultural companies and universities to collect information. But they expressed concerns about the objectivity of the information they can get. Consequently, they search for information on the Internet, a time-consuming activity – time they can rarely afford.

Agricultural programs advertised on the website of the Ontario Ministry of Agriculture were included in the variables interviewees could use to design their mental maps.[4] Interviewees have commonly applied to three programs only: Growing Forward (1 and 2), AgriStability, and AgriInvest. The first one provides training – for making a business plan or a transmission plan – or covers some administrative costs such as hiring consultants, whereas the other two are dedicated to stabilizing farm income. These three programs are commonly used by farmers, and about which have expressed satisfaction. The FARMS (Foreign Agricultural Resource Management Services) program is also popular among farmers who need extra labour, especially among fruit and vegetable growers. The others are mostly unknown and applying is the result of opportunistic behaviours: "the programs have changed so much that I must admit I don't understand them anymore" (CC-NGB1); "we paid $699 for a book [a compilation of existing programs accessible by farmers] but it's on the Internet. I think it's something like 400 pages. (. . .) I have no time to do any of that" (AF-NGB5); "they may have in place incentives on their websites but you know, as a farmer, you don't have the time to go and look through all these different websites" (FVG-GB2). The cost in time for these administrative procedures is usually perceived as prohibitive. The paperwork is time consuming; "there's so much paperwork. And there's a deadline. Farmers are up to here with paperwork" (FVG-GB1). The benefits are delayed in time; "sometimes it's half a year" (FVG-GB2), and illiquid farmers cannot benefit from such programs. "You've got to lay up the cash first and then you get your money. So if you don't have the cash, you can't do the project, no matter how much money they are throwing at you" (FVG-GB1).

[4] http://www.omafra.gov.on.ca/english/busdev/agbusdev.html.

4.3. Competitive access to land

Farmers' proximity to fast-growing urban centres has created unfair competition for land between farmers and non-farmers since prices for developable land are much higher than for farmland. Furthermore, speculators transfer price increases to surrounding agriculture-zoned farmland, which results in few opportunities and a difficult farmland market. Common statements include: "In our view, it's beyond what is reasonable for land. It's because of the Toronto influence but it doesn't seem to come down. Now the $600,000 looks cheap [for a 100-acre farm]" (CC-NGB1); "you can buy but it's very expensive' (AF-NGB5); "the price of land here in south York Region is way over what a farmer can afford to buy" (AF-GB1).

This trend results in a fierce competition between farmers for remaining peri-urban farmland. For instance, CC-GB1 "would like a couple more hundred but all of a sudden everybody else wants it too." CC-NGB1 explains that they "have to be prepared to buy land or to get more, so that if you lose one, it's not too bad." As FVG-NGB0 expressed it, many farmers are always interested in acquiring more land; "you've got to buy land when it's available." And farmers often do not mind buying land at additional cost if necessary, such as FVG-GB1 who explained "we couldn't get a loan at our regular bank, we had to go to another lending institution. We had to pay a higher cost to borrow our money but it didn't dissuade us from buying the farm because we wanted that piece of land." Nevertheless, buying land requires a solid financial situation, equity to back up a mortgage, and cash flow sufficient to maintain liquidity. For instance, this was not the case for FVG-GB1: "being able to buy that means our hands are tied." If farmers invest, they will be short of liquidity and will therefore be less able to respond to changes.

Speculating landowners often choose to rent land; this can be another source of tension since contracts are only one-year contracts, which farmers call "neighbour agreements" (CC-NGB1) or an "individual understanding" (CC-GB1). Renting land is the only way farmers can access land most of the time despite the associated precariousness. Nevertheless, as an insurance strategy, some tenants decide to take care of the land – *e.g.,* maintaining the level of soil nutrients, fencing or draining the property – as an incentive for landowners to keep renting the land to them.

4.4. Availability of labour: family labour versus hired workers

On family farms, family labour usually helps during work peaks. On AF-NGB1's farm operation, the whole family is working on-farm. Each child has developed an activity of his own in what is now a much more diversified farm operation (goat milk, meat, eggs, vegetables, honey, bakery, and restaurant). The farm owner has even found a full-time off-farm job. For CC-NGB1, children "grew up with it. So it's part of their lives." They have engaged in studies related to agriculture but will probably not take over the farm. Indeed, farm work does not always appear attractive, even for children. AF-NGB5 wishes they "had children that would come and work. It's a great time, families working together." FVG-GB2 agrees, in that his "son worked on the farm but this is not for him." For farmers engaged in value-adding processes and direct-sales, labour can become an even more critical issue, such as for AF-NGB5 whose wife "spends a lot of time in here [on the farm], and a lot of time on the road for, first of all, picking up the product, second, selling the product."

Farmers who cannot rely on family for labour need to hire labour. They rarely hire domestic labour, which is expensive; they

often hire workers from the FARMS program[5] (Foreign Agricultural Resource Management Services) or subsidized labour. Custom farm work is also an alternative. In addition to providing labour during work peaks, custom farm work also reduces farm structural costs since farmers do not have to buy equipment, which would barely generate returns on smaller farm operations. Nevertheless, cash-croppers, whose practices rely on machinery instead of labour, are less affected by the availability of labour. Table 4 shows the diversity of arrangements that interviewees have developed for their farm operations.

4.5. Access to capital: barrier versus life-long commitment

The rise of land prices has resulted in an increase of the equity value of farmers' assets, whereas their agronomic value has remained stable over that price rise. This is a growing concern for landowners who have seen their property taxes increase. In order to counter this evolution, AF-GB1 is lobbying for an increased rebate on the property tax of farmland (80% instead of 75%). Equity has also increased due to farmers' investment in land, quota, and equipment. Indeed, some farmers need to increase their level of production to make a livelihood. "I [AF-NGB4] went through that 7/8 years ago. (...) So that time, I decided to be investing and doubling my quota so that I can produce twice as many birds." Nevertheless, such investments can also be part of a strategy for speculation. These farmers admit that "land is always a good investment" (CC-NGB1).

The difficulty is to match the size of the farm with equipment capacity. Indeed, agricultural equipment is standardized for certain levels of production and under/over-sized equipment generates extra-costs. For instance, AF-NGB5 once decided to sell eggs at farmers' markets but had issues finding an egg grading station that would fit their level of production since they do not have any quota and are limited to the number of laying hens they can breed. For CC-NGB1, "the cost of only a few pieces of equipment to do 200 acres doesn't make sense." He echoes AF-NGB4, who could have invested in more quota but could not have afforded investing in the infrastructure necessary to breed the extra birds. Consequently, farmers can get trapped in the investment process. FVG-GB2 is a typical example; as he says, "I've been investing my whole life. (...) You have to continue investing. This is a lifetime program investing in this business." These days, he is realizing that he has been investing too much, "I would never invest in more land. I already have too much." Another reason for this continuous investment in assets is the tax rebate from which farmers can benefit.

Consequently, some of them have started to look at custom farm work as a potential alternative to get out of this trap. Farmers with extra capacity provide custom farm work to make the equipment pay, such as CC-NGB1: "we do more work to use our equipment. If we had more land, I would reduce custom farm work. My farmer's mentality is I buy a big combine and, in order to justify it, (...) I help the neighbours and make some money," or CC-NGB1, who states "if we had more land, I would reduce custom work." On the contrary, undercapitalized farmers hire custom farm work for the tasks for which they do not have the equipment, such as AF-GB2, who states "custom farm work is more for machinery that I don't want to purchase." Custom farm work can provide them with extra flexibility financially since they do not need to own every necessary piece of equipment. However, custom farm work also means a loss of sovereignty in the decision-making process, since farmers are dependent on the availability of the custom operators. Consequently, AF-NGB4 has decided to maintain his 35-year-old combine in order to harvest his crops whenever a field is ready, even if it takes him much more time.

The quota system, initially designed to protect farmers through regulated prices, strengthens the rise of equity. Regulated prices make managed products profitable and result in a fierce competition for quota. In order to win auctions, buyers tend to buy quota and the associated farm simultaneously. This results in a sticky quota market, as mentioned by AF-NGB1; "you can't buy quota anymore. You have to buy a farm that's milking cows and the quota comes with it. You can't actually take that from the farm." Interviewees have also stressed the inequalities resulting from the quota system. Some of them cannot diversify their on-farm production since they cannot access quota or cannot afford investing in the equipment like AF-NGB4; "the payback on just the quota itself is between 22 and 25 years. Then you've got to put a building on top of that. It's not a good investment." Finally, CC-NGB1 worries about the uncertainty associated with the future of the quota system, "and then having trade talks, and the quota is gone."

This overcapitalization affects long-term farm viability. The prohibitive levels of equity needed to invest in a farm operation discourage most heirs and new farmers. As FVG-NGB0 states, "it may be the end of the family farm a generation or two down the road because you've gotta get some financial backing in order to get started at it." In our sample, seven interviewees had identified someone to pass the farm to, six do not have anyone to pass the farm to, and the question was not relevant for seven of them. For the interviewees, farming is less attractive from a financial point of view; "if they are silly enough to come back, they'll have to fight for it" (CC-NGB1) or "I don't encourage them either. If farming was more secure, you'd have probably more farmers saying to their kids yeah, this is great (...) let's carry on the family business" (FVG-GB1). From a lifestyle point of view, "as a farmer you don't have a life. Farming is your belief. (...) You don't want to do that. It's 24/7" (FVG-GB2). The low attractiveness of the agricultural sector makes farm transmission very uncertain.

There is, however, some demand for starting up/taking over farm operations. Heirs are usually emotionally attached to the family farm. FVG-NGB0 explained the case of a farmer growing blueberries, who started a tea house as an on-farm added-value activity: "his daughter would like to run the pick-your-own part of it but he's got nobody to run the farm. The daughter likes that part [the tea house], you know, but she's not interested in growing the blueberries." And new farmers usually associate certain values and benefits with a farming lifestyle. For example, FVG-NGB1 started farming in order to have a lifestyle in line with his environmental values and his concern for climate change.

Nevertheless, the amount of equity necessary to invest in a farm requires a mortgage that banks are unlikely to provide to new farmers without enough equity. CC-GB1 noticed: "before I had my land, I would go to the bank and they would say no. Once you have your land (...) the bank will help as much as they want because you have some equity already." Most new entrants combine an off-farm income that is partly reinvested in the farm until they reach a viable farm size and can then become full-time farmers. This was the case for CC-NGB1, AF-NGB5, and FVG-GB2. The role of off-farm incomes may also be to stabilize the household income and permit extras such as in the case of AF-NGB1 and FVG-GB1. In any case, starting up a farm operation requires a strong commitment that is often discouraging.

4.6. Increasing conflicts among stakeholders

Proximity to urban residents is a source of conflict, which can affect farmers in both their private and professional lives. The urbanization process that takes place in peri-urban areas results in closer proximity between farmers and urban residents who are

[5] The FARMS program provides support for hiring Caribbean and Mexican Seasonal Agricultural Workers http://www.farmsontario.ca/.

not necessarily aware of what farming entails. Interviewees consistently mentioned the increase of road traffic and the difficulty, and risk, to move equipment from one place to another. For CC-NGB1, "if you want to take the combine, if you finish at 4 o'clock in the afternoon, just leave it there. Don't try to take it home. It doesn't work." These conflicts can result in direct financial losses. FVG-GB2 mentioned people trespassing on the farm with snowmobiles, and damaging young trees covered by snow. Road infrastructure tends to be designed for urban traffic, and damages tires (FVG-GB1) or just makes it impossible for large machinery to be driven on certain roads (FVG-NGB0). Most of the time, these conflicts are tensions just between neighbours. This is especially the case in animal agriculture where farmers hear complaints about odours. Spraying and noise late at night have also been mentioned.

Interviewees mentioned two initiatives that try to mitigate these conflicts. Signs such as "Active Farming Community" have been erected at the entrance of the Holland Marsh in order to make people aware of the possibility of being slowed by a tractor in traffic. And in S., farmers have written a pamphlet for the local real-estate agency to explain the chance of negative externalities of living close to a farm resulting from misunderstandings or idealization of farm practices. They believe this is a matter of education. But for FVG-GB1, these daily constraints are a risk that could push farmers to leave the area; "before you know it, the non-farming folks are displacing the agriculture folks."

5. Discussion

For the interviewees, Ontario's Greenbelt goal to make agriculture the primary land use in the protected area is well understood and usually supported. Table 5 below shows that interviewees who tend to support Ontario's Greenbelt are attached to land, young farmers who are beginning to invest, or farmers with an identified successor. On the other hand, our results suggest that detractors of Ontario's Greenbelt are farming in the Greenbelt and tend to be disinvesting since they have not identified a successor to take over the farm. The majority of farmers have expressed neutral positions. While this trend revealed in our data is not very robust given the number of interviews we have made, the strong vocal opposition from the farming community may not be representative of the entire farming community. Nevertheless, several issues that would sustain an efficient farm sector, and therefore permit Ontario's Greenbelt to reach its first objective of protecting agriculture, are not addressed by the Greenbelt. The discussion is centred on five main issues which are potential candidates for policy recommendations: the broken links within the food chain, the obscure multi-layer regulation system that has emerged with time, the general mistrust of political initiatives, the perception of the equity value of land, and the overall support of Ontario's Greenbelt by the GTA population.

The Greenbelt relies on zoned land for protection from development. However, in line with the literature (Caldwell and Procter, 2013; Kubursi et al., 2015), some links in the food chain have disappeared, which has generated extra costs for farmers (mostly transaction and transportation costs). The loss of close equipment retailers and processors is a real constraint for farmers who, as part of the value-chain, need these professional partners to sustain their economic activity. The absence of reliable and easily-accessed sources of information is another serious concern. Regulations are updated regularly – *e.g.,* food safety and traceability – and farmers are often behind in knowing of these changes because they cannot easily access relevant information and adequate technical services. This is obviously true for supply chain-oriented farmers but also for local-market-oriented farmers who need upstream services (information, equipment, and technical support) and sometimes processing facilities in order to sustain their direct sales. The protection of the land base is necessary in the process of preserving agriculture but it is not sufficient: the deterioration of the professional environment of Greenbelt farmers is another crucial issue to tackle. Investing in or supporting initiatives that create outlets for farmers and permit them to access information or equipment would be a beneficial next step. There is a variety of projects that could have potential in addressing this issue, ranging from collective actions, such as co-operatives, to private initiatives, such as local markets, that could participate in the creation of sustainable food hubs (Blay-Palmer et al., 2013).

In Ontario, land regulations are implemented through zoning. The succession of plans (Niagara Escarpment, Oak Ridge Moraines, and Ontario's Greenbelt) and the diversity of actors empowered to regulate land uses (Ontario's Provincial Government, Municipalities, and Conservation Authorities) have resulted in multi-layered land-use regulations. The different zoned areas are often overlapping and farmers may have land within a number of zones and with complex, varied regulations. In such conditions, farmers have difficulty in investing; sometimes they renounce investing because of the challenges in figuring out which regulations apply. The lack of clarity of the planning regulations is a source of controversy, since farmers do not always differentiate between the Greenbelt framework and the local planning regulations. Finally, regulations may sometimes be redundant. In order to preserve farmland from fragmentation, when farmland and farm practices were threatened by residential lot development, the province introduced farm-lot severance constraints, with the minimum farm lot-size of 100 acres to be maintained, with some exceptions. Consequently, most farmers may not sever their land into parcels smaller than 100 acres. Nowadays, this framework seems to impede farm structural change. For farmers who are interested in increasing their farmland base or new farmers willing to start up small-scale farm operations, finding smaller parcels to buy is difficult or they have to rent. In peri-urban areas where farmers may want to engage in intensive fruit and vegetable growing or adjust their land base, this lack of flexibility is a major constraint. Farmers willing to transfer their farms also have difficulty in finding farmers with the necessary financial backing to take over their farms. Since the Greenbelt is attempting to preserve agricultural land, these constraints could be reviewed to allow farmers more flexibility in their investment/transmission plans. A reflection on the current legislation, in order to streamline layers, would potentially be of great impact as farmers could interpret this move as support from municipal planners and local communities (Huang and Drescher, 2015).

There is also a general mistrust of the political process, which may slow down the investment process. Indeed, farmers have the feeling that they have not been consulted enough during the preparation phase for the development of the Greenbelt Plan. Additionally, the existence of grandfathered development permits suggests to farmers that developers are able to work around the regulations. Non-farm investors may believe in a future removal of the Greenbelt and therefore speculate on land prices. The farmland market remains sticky and investment remains low. Furthermore, the sub-objective to preserve prime agricultural land is overshadowing the initial purpose to make agriculture the primary land use in the Greenbelt: there is a consistent interest amongst farmers for a Green Spot[6] policy protecting prime agricultural land only, which, by impeding the continuity of farmland, would not generate the benefits of the current Ontario's Greenbelt. The ten-year review of

[6] The terminology of Green Spot seems to have been developed by farmers themselves in order to represent the fact that, if only prime agricultural land is protected, this will create spots of protected land surrounded by non-protected non-prime agricultural land.

Table 5
Interviewees' attitudes toward Ontario's Greenbelt.

Farm	Position toward the Greenbelt[a]	Farming in the Greenbelt	Share of rented land	Farm owner age	Identified successor	Farm type	Direct-sale	Land attachment[b]
AF-NGB1	+	No	0%	19	N/A	Mixed	Yes	–
AF-NGB2	0	No	0%	29	N/A	Dairy	No-	–
AF-NGB3	+	No	0%	48	Children	Mixed	Yes	+
AF-NGB4	0	No	23%	38	N/A	Mixed	Yes	+
AF-NGB5	+	No	0%	60′s	–	Mixed animal	Yes	–
AF-NGB6	0	No	67%	63	–	Beef	Yes	+
AF-GB1	+	Yes	99%	30′s	N/A	Beef	No	–
AF-GB2	0	Yes	0%	60	Son	Dairy	No	+
AF-GB3	+	Yes	17%	63	Daughter	Chicken	Yes	+
CC—NGB1	0	No	55%	40′s	N/A	Cash-crop	Yes	+
CC—NGB2	0	No	38%	45	N/A	Cash-crop	Yes	–
CC-GB1	–	Yes	55%	64	–	Cash-crop	No	–
FVG-NGB0	0	No	0%	44	N/A	Apple	Yes	–
FVG-NGB1	+	No	0%	25	N/A	Vegetable	Yes	+
FVG-NGB2	+	No	0%	81	Son	Aromatic plant	Yes	–
FVG-NGB3	0	No	13%	59	Son	Mixed	Yes	+
FVG-NGB4	0[c]	No	100%	55	–	Vegetable	Yes	–
FVG-GB1	–	Yes	0%	55	–	Vegetable	No	–
FVG-GB2	0	Yes	0%	61	–	Tree nursery	Yes	+
FVG-GB3	–	Yes	84%	71	–	Vegetable	Yes	–
FVG-GB4	+	Yes	38%	50	Children	Mixed	Yes	+

[a] Interviewees' attitudes towards the Greenbelt can be favorable (+), neutral (0), or unfavorable (–). This position is based on interviewees' statements such as "I support the Greenbelt" or, on the other hand, "the Greenbelt is a joke".
[b] Land attachment is positive if this factor was selected as a very important factor during the interview; it is negative otherwise.
[c] FVG-NGB4's position toward the Greenbelt is very specific. Since he is farming on protected land outside the Greenbelt but managed by a Conservation Authority, his concern for the Greenbelt is mitigated. Nevertheless, considering his interest for buying farmland and farming it, the Greenbelt is of interest.

Ontario's Greenbelt in 2015 is an opportunity to reaffirm the commitment of the Ontario Provincial Government to the Greenbelt and give voice to the farming community. To date, meetings have been organized throughout the Greenbelt to collect stakeholders' concerns. It is not sure whether farmers have taken the opportunity to fully participate in these meetings; a more focused solicitation of their concerns should be considered.

Concerns about the equity value of land have been raised by the interviewees. On the one hand, Deaton and Vyn (2010) found that the Greenbelt has an effect on land prices within 10 km of its border. On the other hand, farmers believe that the Greenbelt has caused prices to plummet. Interestingly, none of them has observed this directly and practically all of them complain about prohibitive land prices. Farmland cannot be used for non-farm development, but the value of farmland is still high and retired farmers can still create a pension out of the sale of their farm. An update of Deaton and Vyn's (2010) analysis would be of real interest.

Finally, Ontario's Greenbelt receives massive support from the GTA's urban population. It is a geographical place that is well-defined and the benefits that urban residents can access in the Greenbelt (recreational areas, environmental protection, and heritage preservation) may result in the development of a sense of place. Even though the Greenbelt Plan primarily focuses on agricultural protection, environmental protection, culture, recreation and tourism are also important objectives. These objectives concern urban residents as well. Greater use of a landscape label to clearly identify Greenbelt products from non-Greenbelt products could allow farmers to take advantage of this sense of place and generate more value from their local production. Well developed in Europe, this is a marketing tool that is not yet commonly used in Canada.

6. Conclusion

In this paper, we analyse the impact of Ontario's Greenbelt using a qualitative approach based on mental mapping. This technique was particularly useful to elicit farmers' tacit knowledge about their investment decision-making. Interestingly, the farmers' feedback on this technique was usually positive. Many of them enjoyed participating in the long interview (2 h) since it was an opportunity to identify and discuss the factors they take into account when investing.

Our results confirm previous findings as revealed in the literature concerning farm investment, which validates our research approach. The results also demonstrate that Ontario's Greenbelt, designed to make agriculture the primary land use in the designated area through farmland preservation, is not sufficient. Protecting a sustainable and efficient agricultural sector requires the presence of the other actors in the whole food chain in order to supply farmers and help them access markets for their products, as well as provide information and technical services. Indeed, the absence of these other actors results in extra costs for farmers (primarily transportation and transaction costs). Additionally, regulations are seen to be complex and redundant; rationalizing the different layers of regulations to increase coherency is now a challenge for policy-makers.

Interestingly, despite environmental protection often being perceived as conflicting with the agricultural interests of farmers, interviewees from our sample did not mention major conflicts with environmental interests. Instead, their preoccupations are concerned with conflicts that emerge from their geographical proximity to urban residents and urban infrastructure. Our sample of farmers is thus more concerned with urbanization, even though their attitudes are strikingly divergent given their opportunity to sell farmland or pass on/take over the farm; these attitudes appear to be independent of farmers' location within or outside the Greenbelt.

In the long run, the Greenbelt may be in a transition phase in which the agricultural sector, benefiting from Greenbelt protection and urban influence, which will become a unique system. Particularly, the possibilities for diversification tend to be promising due to the Greenbelt context. Since the size of the sample is a limiting factor in this research, a quantitative approach would provide complementary results to further reveal on-going trends.

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