THE TOTAL VALUE OF NOVA SCOTIA'S AGRI-FOOD INDUSTRY

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Executive Summary

The Nova Scotian agri-food industry has been declining in relative economic significance in recent years. Commodity-based agri-food production in the province is not generally competitive due to the economics of size, market power, and high input costs.

There are many less obvious benefits and costs associated with agri-food production beyond direct economic impacts. These benefits and costs are not taken into consideration by the traditional market. As a result, there is no incentive for producers to increase beneficial agri-food practices or to decrease harmful practices. This is a failure of the market to provide an agri-food industry that is "optimal" in size and in production methods.

The "external" benefits and costs of the agri-food industry researched in this paper fall into three categories: economic, environmental and social. Accurately internalizing them into producer's production decisions, through "conscious consumption" or targeted policies, would yield a more optimal agri-food industry, for the benefit of all Nova Scotians.

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1 Introduction

The "free market" is one of history's greatest creations and is central to the study of economics. The market allows society to determine the best uses of the Earth's scarce resources in the most efficient manner. The market provides a means for consumers and businesses to come together to determine what is to be produced, how much is needed, and the price of each good and service.

In order for supply and demand to be properly communicated through the market, price is used as a measure of the value that individuals place on goods and services. In a commodity market, i.e. goods with very similar or indistinguishable characteristics, businesses constantly strive to signal value to consumers by finding ways to lower price.

At first glance, the market has served society well. It has provided an increasing variety of goods and services at lower prices. While there is no questioning the efficiency of the market, there are potentially serious shortcomings, what economists have termed "market failures". In technical terms, a market failure results in the inability of the market to provide an "optimal outcome" for society.

One source of market failure is termed "externalities". This means that the market has failed to recognize certain benefits and costs associated with the production of a good. The benefits and costs are thus *external* to the market. There is no price signal to encourage producers to supply additional benefits or to discourage them from imposing hidden costs on society. Externalities have resulted in famous market failures. The hazardous waste that is contained in the Sydney tar ponds, for example, is a failure of the market to communicate to the city's steel industry to properly account for costs associated with production.

The proper function of the market for food should be a global priority. A failure of this important market can have serious consequences. In Nova Scotia, market failure and the commodity orientation of many agriculture and fishery sectors, are leading to the decline of large portions of these industries in the province. Recognizing the benefits and costs associated with food production that are not accounted for by the market would help Nova Scotians to realize the total value of our agriculture and fisheries industries and reduce costs associated with the current food system.

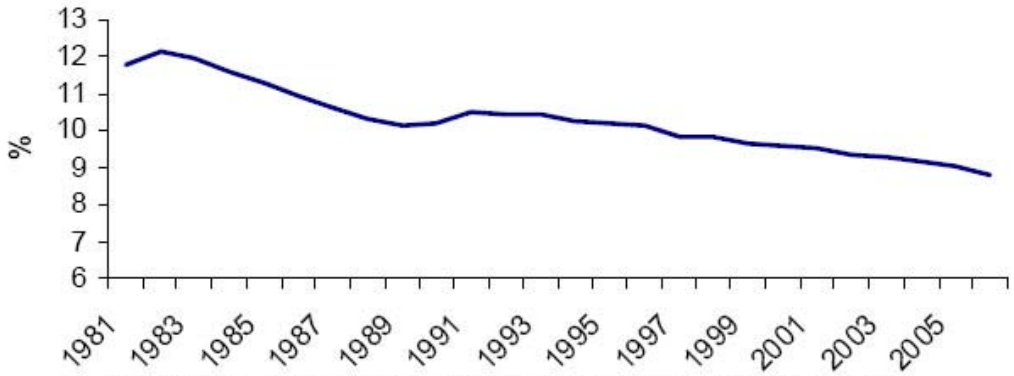
The aim of this paper is to describe the benefits and costs associated with the agri-food industry. The next section provides a background of the economic situation in which the agri-food industry operates. The section that follows describes the economic theory of externality-driven market failure. The remaining sections describe the economic, environmental, and social contributions that the industry provides (or has the potential to provide) to the province. Wherever possible, numerical examples are used to attach tangible figures to a historically intangible argument.

2 Background

The agri-food industry (agriculture, fisheries, food manufacturing) has played an important role in the economic, social and geographic shaping of Nova Scotia. In relatively recent times, the commodity oriented primary production sectors have come under increasing economic hardship. The new global market has opened doors to the industry in terms of export markets, however, many businesses have been forced to fold in the face of competition from low-cost producers that they were previously shielded from.

Competition in the global market has also provided consumers with a wider variety of food products, at all times of the year, and at a lower price. The percentage of household budget that consumers spend on food has been steadily declining (see Figure 1).

Figure 1. Food and non-alcoholic beverage expenditures as a percentage of total personal expenditures- Canada.

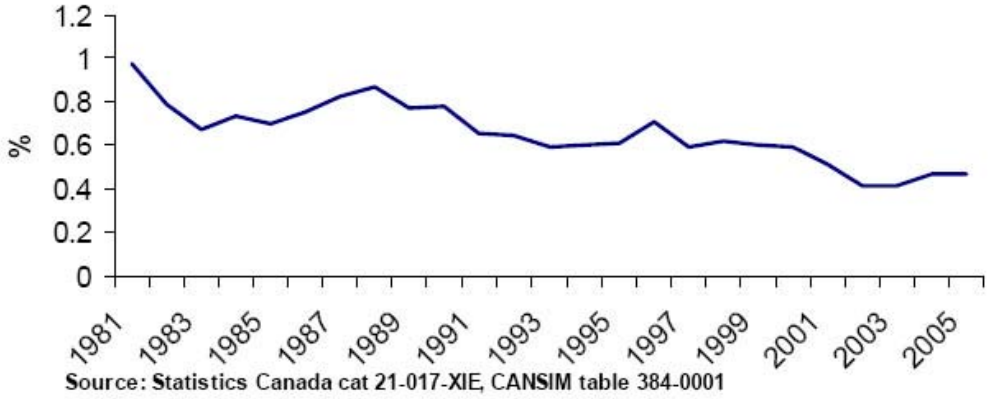


Source: Statistics Canada-National Income and Expenditure Accounts

Traditional economics would suggest that these observations are exactly what should happen, and that such trends have been beneficial to society as a whole. The rationale is that the most efficient producer of a specific good should concentrate its resources on producing that good. Trade with other efficient producers then maximizes the global output, enhancing the welfare of nations.

With some notable exceptions, Nova Scotia does not hold a "comparative advantage" in most primary agri-food commodities. While the price of agri-food commodities are set at the world level, costs are determined locally. The province's short growing season, variable climate, small land base, high wages and other factors drive costs up relative to areas that are better suited to commodity production. In agriculture, financial statistics are showing a sector that is declining in terms of economic importance relative to the economy as a whole (see for example Figure 2). This is not a particularly surprising result. The majority of the agri-food sector is trying to compete in a commodity market using a production system that is not suited for mass-production at such a scale as to be competitive with the lowest cost producers on the planet.

Figure 2. Net Value Added agricultural production as a percentage of Gross Domestic Product- NS.



Source: Statistics Canada cat 21-017-XIE, CANSIM table 384-0001

The fisheries and food manufacturing sectors also struggle with the economics of the global commodity market. Fish landings have increased to unsustainable levels over time while small fish plants have been forced to close. Food manufacturing companies must secure a reliable and low cost supply in order to remain competitive.

In short, for various reasons the majority of the Nova Scotian agri-food sector is not set up to successfully compete in the global commodity market. A complete loss of our agri-food industries would be a significant drain on the provincial economy. There will always be some innovative niche marketers and large scale commodity producers and so a complete loss of this industry would not occur. Nonetheless, it can be expected that a significant portion of the industry's approximate $2.4 billion[1,2] impact on the Nova Scotian economy will be lost in the future if current trends persist.

Certainly, a loss of any portion of the agri-food industry's 8% contribution to the provincial GDP[3,4] is not a good thing. However, the potential losses that could accrue to the province amount to more than this figure indicates. The agri-food industry provides a number of benefits that may not be directly obvious. Similarly, a functioning agri-food industry in Nova Scotia provides the potential to escape less obvious costs associated with the global food system.

The market has failed to account for these "external" aspects of agri-food production. Facilitating an understanding of the benefits and costs associated with different types of food production and providing a mechanism for those who demand certain benefits to pay for them could help the Nova Scotia agri-food industry to differentiate itself from the commodity market. For this reason, the size and market orientation of the agri-food industry that would be "optimal" for Nova Scotia is not realized. The following section gives a brief description of the economic theory of externalities, The remaining sections of this paper describe some of the

currently known benefits and costs associated with the agri-food industry that are not taken into account by the commodity market in which the majority of the industry operates. This discussion should indicate to both producers and consumers of food products that there is additional value in our agri-food industry that can be captured with the appropriate market mechanism.

3 Externalities and Market Failure

The traditional supply and demand curves illustrate how the market determines the price and quantity of a good (Figure 3). Holding all other factors constant, a decrease in the price of a good will increase the quantity of that good demanded by consumers. This is the reason that the demand curve is downward sloping with price increasing vertically and quantity demanded increasing horizontally. The quantity of a good supplied will increase when a higher price is offered and will be low when the price is low (the supply curve has an upward slope). The intersection of demand and supply determine the equilibrium (market clearing) price and quantity of a good.

Figure 3. Supply and demand.

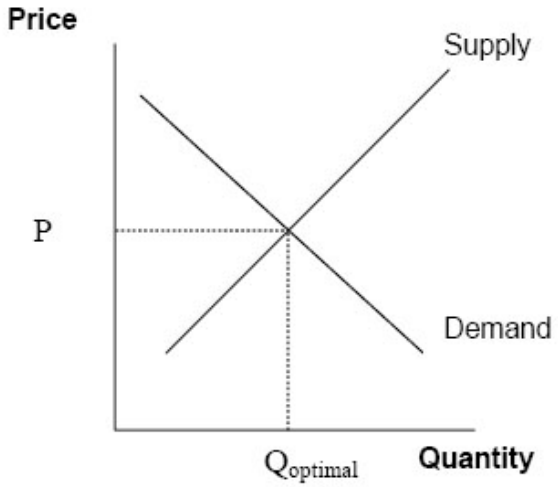


Figure 3 is an ideal situation in which the benefits and costs of a particular good are known to society and are properly signaled in the market. A more complicated, yet realistic, situation is illustrated in Figure 4 where there are benefits and costs that are unknown and/or for which there are no market signals.

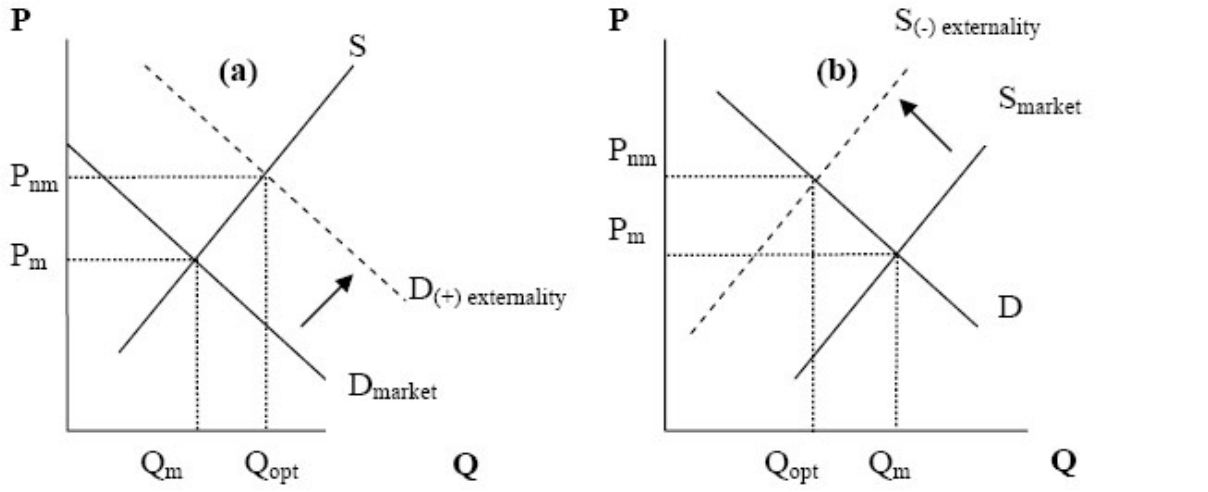
Figure 4(a) is a situation in which there are "positive externalities" associated with the production of a good. For example, a person might be debating whether or not to build a pool in the backyard. This person will (normally) consider only the benefit that he or she will gain from the pool and this benefit is signified by their demand curve[†]. If the cost is greater than the

[†] The demand curve is actually an individual's marginal utility (benefit) function.

benefit, the pool will not be purchased. Neighborhood children could also benefit from being allowed to use the pool. The benefit they could receive adds to the benefit that the owner receives, shifting the demand curve[5]. If these benefits were taken into account, it might make the difference between the decision to purchase a pool or not.

Figure 4(b) is the situation of a "negative externality" or a cost imposed on society from the production of a good which the market does not properly signal. Cigarettes are an example of a market failure resulting from a negative externality that was partially corrected using market intervention. Cigarettes impose a cost on society due to their harmful effects on health for which healthcare expenditures must be devoted. Graphically, this is equivalent to an upward shift in the supply curve to account for this cost[‡,5]. Government recognized the negative externalities and directly addressed the market failure through the provision of public information and increased tax. These actions both informed the public of the costs of smoking and made smokers pay for the additional costs that their actions have on healthcare expenditures. As predicted by economic theory, the quantity of cigarettes demanded decreased in response to the market failure being partially corrected by the tax.

Figure 4. Non market benefits (a) and costs (b).



Q_m=Traditional market clearing quantity
Q_{opt}=Optimal quantity (includes externalities)
P_{nm}=Price including non-market benefits and costs
P_m=Traditional market price

The market failure resulting from externalities is that the optimal (equilibrium) quantities of particular goods that society demands are not reached. In the case of a positive externality, the market doesn't account for some associated benefits and not enough of the good is produced. The reverse is true for negative externalities, where society would actually prefer

[‡] The supply curve is actually the marginal cost curve for an individual business and the sum of all marginal cost curves for the market. An upward shift in the supply curve, then, indicates an increased cost associated with supplying a given level of production, Q.

less of the good (because of its harmful associated costs) than the market is signaling producers to supply.

The positive and negative externalities associated with agri-food production in Nova Scotia result in the failure of the market to produce the optimal quantities of certain goods. Agri-food related externalities are economic, environmental and social. In many cases the costs and benefits are not well-known and so there is also a market failure associated with incomplete information. In all cases, there is no strong market mechanism to reward benefits and to discourage costs that are not defined by the commodity market.

4 Direct Benefits and Externalities of the Nova Scotia Agri-food Industry

Ideally, the agri-food industry would function in a free market with all direct and external benefits and costs properly identified, understood, and recognized by the market. If this were the case, the resulting size and production practices of the Nova Scotia agri-food industry would truly be optimal. As explained previously, this is not the case. The following describes the currently known direct and external values of the industry.

4.1 Economic

The economic value of an industry is commonly measured in terms of Gross Domestic Product (GDP) and employment. The agri-food industry contributed $894 million to provincial GDP in 2006-07 while the total fishery GDP was over $1.5 billion in the early 2000s[1,2].

Employment statistics are aggregated and it is therefore difficult to pinpoint the number of workers in each agri-food subsector. Regardless, available employment estimates for 2006 indicate that agriculture supports approximately 7,200 full-time jobs while fishing, hunting and trapping (of which fishing would be the dominant category) employs over 12,700 full-time[6]. Thousands of additional jobs are provided by the food manufacturing/processing sector.

The economic contributions of the agri-food sectors are greater than these values indicate. As with any industry, inputs must be purchased from other local businesses and a percentage of wages are spent within the province as household spending. The "multiplier effect" of this money circulating in the provincial economy increases the economic impact of the industry and indicates that many other sectors of the economy are impacted by downturns and upswings in the performance of the agri-food component. The agri-food industry plays a major role in regional economies within the province, particularly in rural areas.

Industry Structure

An additional opportunity or potential competitive advantage of the agri-food sector in Nova Scotia is its make-up of a large number of small businesses. Worldwide, large businesses achieving "economies of scale" and producing at lower cost than competitors are becoming the

norm, forcing small operations out of business. While Nova Scotia is not exempt from this trend, it has been slower in its uptake. Many economists would view this as lagging behind the competition and bad for the economy, however small Nova Scotian owned farms and fishing boats have the potential to keep money in the province and to strengthen the economy through diversification and a more equal distribution of wealth.

As of the 2001 Census, 21.6 percent of farms in Nova Scotia reported farm gate sales of over $100,000[7]. Only Newfoundland and British Columbia reported fewer of these farms. Nova Scotia was also the third lowest in the country in terms of average farm size measured in acreage[8]. Only Newfoundland and Ontario reported smaller average acreages.

Official policies exist in the fisheries industry to protect against undue concentration and promote the benefits to coastal communities that arise from the successes of individual fishermen. The owner-operator and fleet-separation policies are intended to protect the in-shore fleet from outside interests and keep the harvesting and processing functions of the industry separate[9].

Consolidation in many industries has gone hand-in-hand with increased productivity and GDP. Total Nova Scotian GDP is rising and was $1.7 billion higher in 2005 than in 2001. The relationship between increased GDP and the welfare of individual Nova Scotians, however, is not well understood. By the late 1990s, Nova Scotia had the second lowest income equality in Canada trailing only Alberta and Nova Scotia's poorest 20% were the poorest in Canada[10].

The structure of an industry will affect the leakages of money from the provincial economy. Corporations, for example, offer partial ownership to investors by selling shares in the company. Unless all shareholders are residents of Nova Scotia, there will be a leakage of economic benefits to individuals who live outside of the province, and do not purchase goods and services or pay taxes in Nova Scotia. The gains of smaller and unincorporated farm and fisheries enterprises accrue to the owners which are more likely to be Nova Scotians and have a relatively long-term dedication to the sustainability of their business.

An additional leakage results from the input purchasing decisions of large corporations. Under constant price pressure from competition, large quantities of inputs can be more cost-effectively purchased en masse from the lowest cost source. This allows businesses to remain cost competitive with minimal sacrifice of profit margins. The lowest cost producer in the current economic and regulatory environment is often a foreign source which is able to offer low cost inputs often because of low environmental standards and wages to which it must adhere. Aside from the obvious ethical concerns associated with supporting such practices, purchasing inputs from outside Nova Scotia is a further drain on the economy.

A United Kingdom study identified that county council expenditures of £1 spent with local suppliers was worth 400% more than £1 spent with suppliers from outside the region[11]. Closer to home, an economic impact study on Mid-coast Maine revealed that locally owned business spent 44.6% of their revenues in the local economy and 8.7% in other regions of the state. This was compared to nationally-owned chains, which spent 14.1% of revenues in the local

economy[12]. A strong local business community keeps more money circulating in the local economy.

Small scale farms and fisheries operations offer an opportunity for Nova Scotians to plug leakages of dollars from the provincial economy and promote a more equitable distribution of income, particularly in rural areas. A small and diversified agri-food sector also helps to reduce risk in the performance of the overall economy.

Numerous small enterprises offer a form of risk management for the Nova Scotian economy relative to few, large firms. The economic impact of the loss of one small farm is quite obviously less than that of a larger farm. Similarly, the loss of a fishing vessel would be less damaging than the loss of a consolidated fleet. The reverse argument could be made to support large enterprises in times of robust economic growth.

Diversified agri-food operations also provide insulation from risk in the economy. Mono-crop enterprises rise and fall with commodity price fluctuations. The degree of specialization in one or a few key commodities puts the economy at risk of declines in demand or increases in operating costs associated with those commodities. Diversification, like a mutual fund, spreads risk across a larger number of agri-food products and reduces the probability of economic catastrophe that is too commonly seen in one industry towns.

Of course, large companies with non-Nova Scotian shareholders play an extremely important role in the economy and their loss would by no means be a positive for the province. The final impact on the local economy might be higher with one large and efficient corporation or with numerous, smaller local businesses. The argument is simply that the relatively small and diversified agri-food industry in Nova Scotia, while rarely as efficient as an agri-food industry comprised of large consolidated and specialized businesses, offers important economic benefits that should not be overlooked.

Tourism

The presence of the agri-food sector directly impacts tourism in Nova Scotia. The influences that the industry has on tourism are externalities: the influences are naturally associated with agri-food production and there is no market signal to producers to provide additional positive influences or to mitigate negative influences. Tourism revenues are extremely beneficial, equivalent to exports, as they are pure injections of dollars from outside of the province.

Examples of positive externalities affecting tourism are as general as having a functioning agricultural region such as the Annapolis Valley or a vibrant fishing community. In this case, the agri-food industry is showcasing an alternative way of life for those that are not otherwise able to experience it. Positive externalities are also specific objects such as a lighthouse or an old farmhouse. Negative externalities, those that would actually decrease tourism in an area, could be a result of unaesthetic buildings, smell, traffic congestion etc.

The net effect of agri-food externalities on tourism has likely been positive. Nova Scotia is viewed as a vacation destination and entire regions of the province are defined in large part by agriculture and fisheries. Without agricultural and rural landscapes and without small but active fishing communities, Nova Scotia would lose much of its appeal to tourists.

European nations have recognized the external benefits arising from specific forms of agriculture that are pleasing to tourists. An Austrian study in 1991, indicated that 84 percent of tourists stated that a well-kept countryside is a decisive factor in their choice to spend their vacation in Austria. Furthermore, "environment and countryside" was ranked the highest out of a list of 26 "important vacation items"[13].

Weiβensee is a community in Austria that is heavily dependant on tourism. Mountain agriculture is an important input in the overall tourist experience but the extensive production practices and low commodity prices are reducing the economic relevance of the sector. To partially correct a market failure, a contract between farmers and the Landscape Conservation Organisation pays farmers to uphold certain production practices. The most important practices are: mowing grassland and removing clippings, maintaining a low animal stocking density, and the prohibition of chemical inputs and afforestation[14]. The program has allowed a form of agriculture that is beneficial to the local economy, but that would not exist under traditional market conditions, to maintain economic relevance.

The Flåm Railway is one of the most visited tourist attractions in Norway[13]. The railway offers breathtaking views of mountains and fjords. Uncontrolled growth of birch forest, however, had concealed much of the view. The market for sheep farming in the region is more attractive to farmers than is the market for goats and kids, however goats and kids provide a positive externality in that they manage the growth of birch forests during grazing. The externality, by definition, was not addressed by the traditional commodity market and goat farming was less prevalent than sheep farming. Through a small tax attached to the cost of a rail ticket, the market failure is partially addressed by paying farmers to pursue controlled grazing of goats and kids in specified areas that have the best views. Internalizing these benefits (there are also benefits to passengers from seeing the animals themselves) has reinstated the impressive views and partially corrected a market failure for the benefit of farmers, the railway, and tourists.

Without a proper market signal to the agri-food industry, the benefits and costs to the tourism industry resulting from agri-food production will not be taken into account. Theoretically, internalizing the effects of externalities into the business decisions of the agri-food industry would enhance the province as a tourist destination. In practicality, the accurate quantification of these externalities is difficult, although not impossible.

Other Amenity Benefits

The amenities that bring tourism dollars to the rural and coastal areas of Nova Scotia will play an important role in the future viability of these communities. Amenity-driven growth is

receiving increased attention and will be a leading factor in securing wealth for rural regions that can maintain and enhance their amenity endowments [15,16,17,18,19].

Amenities provided by agricultural landscapes and coastal communities can lead to a competitive advantage for regions in driving population growth and business development. High-amenity areas stand a better chance of attracting new households and businesses. In a written statement by 300 economists, natural resource amenities of the western states were identified as being the region's most significant long term strength, contributing to economic growth by attracting productive families, firms, and investments[15].

Many studies have shown that amenity-rich rural counties are out-performing non-amenity counties in terms of population growth[17]. The type of new residents and businesses that amenity-rich areas attract are also of interest. People attracted to these communities generally have above average education, incomes, and entrepreneurial skills[15]. Similarly, businesses that depend on a highly skilled workforce will be increasingly persuaded to locate in these areas[18].

Amenity-rich areas can often pursue a "people-then-jobs" strategy, encouraging new entrepreneurial enterprises and high-paying, service related industries. Service related industries are free to choose rural areas relative to goods-producing industries, which tend to locate near major urban markets or specific input sources. A new strategy that will see all of rural Nova Scotia have access to high speed internet by 2009[20] adds to an ideal rural economic development climate. Few places have such a wealth of scenic landscapes, coastline, culture and heritage, much of which has been and will continue to be determined by the agri-food industry.

Health Benefits

There may be an opportunity to reduce the reliance on the healthcare system as a result of the food that we eat. Food consumption is a modifiable determinant of health.

Obesity rates in children and adolescents, for example, have been increasing considerably over the past 25 years[21]. Nova Scotia has the third highest overweight/obesity rate in this age group in Canada. Increases in obesity rates in adults have also been significant[22].

Obesity is a serious risk factor for diseases such as hypertension, cardiovascular diseases, type 2 diabetes, dyslipidemia, gallbladder disease and cancer[23]. A 1997 study estimated the direct impact of obesity on Canadian healthcare spending at over $1.8 billion, or 2.4 percent of total healthcare expenditures.

Increased consumption of fast foods and decreased consumption of fruits and vegetables is a determinant of obesity[20]. This is an example of a market failure similar to that described in the case of cigarettes. Significant savings could be realized if people were to alter their eating habits.

The nutritional value of food is affected by production practice. While there are many claims regarding the nutritional benefits of organic versus conventional, unprocessed versus processed etc., no scientific consensus exists. There may be additional nutritional benefits in local food systems that reduce transport time from harvest to consumption. Vitamin C content of fruits and vegetables, for example, decreases post-harvest and little may remain after 2-3 days[24].

4.2 Environmental

Before the second World War, food systems were more localized. Today's complex systems are the result of the market's response to consumer demand. Shoppers want uniform quality, low-priced food, convenience and variety throughout the year. Agricultural enterprises have responded through consolidation, rationalization and technological advancements. This market driven response does not take into account external environmental costs.

Food Miles

The food system has a complex impact on climate change. Globalization and specialization in agri-food industries has led to increasing distances that our food travels, and thus increases in fossil fuel use from transportation. The transportation sector (of which food transport is a major component) is responsible for 25 percent of Canada's greenhouse gas (GHG) emissions[25]. Emissions from transportation increased 27 percent between 1990 and 2004.

One measure of the environmental impact of food systems is food miles: the distance that food travels from the point of production to the point of purchase. Local food systems reduce food miles while the industrial food system has drastically increased the distance that food travels. Food miles offer only partial insights into the environmental impact of different food systems. Food that is grown locally and that requires a large amount of mechanical infrastructure may not be as environmentally friendly as food grown organically in a distant field and bulk-shipped. Regardless, all else being equal, shorter "farm to fork" or "boat to throat" distances result in lower GHG emissions.

Food miles studies have calculated the distance that local food travels versus imported food. One study estimated that produce grown in the state of Iowa traveled an average of 56 miles to market while the same food produced conventionally (not local) traveled 1,494 miles to reach the same markets[26].

An Ontario-based study found that a basket of locally produced food consisting of vegetables, fruits and lamb chops traveled an average of 101 km to reach a Toronto farmer's market. The same imported food basket resulted in an average distance traveled of 5,346 km to reach a Toronto supermarket[27].

The Ontario-based report concludes that the emissions caused by transporting the local food amount to 0.118 kg of CO_2 and 11kg for importing the foreign sourced food. If all Nova

Scotians were to pay for the difference in CO_2 emissions caused by importing this food basket versus buying it from local sources, it would cost the province approximately $6.2 million (see table 1)[§].

Table 1. Cost of carbon offsets to account for CO2 emissions from the transportation of sample food basket.

	Local	Imported
CO_2 from transporting food basket (tonnes/year)	.006	.573
Carbon offset*	$11.72/ tonne	$11.72/ tonne
Cost per person per year	$0.07	$6.72
NS population**	937,889	937,889
Total cost	**$65,652**	**$6,302,614**

Notes:
* Average carbon offset price ($10 US)[28].
** 2005 population estimate, NS Dept of Finance.

As a result of environmental externalities being exempt from the commodity market, food systems evolve that would be uneconomical if the externalities were accounted for. Tomatoes trucked to Nova Scotia from California, for example, would cost between 1-3 cents more per pound to offset CO_2 emissions. Shipping by air from Mexico would increase the cost by 3-12 cents per pound (see Appendix). Based on food-miles alone, food that is caught or produced locally would have an economic advantage over imported foods, the opposite of what is often the case.

Ecological Goods and Services

Ecological goods and services (EGS) are the positive environmental externalities (non-market benefits) associated with ecosystems. The agri-food industry, as a steward of the land, is in a position to directly affect EGS offered. Agriculture in particular, depending on the production method, offers EGS that would not otherwise be available, changes the nature of some EGS and diminishes other EGS. Again, EGS for which there is no market signal will not be provided at an optimal level.

Examples of ecological goods and services provided by the agri-food industry are shown in Table 2 [29,30]:

Table 2. Potential ecological goods and services resulting from the agri-food industry.

Positive	Open space	Watershed protection
	Soil conservation	Flood control
	Biodiversity	Groundwater recharge
	Wildlife habitat	Regulation of atmosphere and climate
	Scenic vistas	Nutrient cycling
	Isolation from congestion	Pollination
Negative	Odor	
	Nutrient runoff	
	Chemical runoff	
	Soil erosion	
	Ecosystem fragmentation	

[§] Carbon offsets allow the consumer to account for their carbon use by purchasing credits (by the tonne) from projects such as wind farms that promote sustainable technologies.

The economic benefits of EGS are being increasingly recognized. New York City, for example, saved billions of dollars that would have been required for a water treatment plant by creating programs to recognize and protect the ecological goods and services provided by its watersheds, a significant portion of which are agricultural lands[31]. The economic viability of beneficial agricultural production in the watershed was necessary to prevent the commercial and residential development of the area while at the same time protecting water quality.

In terms of agricultural policy, the US Farm Bill and European Union Common Agricultural Policy (CAP) contain programs that address EGS externalities. The US and EU approaches to the provision of EGS are quite different. While most US programs focus on reducing negative environmental externalities associated with agriculture, most EU policies pay for the provision of positive EGS[32].

Assigning a dollar value to the view of a meadow or the clearness of water in a stream may seem a bit abstract. A large and growing body of environmental economic research has brought this subject into the mainstream in recent decades. A wide range of non-market goods and services can now be estimated with enough accuracy for policy relevance[33].

For example, a study on the market and non-market values of a dune-beach system in Maine offers valuable insight for land-use decisions. Private residential development of the beach front park would yield an estimated value between $4-8 million USD. The value of recreational services provided (the willingness to pay of visitors to the park each visit) is between $3.4-12.2 million USD per year (a present value of $68-240 million USD)[34].

While this example would not necessarily be able to determine the best use of this particular beach, it does offer a clear choice between two alternatives. The valuation of ecological goods and services helps to add information to inform policy decisions.

Not all farms or fishing operations contribute only positive or negative EGS. In fact, most operations are probably producing a combination of good and bad EGS. Again, signaling the value that society places on the various positive and negative EGS through the market mechanism would promote a more optimal agri-food sector as valued by society. This would almost certainly attract positive attention and serve as a model for other parts of the world.

4.3 Social

While the economic impacts and environmental externalities of the agri-food industry generally affect individuals equally, or at least in a predictable manner, the social aspects are less certain. While there is considerable difficulty in assigning a dollar value to the social goods and services provided by agri-food, these benefits are very real.

Food Security

The term "food security" does not hold consistent meaning across the globe. The Food and Agriculture Organization of the United Nations provides the following definition:

> "Food security exists when all people, at all times, have access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life."[35]

A background prepared by the Policy Working Group of the Nova Scotia Participatory Food Security Projects expands on a definition of food security and states:

> "…food security means that an individual or a community has access to nutritious, safe, personally acceptable and culturally appropriate foods that are produced, procured and distributed in ways that are environmentally sound and socially just (adapted from Fairholm 1998)."[36]

The industrial food system has made it more difficult to determine the geographic source, production methods and standards used in growing, processing, and transporting food. For people who are not concerned with these issues, there is no loss of food security. For others, the inability to readily access this information, or to procure foods produced in a desired manner, is a real problem.

Local food systems have an important role to play in ensuring food security in this province. As the former report points out, Nova Scotia is not food secure. Efficient and transparent local food systems can provide food that is produced, processed, transported and sold in environmentally sustainable, culturally appropriate ways, and that supports the local economy at the same time. Interfaces such as farmer's markets, community supported agriculture (CSAs), and direct from farm purchasing foster relationships between producer and consumer and allow for increased control of an individual's food security.

Tourism

In an economic sense, the social goods and services that agri-food provides are mostly realized as tourism dollars. The cultural or social aspects of agri-food in Nova Scotia influence the amount of tourism dollars that flow into the province from outside, and also enable some transfers from urban to rural areas within the province.

The cultural and social components of our society are certainly based to a significant extent on agricultural areas and fishing communities. As testament to this, many Nova Scotian museums and festivals are directly based on the agri-food industry.

Various forms of agri-food production offer different social/cultural impacts and differ in their ability to generate tourism revenues. In most cases there is no market signal to indicate which form or scale of agri-food production is most beneficial to tourism. Unfortunately, in selecting a production method there is likely to be an inverse (negative) relationship between the current

methods used to generate economic profit from the commodity market and the impact on tourism revenues. Without the proper market incentives, the agri-food industry, under competitive pressures to produce at the lowest cost, must work towards a conflicting goal with the tourism industry.

Intangible benefits

The outmigration of residents from rural areas have many influences on communities, families, and individuals that are beyond the scope of a balance sheet. The agri-food sector has played an important role in providing intangible societal benefits. The economic undertakings of this industry necessitate communication and partnerships between residents, producers, and businesses, building a stronger community and sense of place. The desire of farmers and fishermen to pass something on to the next generation cannot be assigned a dollar value, but holds value nonetheless.

This paper has attempted to explain the many benefits of our agri-fish industries that are not recognized by the market. At the same time, it has argued that dollar values can at least be estimated for many of these benefits and included in our decisions about what we are supporting when we purchase food. The cultural component of these industries, one of the most valuable "spin off" benefits or externalities, cannot be assigned an accurate dollar value. The value is there nonetheless, reflected in the Annapolis Valley Apple Blossom Festival, the Pictou Lobster Carnival, Yarmouth Seafest, Lunenburg Folk Harbour Festival, Digby Scallop Days and many other events, attractions and especially communities that line our coastline and dot our interior. These are benefits of the agri-food industry that help define us as a province.

3.0 Conclusion

The agri-food industry generates many costs and benefits beyond the production of food and fibre. Failure to recognize this is a failure of the market, which relies on price to signal value. In the case of food production, lowest price and convenience will commonly win over these hidden costs. At first glance, a cucumber is a cucumber and a fish is a fish, but in reality, this is simply not the case. A strong agri-food industry in Nova Scotia increases our control over the quality of our food and the impact that its production has had on the economy, people, and the environment.

Agriculture and the fisheries have laid down the foundation of this province, define our past and can be an integral part of our future. Recognizing the benefits and costs, and internalizing them into the production decisions of agri-food enterprises would benefit all Nova Scotians by realizing the total economic, environmental, and social value that the agri-food industry can provide.

APPENDIX

Table A.1 Cost of carbon offsets for tomatoes-calculations			
Product	Tomatoes	Tomatoes	
Origin	San Joaquin, CA	Mexico City	
Destination	Halifax	Halifax	
A. Distance	6,158 km (road)	4,324 km (air, straight line)	www.mapquest.com http://jan.ucc.nau.edu/~cvm/latlongdist.html
B. Method	38,000lb semi-trailer (truck)	10 tonne container (air freight)	
C=A*B. Tonne-km	106,142	43,240	
D. CO2/tonne-km	207 grams	1,260 grams	www.leopold.iastate.edu/pubs/staff/ppp/food_mil.pdf
E=C*D. CO2/shipment	21.97 tonnes	54.48 tonnes	
F=E/B. CO2/lb tomatoes	0.00058 tonnes	0.00247 tonnes	
G. Cost of CO2 offset	$13.50 – 47.00	$13.50 – 47.00	www.ecobusinesslinks.com/carbon_offset_wind_credits_carbon_reduction.htm
H=F*G. Cost of CO2 offset/lb tomatoes	**$0.01 – 0.03**	**$0.03 – 0.12**	
Conversion ratios: lbs-tonnes= 0.000454 grams-tonnes= 0.000001 kg-lbs= 2.204623			

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