Research Article

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Agriculture and tourism sector linkages: Global relevance and local evidence for the case of South Tyrol

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Abstract: The promotion of agritourism, i.e., commercial encounters between farmers and non-local visitors, is seen as a vital development option to stabilise economic decline in rural areas. In addition to agritourism, this article analyses the various transactional linkages between the agriculture and tourism sectors. The theory part discusses earlier literature and also covers modern types of farmer-tourist interactions such as on-farm education and training activities. The empirical analysis provides a complete monetary quantification of the various sector linkages for the case of South Tyrol, a north Italian province with significant agricultural and tourism sectors. By using provincial input-output table data from 2011 and combining them with additional agricultural trade numbers, a complete sectoral interlinkage picture is constructed. The results show that while farmer income from tourism is significant, the money earned by exports of agricultural products to tourist source countries is more than double as much. Tourists' farm overnight stays contribute to about 10% of total farm incomes. Moreover, the results show that agritourism activity and physical farm output are inversely related to each other. A thorough policy assessment of agritourism must differentiate between its farm income effects and its potential counterproductive consequences for global food security and local food supply.

Keywords: agritourism; agricultural trade; economics; input-output table; Italy

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1 Introduction

Rural areas are vital for society because they provide living spaces and natural resources for people despite the fact that now more than half of the world's population live in urban areas (United Nations 2018). Therefore, the conservation and development of the countryside is a matter of general and continuous societal interest.

Western rural area paradigms have changed during the last decades. Traditionally, the countryside has been seen from the perspective of economic sectors (Arënliu 2015). Agriculture used to be the most important rural sector with a focus on the production of agricultural commodities both food and non-food (e.g., cotton). Starting with the Rio Earth Summit in 1992, the term "multi-functionality of agriculture" emerged which has subsequently been integrated into the Common Agricultural Policy (CAP) of the European Union. The multi-functionality concept expresses the idea that agriculture not only produces physical commodities but also supplies non-commodity outputs or services such as landscape beauty, environmental services or social and cultural benefits (e.g., preserving customs and traditions) (OECD 2009). By providing such services to rural communities, the significance and impacts of farming have surpassed traditional economic functions.

Another view on rural areas has emerged with the introduction of the concept of geographic territories (Van der Ploeg 2008). Rural areas can be seen as territories that offer countryside capital or rural resources both natural and social. Such assets attract people from non-rural or other rural areas and, if managed well, can contribute to territorial development. Rural tourism can be both farm- and non-farm based (Phillip et al. 2010; Busby and Rendle 2000).

Regardless of the adopted rural area paradigm, it is clear that there are various interactions between agriculture and tourism. In particular, there are often resource and market linkages (Bowen et al. 1991). Resource linkages exist because both the development and maintenance

of economic activities require land, labour and capital. For instance, land may be used for growing crops or for building hotels on it. People can choose either to produce food or to serve travellers. Financial capital can be used to improve touristic infrastructure (swimming pools, say) or to buy agricultural machinery. Market linkages exist because tourists who visit a country for its attractions and who provide jobs and incomes for visitor industries are often also customers of the host country farmers. Farmers may provide food and other agricultural goods such as handicraft products or green energy to tourists.

In general, the nature and intensity of sector interaction can differ widely. Economic sectors can compete with each other (i.e., they are in conflict), they may coexist (in which case there are no interactions between them), or they may create synergies (i.e., there is a symbiosis relationship) (Budowski 1976). At the same time, the intensity of sector interaction can vary between strong, ambiguous and weak (Garung 2012; Torres 2003).

One particular interface between tourists and farmers is agritourism. In the wider sense, agritourism and related concepts such as 'agrotourism', 'farm tourism' or 'farm-based tourism' (Phillip et al. 2010) comprise all encounters between farmers and tourists (i.e., non-local visitors) with commercial purposes, where money is exchanged for some sort of service that farmers offer to visitors. In the narrow sense, agritourism is seen as a subset of rural tourism that fulfils certain criteria regarding the location of the tourist activity (on a working farm), the nature of contact between visitors and farmers (passive, indirect or direct) and the authenticity of the tourists' farm experience (Phillip et al. 2010). Farm holidays (i.e., overnight stays) are part of the wider agritourism definition and constitute an economic activity that is growing in many countries, in Europe and elsewhere. Tourists who sleep and eat on a farm often provide vital income to the host farmer family. In this way, they may help stabilise a declining traditional farming sector, resulting in a symbiosis situation between the two sectors.

However, a potential drawback of agritourism activity can be that farmers' time spent to serve commercial guests may lack to do agricultural production work, thus potentially posing a threat to traditional farming activity (Cox et al. 1994). While such activity diversification may still serve to stabilize rural incomes and maintain jobs, it may be counterproductive in terms of contributing to global food security, to the supply of locally produced food or to the provision of other needed non-food farm commodities. Hence, the two sectors may be in conflict, at least partly. Also for this reason, among others, countries such as Italy have passed regulation that limits the time a farming family devotes to hospitality to less than fifty percent of total worktime (Sidali 2009). Otherwise, the farm is not allowed to use the term *agriturismo* (agritourism enterprise).

The existence of the linkages between agriculture and tourism has been acknowledged and documented already a long time ago. For instance, Bowen et al. (1991) described the interface between the two economic activities with illustrations and examples for the case of Hawaii. However, until now, the exact empirical extent to which agriculture benefits from tourism has not yet been estimated systematically in monetary terms.

Therefore, the objective of this study is to contribute to a better understanding of the economic significance of agritourism among the full range of commercial linkages between the agriculture and tourism sectors. The study uses a theory-based and empirical approach, adopts an agricultural economics perspective and focuses on the sector rather than the firm or farm level. In particular, the study seeks to quantify in monetary units the various interactions between tourism and agriculture for the case of South Tyrol, an autonomous province in the north of Italy. Using detailed data from provincial economic input-output tables (IOT) and tourism satellite accounts, I estimate the euro values of the various goods and services flows between the two economic sectors.

2 The agriculture and tourism sectors and the linkages between them

The interface between tourism and agriculture was described by Bowen et al. (1991) using a graphic conceptual model. According to this, the home and external economies are linked via visitors who, while being in the host country, consume agricultural goods and services either directly (e.g., by visiting farms) or indirectly through visitor industries (e.g., hospitality enterprises). Moreover, the model links home-country farmers and external-economy visitors via agricultural exports that extend the period of consumption of home-country goods by tourists to before and/or after their travel. There are also agricultural imports from tourist source countries that may actually reduce farmer-visitor transactions in the host country as such imports substitute local farm production for foreign one. Finally, the model also depicts resource sharing or competition between the farming and visitor industries, as already outlined above.

Despite its clarity, the conceptual framework of Bowen at al. (1991) is still quite general and does not depict all transactions between local farmer and foreign visitors in detail. Moreover, the model may need updating to reflect recent developments in agritourism. Therefore, in the following, I discuss in more detail the existing interactions between tourists and farmers while the former stay in the host country (first subsection), their interaction via trade flows (second subsection) and the actual economic significance of agriculture and tourism sectors from a global and local (i.e., South Tyrolean) perspective (third subsection).

2.1 Host country agriculture-tourism linkages in detail

Following Arënliu (2015) and Telfer and Wall (1996), farmers can interact with tourists and complete transactions with them either indirectly (i.e., with no personal contact) or directly. Indirect transactions occur when farmers sell their products, be they food or non-food, via intermediaries to tourists. There may only be one intermediary (e.g., a grower sells fresh produce to a restaurant that prepares meals for tourists), or several (e.g., a farmer sells milk to a dairy that sells cheese to a retail outlet that then sells to tourists).

Direct sales of products and/or services from farmers to tourists may occur at different places on- or off-farm and during different occasions (e.g., to a farm store customer or to a farm guest staying several days on the farm). Off-farm tourist encounters include farmer markets or cultural festivals where farmers may provide entertainment services such as the display of dances or the playing of music. A more recent format of farmer-tourist transactions is the sales of educational offerings where farmers may teach tourists traditional skills such as how to make cheese, maintain a garden or to do a certain handicraft (Canavari et al. 2011).

Farm (overnight) stays is a particular intensive form of interaction between farmers and tourists (Busby and Rendle 2000; Fleischer and Tchetchik 2005). It can take various formats. For instance, 'guests' enjoying close family integration with their rooms located in the actual farm building. Or the agritourism enterprise operates as a larger-scale accommodation business where tourists are accommodated in separate buildings on the farm territory. Figure 1 provides a detailed depiction of the various trans-

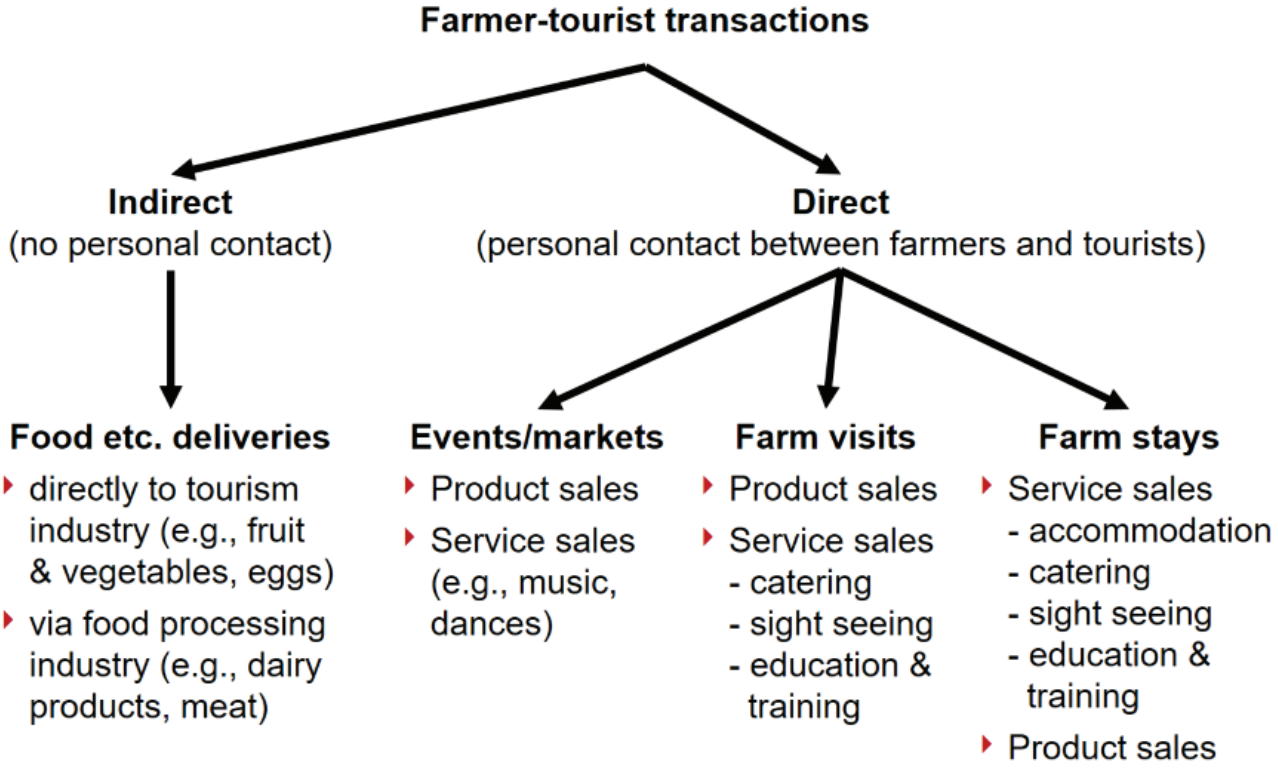

Figure 1: The in-country transaction interface between farmers and tourists

actions that may occur between farmers and tourists while the latter are in the host country.

2.2 Agricultural exports and imports

The travel of people can alter their tastes as a result of learning about new products and/or consumption habits (Santana-Gallego et al. 2016; Fischer and Gil Alana 2009; Fischer 2007). Consequently, aggregate buying preferences in the tourist source countries, i.e., national demand curves, can change, potentially leading to an increase of imports of products from tourist destination countries. An example would be a certain type or brand of wine that some tourists may like continue to consume back home after their holidays. At the same time, tourists may want to enjoy their favourite home country products while being on holiday in another country (Telfer and Wall 1996). For instance, it could be a favourite beer brand that is exported from source countries of the travellers to their tourist destinations.

Economic studies have quantified the potential trade effects resulting from tourism flows. Santana-Gallego et al. (2016), using a gravity trade model and tourism data from 195 countries, provide strong evidence that, generally, tourism increases both the probability of two countries trading with each other and their trade volumes. More specifically for agricultural products, Fischer (2004) showed that in the case of German imports of food and drink products from France and Italy, tourism elasticities are between one and two in absolute terms. That is, an increase of German tourists to these countries by one percent results in an increase of imports of certain food and drink products from these countries by one to two percent. Fischer and Gil-Alana (2009) and Gil-Alana and Fischer (2010) also estimated the length of the effect that tourism has on imports from the tourist destination countries. For the case of German imports of Spanish wine, they found that the tourism effect decreases over time and lasts between two and nine months after the tourist trips.

2.3 The global and local economic significance of agriculture and tourism sectors

Agriculture and tourism are two traditional economic activities with significant contributions to the regional, national and global economies. While both sectors share characteristics such as widespread prevalence and importance, there are also fundamental differences between them. Globally, in 2017, according to World Bank Open Data (online), agriculture contributes about 3.5% to world gross domestic product (GDP) and agricultural raw materials represent about 1.7% of world export value. In the same year, one quarter of all jobs worldwide are provided by the agricultural sector. This share has been fallen from about 42% in 1991. In contrast, the tourism sector represents 9% of world GDP and 6% of world export value, according to data from the United Nations' World Tourism Organisation (UNWTO). In terms of jobs, one out of 11 people, i.e., 9% of the world population, earn their living in the tourism sector. The number of travel trips per thousand head of world population has increased from about 10 in the 1950ies to almost 140 in 2010 (UNWTO online). Hence, in terms of economic output and exports, tourism is about three times as important as agriculture. In terms of jobs, agriculture is roughly three times as important as tourism. As to growth, agriculture is shrinking while tourism is expanding.

South Tyrol is an autonomous province in the north of Italy at the border to Austria. According to the website of ASTAT, the provincial statistical agency, in 2014, the South Tyrolean population numbered about 520,000 inhabitants, or 0.9% of the Italian population. The province GDP of about €21 billion represents 1.3% of national GDP. In the same year, total exports and imports of the province equalled about €4.0 billion each, or 19% of province GDP. The South Tyrolean agriculture and tourism sectors (only hospitality industry – i.e., accommodation and catering establishments but no other tourism service providers such as transportation or entertainment) in 2014 represent 4.3% and 9.6% of province GDP, respectively (ASTAT online). The sectors' share in total job provision are 6.3% (agriculture) and 11.3% (hospitality). Agricultural exports (mostly apples) are significant and amount to 15% of all province exports while agricultural imports are 4% of total province imports (in value terms).

Farming in South Tyrol is almost exclusively done by family smallholders. In 2010, 96% of the 20,247 registered farms are owned by individuals or families (ASTAT 2016). Two production activities dominate: dairy farming (44% of all farms) and apple and/or grape growing (also 44% of all farms). Fruit growing provides an average yearly farm revenue (standard output) of €33,400 and dairy farming of €23,700. The share of full-time farmers is 43% in fruit growing and 50% in dairy farming. Overall, 99.7% of all farms earn less than €100,000 per year (ASTAT 2016).

Agritourism is significant in the province (ASTAT 2018). Out of the total of 32.2 million overnight stays by tourists in the tourism year 2016/17 (November to October) – which represents about 17% of additional population – 2.7 million, or 8.3%, have occurred on farms. Farm

holiday guests originate to 72% from abroad and 28% from other Italian provinces apart from South Tyrol. Seventy-one percent of the farm overnight stays occur during the summer half year (May to October) and the rest during winter (November to April). According to IDM Südtirol/Alto Adige (2018), a typical tourist in South Tyrol spends about €122 a day during the stay, more in winter (€140) than in summer (€104). Tourists staying on a farm spend about 24% less than the average tourist. More than half (56%) of that is spent on accommodation, 14% on meals, 17% on shopping, 3% on transportation and the remaining 10% are various other expenses (IDM Südtirol/Alto Adige 2018).

South Tyrolean agritourism businesses numbered 3,173 in 2015 (ASTAT 2017). This represents a share of 19% of all farm operations. Two-thirds (65%) of the agritourism businesses offer accommodation only. Another 24% offer accommodation plus at least breakfast or half-board catering. A further 7% of the businesses offer catering and tastings in form of farm inns but no accommodation. The remaining ones (4%) offer neither beds nor food but daytime activities such as hiking, horse riding and other farm-based sports like mountain biking. In 2017, the average number of beds on farms available for tourists were 8.9 and the average number of seats for catering activities were 11.2 (ASTAT 2019). In the same year, only 13% of agritourism businesses in South Tyrol are run by women. This compares to 24% in the neighbouring province of Trentino and an overall Italian average of 36% (ASTAT 2019).

3 Methods and data

Economic activity at the national level (but also at the regional and international levels) is recorded in the System of National Accounts (SNA) framework (United Nation 2018; Eurostat 2008). One integral part of this framework are Supply and Use Tables (SUTs) that allow for a single and coherent estimation of GDP. SUTs describe how products (goods and services) are brought into an economy (either by domestic production or imports) and how these products are used (by companies, households, governments, physical investment or exports). SUTs show the interaction between producers and consumers. SUTs form the basis for the compilation of Input-Output Tables (IOTs).

IOTs display in monetary units the sale and purchase relationships between producers (intermediate use) and consumers (final use) within an economy (Eurostat 2008). IOTs also show separately the import and export of products. IOTs derived from SUTs have been balanced, meaning that IOTs follow certain assumptions, are free from missing values and are consistent with the other tables in the SNA framework. IOTs can be defined according to product outputs (product x product tables), industry outputs (industry x industry tables) or combinations of them (product x industry) (OECD online).

An extension to SUTs and IOTs are satellite accounts such as regional, environmental, labour or tourism accounts that allow feedback loops with SUTs and IOTs (United Nations 2018). For instance, when linked to tourism, the satellite accounts capture transactions and transfers between the domestic and foreign economic agents in the accounting system and measure the effects of potential policy interventions.

IOTs can be compiled at different levels of detail. They typically depict a matrix of products (the rows of an IOT) and industries (the columns of an IOT). Thus, the columns reflect industry cost structures. If the number of products equals the number of industries, an IOT matrix is square. If there are more products than industries, the matrix is rectangular. While national IOTs are harmonised, regional accounts may use rectangular systems and are often more detailed, sometimes listing thousands of products and hundreds of industries (Eurostat 2008).

IOTs are the basis for Input-Output Analysis, a technique developed by Nobel Prize winner Wassily Leontief (United Nations 2018). They make possible different types of analytical uses at micro and macro level, including economic analyses, impact and policy assessments, industry and sector studies, or local government investment planning. Moreover, IOTs may serve as base structures for scenario analysis such as Computable General Equilibrium modelling etc. More recently, SUTs and IOTs have also been employed successfully for gaining a better understanding of global value chains (United Nations 2018).

Input-Output Analysis typically covers an entire economy, based on IOTs and/or SUTs and their derivations such as matrix tables with input-output coefficients (industry cost shares), indicators (input structures) or multipliers (e.g., policy output effects) (Eurostat 2008). However, at the industry level, a more specific Inter-industrial Linkage Analysis (ILA) is also common, aiming at the depiction and the improvement of understanding of the transactional relationships between various sectors or industries. Here, 'backward linkages' and 'forward linkages' are distinguished (United Nations 2018). Backward linkages indicate the inter-connection of a particular industry to other industries from which it purchases inputs. Forward linkages indicate the sales side, i.e., cus-

tomer industries. Such ILA can and is typically done systematically for an entire economy, compiling matrix tables of input and output coefficients of backward and forward linkages and derivations for all industries. However, the interest in this paper is only on the linkages between the agricultural and tourism sectors and some intermediate industries such as food processing for the case of South Tyrol.

For the analysis of such linkages, data from regional IOTs and tourism satellite accounts which I obtained from the provincial statistical agency ASTAT were used. These data were complemented by additional statistical records from the provincial WIFO trade chamber, covering agricultural exports and imports.

The latest provincial IOT for South Tyrol is only available for the year 2011 (ASTAT 2014, ASTAT 2012a). It is a square product x product matrix covering 37 goods and services of the provincial economy. The table is extended by tourism satellite data (ASTAT 2012b) and in the final use section specifies separately the expenses of local private households and tourists. Moreover, also contrary to the common national and international IOTs, the province IOT distinguishes in the final uses between exports to foreign countries and those to other Italian provinces. The same subdivision is done for imports, with separate table rows for goods and services originating from foreign countries and those from other Italian provinces. Overall, the province IOT contains 480 cells with numerical values.

The interest of this study is in the quantification of the various transactions between tourists and the provincial farmers. In particular, the following interlinkages are investigated:

1. Total tourist expenditures for the tourism and food industries
2. Direct tourist expenditure on farms for
   a. farm accommodation
   b. agriculture goods (farm food, souvenir products, other services)
3. Indirect tourist spending for agricultural goods via intermediaries for
   a. processed (non-farm) food and drinks
   b. hospitality services (food, furniture, decoration etc.)
4. Tourist expenditures for agricultural products before/after their holidays and imports of such products
   a. provincial exports of agricultural products to tourist source countries
   b. provincial imports of agricultural products from tourist source countries
5. Indicators for the degree of resource/activity competition between the agriculture and tourism industries

To compile the mentioned values, data were taken from the province IOT and added up or were otherwise adjusted where necessary. Moreover, data from other sources were used and partly adjusted to complement the IOT data. In particular, further tourism data were used from ASTAT (2013, 2015, 2018a, 2018b). Tourist origins were taken from IDM Südtirol/Alto Adige (2018) while provincial agricultural/food export and import were obtained from WIFO (2012).

4 Results and discussion

Total tourist expenditure (TTE) in 2011 in South Tyrol amounted to €3.9 billion. From this, €2.2 billion, or 56%, were spent on the hospitality industries. The province IOT indicates an overall input import share of 2.5%, showing that the provincial economy benefits considerably from tourist arrivals and that most of the value added in this activity is kept in the territory.

Regarding direct expenditures, tourists spent on farm accommodation in 2011 about €100 million, or approximately 2.6% of TTE and 4.5% of total hospitality industry expenditure. This value was estimated by multiplying the number of overnight stays on farms (2,201,743) (ASTAT 2013) with the estimated expenditure of tourists on farm accommodation per day (about €45) (ASTAT 2015). In addition, according to the provincial IOT, tourists spent €68 million on farms for food, souvenir products and other services. This represents 1.7% of TTE. In South Tyrol, direct marketing of farm products is well developed. There are about 2,000 sales outlets (e.g., farmhouse stores) on the roughly 20,000 registered South Tyrolean farms. Farm families typically sell products such as eggs, apples, chestnuts but also more processed items such as cheese, apple juice, cordial concentrates, wines, bakery products or *speck* and sausages.

Indirect tourist spending for agricultural goods via intermediaries can be subdivided in the expenditures that arrive the farmers via the food and drink industries (3a in the above list) and those earned through the hospitality industries (3b). According to the provincial IOT, in 2011, tourists spent €141 million on processed (non-farm) food and drinks. The provincial agricultural input share in the local food and drink industries is given by 14.6%, which amounts then to about €21 million that farmers earn indirectly from tourists through this channel. At the

same time, tourists spent €2.1 billion on accommodation (without farm stays), with an agricultural input share of 1.8% (food, furniture, decoration etc.). This amounts to an extra €38 million that farmers indirectly earn from tourists.

Summing up, there are €100 million from farm accommodations, €68 million from on-farm tourist spending, €21 million from local agricultural inputs for processed food and drinks consumed by tourists and another €38 million from agricultural input sales to the hospitality industries. Overall, tourists payed €227 million, or 5.8% of TTE, to South Tyrolean farmers. Total value added of the farming sector in 2011 was €726m and total turnover including taxes about €1.0 billion. Hence, tourists payed about 23% of farmer incomes in this year.

The other major income streams derive from exports of South Tyrolean farm products to the tourist source countries. In 2011, 48% of the South Tyrolean tourists originated from Germany, 33% from Italy (i.e., Italian provinces other than South Tyrol), 4% from Switzerland and Liechtenstein, 4% from Benelux countries, 3% from Austria and 7% from other countries such as UK, Russia, Denmark and USA (IDM Südtirol/Alto Adige 2018). In the same year, total South Tyrolean agricultural exports amounted to €571 million of which €303 million, or 53%, were shipped only to the mentioned tourist source countries (WIFO 2012). According to the provincial IOT, other €296 million worth of agricultural products were "exported inter-regionally", i.e., to other Italian provinces. The total of €599 million of farming incomes resulting from exports to tourist origins is therefore more than two-and-a-half times the amount of money that farmers earned from tourists during the latter holidays.

South Tyrolean farmers also lost incomes to farmers and food manufacturers from the tourist source country who exported their agricultural products to South Tyrol where their holidaying compatriots consumed them. However, these opportunity costs were small. In 2011, only €1 million of agricultural products were imported from the main tourist source countries mentioned above. This represents about 66% of all agricultural imports used in the local hospitality industry in this year. This would represent the pork products, beers etc., mostly from Germany, that German tourists choose to continue to consume while they are in South Tyrol. At the same time, tourists in South Tyrol consumed €2.8 million of inter-regional agricultural 'imports' of other Italian provinces. These are likely products such as vegetables, pasta and olive oil that are not, or cannot be, produced by South Tyrolean farmers and food manufacturers. Hence, overall, there were about €3.8 million 'lost' incomes from tourism.

A visual summary of the revenue situation is provided in Figure 2. With €2.34 billion spent, tourism is a big economic factor in the province. Yet, farmers directly or indirectly receive only €227 million, or 9.7% of this money. However, they earn €599 million from exporting their

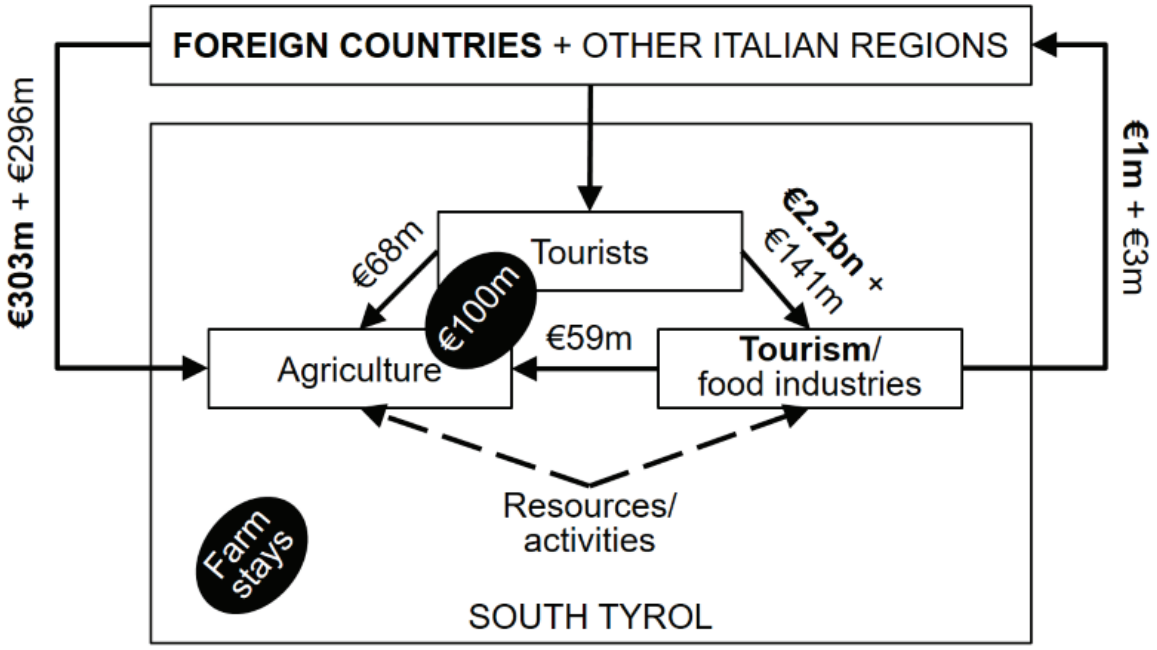

Figure 2: Summary of the farmer-revenue-from-tourism situation in South Tyrol, 2011

agricultural products to the tourist source countries. This income could even be higher by €4 million if local farmers succeeded in income substitution of imported food from tourist source countries.

A final result relates to the competition for resources or activities between the agriculture and tourism sectors in South Tyrol. As argued above, traditional agricultural production and agritourism activities compete for the time of the farming family and for other resources such as space. With family working time being fixed on a farm, more farm guests mean that less time is available for producing food, etc. I test this hypothesis using agricultural production output as an indicator for traditional farming activity and relating it to the number of agritourism farms. The results are shown in Figure 3. The four different panels display the production outputs in kg per head of the South Tyrolean population in the agricultural sub-sectors of milk for 2000 and 2010, and for cereals and potatoes, apples and other fruit, and wine grapes for the years 1990 and 2010. In the same panels, the number of farms with agritourism activities in the given sub-sectors for the mentioned years are provided. As it can be seen, there is a negative correlation between agricultural output and the number of agritourism farms in all sub-sectors. The production outputs for milk, cereals and potatoes, and wine grapes decreased over the mentioned periods. At the same time, the number of agritourism farms increased in all three sub-sectors. In the apples and other fruit sub-sector, the situation is reversed: output grew while agritourism activities decreased. Even if these basic correlations only provide limited evidence, they nevertheless support the hypothesis mentioned above.

5 Conclusions

This study has investigated theoretically and empirically the various linkages between the agriculture and tourism sectors. In theory, the degree of interaction between the two sectors can reach from non-existent, via strong synergies, to intensive competition for shared resources and activities. Globally, both sectors are not at the same performance level. Agriculture, despite still being a significant employer, is in decline and in terms of monetary output rather insignificant for the world economy. In contrast, the tourism sector represents almost 10% of world GDP and is still growing strongly.

For the special case of South Tyrol, the analysis in this article has shown that the farming sector can benefit much from vibrant tourism flows. Although farmers only receive about 10% of the total expenditure of tourists while they holiday in the province, this represents about 23% of farmer incomes. This income is earned either via direct tourist interactions or via indirect transactions

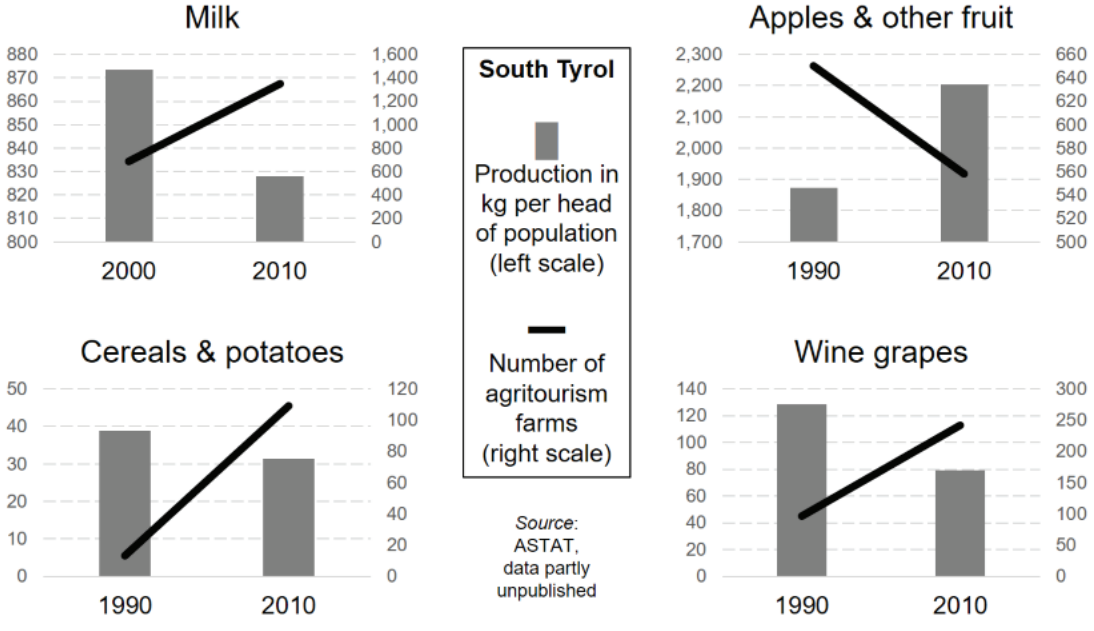

Figure 3: Correlation between sub-sector farm output and agritourism activity in South Tyrol

through intermediaries such as the food processing or hospitality industries. Moreover, by exporting agricultural and food products to the tourist source countries, the local farmers earn another 60% of their incomes indirectly from tourism.

However, not all of these export revenues may be directly attributable to tourism activity. Some of the apples, the milk and the wine that South Tyrol produces goes to the tourism source countries independent of potentially newly acquired preferences of tourists for holiday location products. Nevertheless, the literature has shown that there is an empirical connection between the flows of goods and people. While the exact share of South Tyrolean agricultural/food products that is directly linked to tourist flows remains a potential topic for future research, it cannot be disputed that there are clear synergies between them.

Farm (overnight) stays, i.e., the provision of accommodation, and the core of the agritourism activity in South Tyrol, amount to about 10% of total farmer income. As mentioned above, in 2015, almost 20% of all farms engaged in agritourism activities and 65% of them offered accommodation only. Moreover, it is an activity that is, at least for official statistical purposes, mostly run by men. In reality, while the official farm owner-manager is male and looks after the farm, his wife or female partner often manages the guests. This points to a low degree of specialisation and potentially professionalism in the accommodation agribusiness. There is probably scope for increasing the cross-selling of related hospitality services such as catering, wellness offerings, souvenir products etc. to tourists if the agritourism business were officially run by women. In 2011, such activities amounted to almost 7% of total farm income in South Tyrol. Yet, given an Italian national average share of female-run agritourism businesses nearly three time as high as in South Tyrol, further specialisation in South Tyrolean farming may increase the share of hospitality-related farm income.

However, as also demonstrated above, too much farm activity diversification may be counterproductive from other policy perspectives. When food output from farming declines as a result of producer distraction by hospitality activities, this may be undesirable in the view of global food security and/or local food provision. World demand for agricultural commodities (food, feed and biofuel) is predicted to increase by 50% by 2050 as compared to 2012, according to FAO (2017). Given limited land availability, production in many regions of the world needs to be sustainably intensified (FAO 2018). Sustainable production practices such as organic farming, conservation agriculture or agroecology are knowledge intensive and require more highly trained farmers than in the past. Such sustainable farming professionals should be given access to land where they can make use of their skills. This land can be bought or leased from economically unviable smallholder farms rather than encouraging these to keep operating by engaging in diversification activities that ultimately restrict land mobility.

In conclusion, farmers and tourists can benefit from each other in various ways. However, farmers also have other, and maybe more important, social responsibilities than offering homes, land and worktime for tourist leisure activities. As long as tourism serves to maintain traditional farming activities, in particular in marginal rural areas, it should be welcome as a vital additional farm income source. However, when tourism starts affecting agricultural output, in particular in areas with fertile lands and the potential for sustainable farm commodity production, farm hospitality activities may do more societal harm than good. Policy makers who see agritourism as some sort of 'silver bullet' to solve the problems of the farming sector should pay attention to this.

Conflict of interest: Author declares no conflict of interest.

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