Farmer direct selling: the role of regional factors

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Abstract
In this paper, we study the factors affecting the decision of farmers to directly sell their products to consumers using micro-data on the entire farm population in Italy The empirical setting of the analysis reflects our focus on the geographic determinants of farmers' choices as we estimate our model adopting a multi-level approach and including also spatially lagged variables. The results support the idea that the diffusion of direct sale is a localised process of social innovation, based on knowledge sharing among actors. Policy design should consider the nature of this process in supporting more sustainable forms of supply chain.

Keywords: direct selling; alternative food networks; linear probability models; multilevel estimation; Italy

JEL codes: Q12; Q13; R12

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Introduction

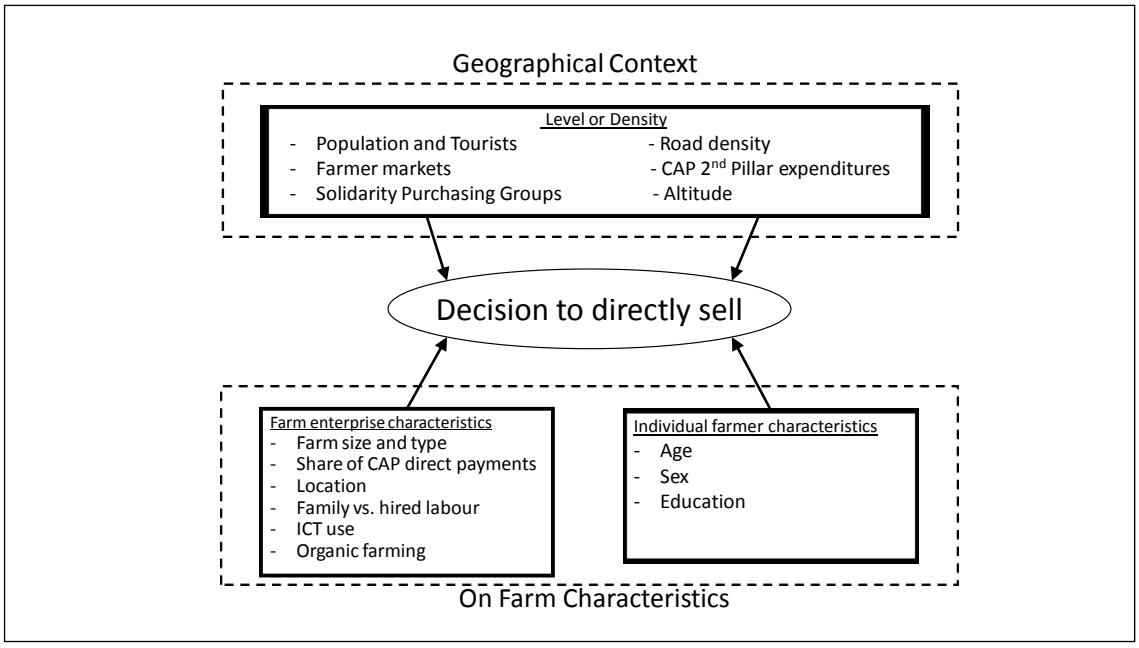
The adoption of direct selling to consumers as a marketing strategy is a typical feature of farms joining the creation of alternative food networks (AFNs). In the last twenty years, the study of AFNs has gained growing attention but some scholars (Goodman, 2003; Sonnino and Marsden, 2006; Tregear, 2011) argue that it is appropriate to reflect critically on the results of the previous researches. A problem in AFN research is a tendency to divide agri-food systems into two antagonistic types, namely "alternative" and "conventional" food systems (Feenstra, 1997; Goodman and Dupuis, 2003). There are a few case studies (Murdoch and Miele, 1999; Straete and Marsden, 2006; Jarosz, 2008) demonstrating that clear boundaries between them do not exist and therefore "in the context of the evolutionary dynamics of alternative food networks, the conventional dichotomy between standardized and localized food does not thoroughly reflect the present reality of the food sector" (Sonnino and Marsden, 2006, p. 184). The goal of this paper is to study the on-farm and regional factors affecting the farmer's choice to directly sell their products to the consumers in Italy. We use the micro-data on the entire farm population which is available from the Census of Agriculture carried out by Istat (Istituto Nazionale di Statistica) in 2010 (about 1,653,000 farms), which means that we have information on every single farm in Italy. The analysis of the entire farm population allows us to go beyond the dichotomy between conventional and alternative because if it is true that direct sale continues to be described by many scholars as a typical feature of AFNs (Sonnino and Marsden, 2006; Donald et al., 2010), it also true that it often takes place in very conventional farms. Furthermore, today it is no longer a niche farm strategy but rather a possible marketing option within the evolving agri-food system. The Census Questionnaire asks the respondents to quantify the share of different marketing channels, including on-farm and off-farm direct selling to consumers. We use this information to study the determinants of direct sale.

In the literature, a set of hypotheses on the drivers affecting the direct sale has already been tested. Direct marketing could be the expression of strategies to increase the gross farm income (Govindasamy et al., 1999; Uematsu and Mishra, 2011), to reduce risks in farm management (Farmer and Betz, 2016), to reduce disguised unemployment of family labour (Aguglia et al., 2011), to exploit the opportunity of a monopolistic competition market in the urban fringes (Fournier 2018) or to sell organic produce at higher prices (Torres et al., 2017). The nature and the diversification of a farm's production can affect the probability of directly marketing to consumers (Corsi and Novelli, 2018). Also, context variables have already been used to explain the direct sale strategy (Gatrell et al., 2010; Bonanno et al. 2014; Aguglia et al., 2011; Corsi and Novelli, 2018; Fournier, 2018), although in these studies they are included as proxies of factors affecting production costs (as in the case of the distance from urban market outlets) or market opportunities (increasing demand in most urbanised areas) within a theoretical framework where farmers' decisions are only driven by individual utility (or profit) maximisation. In other words, in these studies, context variables describe only the competitive space of farmers without any reference to the possible impact of the *geographical* location.

Despite an increase in the focus on the new geographies of food in the literature (Ilbery et al., 2010; Gatrell et al., 2011), the lack of a spatial perspective in the study of food system has endured (Dansero and Puttilli, 2014). While the majority of studies share a focus on the way in which food supply chains are subject to pervasive changes in the organisation of their social, economic, environmental, cultural and spatial set-up, it is still not clear which typology of geographical context actually fosters the evolution of the agri-food system (Sage and Goldberger, 2012). In this paper, we argue that geography plays an important role in determining farmers' choices. In order to reveal the dynamics and mechanisms that move towards a re-localisation of food systems, this paper suggests to draw the analysis upon recent evolutionary economic geography (EEG) literature (Boschma and Martin 2010). In our view, geography is not only a factor

of differentiation of individual competitive space, but also a driver of different trajectories in regional development. In our empirical analysis, besides the variables referring to on-farm characteristics both in terms of structural features (such as farm size, farm type and utilisation of hired work) and the farmer's subjective characteristics (such as age, sex and education), we include a second group of variables addressing the geographical, social and economic context of the farm's location (Figure 1). Furthermore, the empirical strategy of the analysis reflects our focus on the geographic components as we estimate our model adopting a multi-level approach (including municipality, province and regional level) that allows us to capture, besides the impact of on-farm characteristics, also the influence of the geographic context where each firm operates. Moreover, we pay attention to the spatial dimension of data and include in the regressions spatially lagged variables, acknowledging that the characteristics of the neighbouring areas are also important.

Figure 1 Conceptual framework of the analysis



The research questions that this paper answers are: which farm and/or farmer socio-demographic characteristics increase the probability of directly selling their products? Which regional context positively affect the farmers' decision to implement a direct sale marketing channel? How the sector policy affects the diffusion of direct sales?

The paper is structured as follows: we first introduce the theoretical framework and the hypotheses to be tested; the subsequent section presents the model; we then move to the results of the econometric analysis; the final section discusses the main findings of the study.

Theoretical framework

Features of farms

Following Boschma and Martin (2010), EEG deals with the process of spatial diffusion of economic novelties such as innovations, new products, firms and networks. The emphasis is on the micro-behaviours of economic agents (individuals, firms, organisations) and the analysis focuses on the locational behaviour of firms and how firms compete and learn based on their routines in time and space. Due to their tacit and cumulative nature, routines do not change easily, and they are difficult to imitate (Boschma and Frenken, 2006).

In the case of farms, the locational behaviour is very limited and the farmers' capacity of innovation can be influenced by the context where the farm is located. The concept of space our research refers to is not then just a physical ground where farms operate but rather a driver of economic evolution because the spatial structures and the geographical features can influence the micro-behaviours of farmers (Boschma and Martin, 2010). The diffusion of direct selling in the farm proceeds differently in different places, and the emphasis in this paper is to understand the spatial structures and the geographical features that make for or hinder the diffusion of direct selling. A spatial analysis is then crucial because "in order to be an innovative firm it matters where you are located" (Ter Wal and Boschma, 2011, p. 932). The space we refer to is isotropic and the influence of spatial structures and geographical features is supposed to diminish with an increase of the distance from the farm.

Starting to sell directly to consumers is a novelty that requires a comprehensive renovation of farmers' routines. A key mechanism in this process is the imitation of other firms. The literature

(Boschma and Frenken, 2006) has focused on agglomeration externalities as a mechanism that allows firms to successfully acquire routines from other firms. The transfer of knowledge may happen face-to-face and the networks for such an interaction are at the core of the innovation process. Such networks also work as social systems in which trust and knowing each other play an important role (Graziano and Forno, 2012). Networks are localised in the sense that they operate at the regional level and the geographical distance from them is crucial for farmers. These localised networks are important for yet another reason - it is through them that farmers gain reputation and recognition within their field. Although reputation and credibility are important for all firms, localised networks are even more crucial for firms aiming at selling their product directly to consumers.

Farmers Markets (FMs) are a typical expression of these emerging networks and they work as spatial structures. It follows that farmers located in proximity of FMs could be fostered by the decision to innovate their marketing strategies. Broadly speaking, FMs function both as incubator spaces in that they support the process of research, experimentation and imitation in an early phase of a path creation (Boschma and Martin, 2010) reducing the start-up costs, and as new market outlets in the shift towards a different channel of commercialisation (Mastronardi et al, 2015).

HYPO n. 1: *The closer they are to FMs, the higher the probability that farms succeed in the transition towards direct selling.*

A few scholars (Nooteboom, 2000; Boschma, 2005) argued that proximity means more than just geography, as it also includes non-spatial dimensions. Geographical proximity is important but it is not sufficient to gain access to knowledge (Boschma, 2005). Some individual characteristics may foster the process of innovation and not all farmers will have equal access to knowledge. In a dynamic rural space, farmers with an absorptive capacity or higher propensity to risk, such as the

younger ones and those with specific background and skills, have a higher probabilities to shift towards the new routines associated with direct sale. In a survey on farms in West Virginia, Farmer and Betz (2016) found a positive association between educational attainment and the choice of a direct-selling strategy, which is to say that the higher educational level, the lower the concern about a change in technology and routines.

HYPO n. 2: *To be competitive in a re-localised agri-food system, the farmer needs some selected capabilities (e.g. use of ICTs) and a higher educational degree. The younger farmers have more probability to step into direct sale*.

Direct selling is often part of a "deepening" strategy within a multifunctional approach to farming (Van Der Ploeg and Roep, 2003). This deepening aims at increasing the share of value added remaining on farm both by supplying products with non-conventional qualitative features (such as organic and local/typical food products) and reducing the downward competitive pressure along the food supply chain by marketing directly to consumers (Torres et al, 2017). Very often the two actions are shaped as a single strategy (Dries et al, 2012) as direct marketing interactions allow the farmers to supply to consumers the knowledge relevant for assessing the quality of products (information on organic production techniques or about the uniqueness of local food). Furthermore, it reduces the risks intrinsic in marketing agricultural commodities, mostly affecting farms where the small economic size limits the competitiveness on conventional markets.

HYPO n. 3: *Small farms are more likely to sell directly to consumers.*
HYPO n.4: *Organic farms are more likely to sell directly to consumers.*

The role of consumers

Nowadays, consumers exhibit a diversity of social, ethical and cultural values: in fact, they incorporate environmental issues and extend their preferences to animal welfare, human rights and worker conditions (Marsden, 2003; Graziano and Forno, 2012). Broadly speaking, the “ethical

consumer feels in charge with society and follows these feelings with an appropriate purchase behavior" (Vermeir and Verbeke, 2006, p. 170). In the case of direct sale, the motivations of consumers are to provide healthy food for themselves and to support local farmers (Brunori et al., 2012). The re-positioning of consumers' purchase decisions might open a window of opportunity for new configurations (networks) at the niche level and new spaces of interaction with farmers (Migliore et al., 2013).

Since the Nineties, some consumers have organised themselves in informal networks in order to search for new ties within the food supply. These new informal networks of consumers shape differently worldwide. In Italy, Solidarity Purchasing Groups (SPGs) are widely spread (Brunori et al 2012). A SPG is an informal network of consumers built by members who co-operate to buy food and other commonly used goods directly from the producers (Randelli, 2015). In this paper, we test the capacity of SPGs to support farmers in the decision to sell directly their products. Many scholars (Brunori et al., 2012: Migliore et al., 2013) argue that there is a twofold effect from SPGs: direct, increasing the demand for local food; indirect, producing environmental and social impacts such as environmental awareness-raising, education and promotion, changing the attitudes of local policymakers, engaging people in sustainability issues in their daily lives, and developing new ways of working towards sustainable development.

HYPO n. 5: *Farms closer to SPGs have a higher probability to start a direct sale.*

The quality of local food can also be a driver of destination attractiveness while the tourist movement is an opportunity for direct selling (Viassone and Grimmer, 2015).

HYPO n. 6: *The diffusion of direct selling is likely to be linked with the presence of tourists in the area.*

Many scholars (Jarosz, 2008; Aguglia et al., 2011; Corsi and Novelli. 2018) have proposed proximity to urban areas as a factor affecting the choice of direct selling, in the sense that the more population in the surroundings, the more probability to start a direct sale. In addition, the accessibility of the farm to consumers (or conversely, the accessibility of urban outlets to farmers) is likely to affect the effectiveness and the cost of managing the direct selling channel.

HYPO n.7: *The higher the population density in the areas surrounding the farm, the higher the probability of farmers starting direct selling*.

HYPO n.8: *Better accessibility (KM of roads) increases the probability of farmers starting direct selling.*

The role of policy

The selection environment also includes the policy "whose effects become especially visible when a major institutional change occurs and the "playing field" on which firms compete changes dramatically" (Boschma and Martin 2010, p. 12). Understanding the transition of agri-food systems to direct selling requires an analysis of policies, as relevant enabling and constraining context drivers. Any level of institution (municipality, region and country) may influence the emergence of new paths at the micro level of the farm, although today the Common Agricultural Policy (CAP) affects rural development widely and more deeply than national and regional policies.

We study agri-food transitions as a shift from a predominant conventional system to a new re-localised food system through the interplay of processes at three different levels: micro (local), meso (regional) and macro (European). The important point of this evolutionary approach is that the success of direct selling within rural areas is not only governed by processes at the micro-level (Hypo 1-8), but also by developments at the meso and macro level. It is the alignment of developments - successful processes within the micro level reinforced by changes at the meso and macro level - that determines whether a rural shift towards a re-localisation of agri-food systems will occur.

In this paper, we test the role of CAP funds in the transition towards a re-localised food system. Under the CAP, the so-called Second Pillar includes measures aimed at supporting rural development. For the largest part, the investments to increase the competitiveness of farms as well as the adoption of environmentally-friendly production techniques (such as organic farming) are supported by expenditure under the Second Pillar. In Italy, the regions are called to manage these policies, taking into account the diversity of local systems through the allocation of budget towards different priorities (Raggi et al., 2015). Successful areas in activating measures of the CAP Second Pillar are more likely to show processes of re-localisation of food systems of which direct selling is a peculiar feature.

HYPO n.9: *The higher the total amount of CAP expenditure for rural development measures in the area, the higher the probability that direct sale spreads among farmers.*

The majority of support under the current First Pillar of the CAP is provided in the form of direct payments decoupled from (i.e. not depending on) production levels, aimed at ensuring adequate and stable farm incomes. The relative stability of payments reduces the variability of incomes from farming, with an impact increasing with the share of payments within the total receipts of the farm (Severini et al., 2016). The risk-reducing effect of direct payments may hinder the incentive to implement other strategies, such as the diversification with non-agricultural activities (Bartolini et al., 2014) and the decision to sell directly.

HYPO n.10. *A higher share of direct payments on farm revenues is associated with a lower probability of farmers starting direct selling.*

The model

The dependent variable y of our analysis is a binary variable that represents whether a firm perform or not direct selling. In our estimation, we assume that the observable characteristics of a

farm determine the probability of direct selling and that the actual outcome therefore depends on observed characteristics and unobservable (level-specific) components. In particular, we model the observed outcome as follows:

$$y_{r,p,m,i} = \alpha + \beta_1 x_i + \beta_2 z_m + \beta_3 z_p + \beta_4 z_{m\_sl} + \beta_5 z_{p\_sl} + \theta_r + \varepsilon_{r,p} + \epsilon_{r,p,m} + u_{r,p,m,i} \qquad (1)$$

where $y_{r,p,m,i}$ represents whether the firm *i*, located in municipality *m*, province *p* and region *r* is directly selling its product. This variable is one in the case of direct selling and zero otherwise[1]. The components $\theta_r, \varepsilon_{r,p}, \epsilon_{r,p,m}$ and $u_{r,p,m,i}$ are the zero-mean, normally distributed random terms for each level. The components x_i are the observable characteristics of the farm, whereas *z* variables are the characteristics of the administrative context where the farm is located and therefore do not vary between farms belonging to the same context. Given our data availability, some variables will capture characteristics of the municipality context (z_m) and others of the provincial context (z_p). The components z_{m_sl} and z_{p_sl} are the spatially lagged variables at the municipality and province levels. A spatial lag of a variable is defined as a weighted average of values of the variable over neighbouring administrative levels, where the weighted average is obtained using a spatial-weighting matrix and the weights are thus related to the distance between administrative levels. The spatial-weighting matrices allow us to take into account Tobler's first law of geography - "everything is related to everything else, but near things are more related than distant things" (Tobler, 1970: 234-240).

The estimation of equation (1) is obtained using a multilevel linear probability model (LPM) with four levels. Given the binary nature of the observed dependent variable, the logit and probit models would also be possible choices. However, the huge amount of observations (about 1.6

[1] Details on data are provided in the Appendix

million) and four levels of unobserved components generate computational problems making these models hardly feasible: as a matter of fact, econometric theory has acknowledged that logit and probit models with unobserved components are difficult to estimate and interpret and that LPM delivers good estimates of the partial effects of the covariates (see Wooldridge 2010, Chapter 15). Finally, even if standard LPM can suffer from heteroscedasticity issues, we control them using Hubner/White robust variance estimation. The latter technique first obtains the residuals of the regression and then use them to get an estimation of the variance matrix that is used in the computation of the standard errors (see Wooldridge, 2010, Chapter 4).

It should be stressed that we estimate a static model based on cross-section data. As a consequence, our results do not necessarily provide inference on cause-effect relations. We simply use the model to test the hypotheses described in the previous sections as expected relations between the dependent variable and the covariates. Actually, some of our hypotheses may refer to bi-directional causal relations (as in the case of the influence of spatial structures, such as FMs and SPGs, on direct marketing choice and the role of CAP Second Pillar expenditure), a typical feature of the cumulative processes shaping the transition towards re-localised food systems.

Results

Table 1 provides a summary of the estimated model. The likelihood ratio test clearly confirms that the multilevel model better performs than the corresponding pooled one. The out of bound predictions (1.06%) appear to be reasonably small and in any case our study is mainly focused on the determinants of the outcome so that the methodology adopted satisfies our needs.

Table 1. Multilevel linear probability model for direct sale: regression summary

Constant	0.2449 **
	-0.1022
Observations	1,620,884
Number of groups	
Regions	21
Provinces	110
Municipalities	8,092
Lr Test on equality of Multivel vs. Pooled	214,832.76***
Out of bound predictions	1.06%

Robust standard errors in parentheses.*** p<0.001, ** p<0.01, * p<0.05

The coefficients estimation reported in Table 2 measures the impact of farm-level variables on the choice to sell directly to consumers.

Table 2. Multilevel linear probability model for direct sale: farm-level variables

Farmers' characteristics	Coefficients (Robust SE)		Farms' Characteristics	Coefficients (Robust SE)	
Age	-0.000206		Standard Output	-2.09E-08	***
	(0.000480)			(3.67E-09)	
Age Squared	-4.03E-06		Share of CAP direct	-0.000997	***
	(0.000003)		payments on total revenues	(0.000189)	
Female	-0.00783	***	Labour intensity	0.00130	***
	(0.001540)			(0.000238)	
Lower Secondary Education	-0.00685	**	Share of Family Labour	0.0601	***
	(0.002190)			(0.015800)	
Intermediate Secondary	0.0114		Only family labour	-0.0780	***
Education in agriculture studies	(0.013500)			(0.011000)	
Intermediate Secondary	-0.00319		Farm produces organic	0.0900	***
Education	(0.003000)		products	(0.010800)	
Higher Secondary Education in	0.0228	***	Farm has other activities	0.292	***
agriculture studies	(0.005120)			(0.028600)	
Higher Secondary Education	-0.00664	*	Farm has internet access	0.0924	***
	(0.003250)			(0.012100)	
Tertiary Education in agriculture	0.0191	**	Farm has a web page	0.129	***
studies	(0.006020)			(0.019900)	
Tertiary Education	-0.0212	***	Farm uses IT devices	0.0352	***
	(0.005460)			(0.008830)	

Robust standard errors in parentheses.*** p<0.001, ** p<0.01, * p<0.05

Differently from previous studies on Italy (Aguglia et al., 2011; Bonanno et al., 2014; Corsi et al., 2018), our results suggest that the age of the farmer does not have a significant impact on the

outcome: we find the expected negative sign, but no statistical significance. We find a lower propensity to direct sales in farms managed by women.

The coefficients for educational attainments show an interesting pattern. Previous studies on Italy generally found a positive impact of education on the participation to AFNs. We find that farmers with a higher degree of education tend to participate but only when the focus of studies is on agriculture; conversely, general education shows a null or negative impact on direct selling. It follows that specific knowledge of agriculture can foster the decision to start direct selling. For instance, the direct contact with consumers looking for a better knowledge about the food they purchase, allows the farmers to share their contextual knowledge on production methods as an immaterial, valuable characteristic of products. On the other hand, highly educated farmers without a specific background on agriculture prefer the standard marketing channels: their high but general skills are probably more useful in the more conventional food supply chain.

Our regression also included the impact of a set of farm-level structural characteristics. As in previous studies, the adoption of organic agriculture is associated with a more frequent use of direct marketing channels (Aguglia et al., 2011; Sage and Goldberg, 2012; Bonanno et al., 2014; Corsi et al., 2018). This result confirms that the direct contact with consumers is today largely the expression of a wider transition towards a sustainable agri-food system. Labour intensity relative to cultivated land positively affects the probability to start direct selling. We also find that in farms employing both family and hired labour, a larger share of family labour enhances the propensity toward direct selling (confirming the findings of Aguglia et al., 2011). This is a management strategy aiming at reducing the underemployment of family members within market oriented units. However, employing only family labour reduces this propensity. According to the Census, data only-family-labour farms are very small in size and mainly or exclusively managed for self-consumption. Farmers managing small units as a secondary source of income and with the main

goal of maintaining the property of land as a family asset, are not likely to afford the logistic and administrative costs implied by the direct selling of small volumes of products.

The farm type (Table 3) shows a significant impact on direct selling strategy, as found by other scholars (Corsi et al., 2018).

Table 3. Multilevel linear probability model for direct sale: farm-type specific coefficients.

Farm Types	Farm Type Dummies (Direct coeff.s)		Significance of chi-square test on equality between coefficients of farm types								Utilized Agr. Area (Coeff.s by FT)	
			FT2	FT3	FT4	FT5	FT6	FT7	FT8	FT9		
FT1:	Base		***	-	***	***	***	***	***	***	-6.79E-07	
Field Crops	category										(3.79E-07)	
FT2:	0.188	***		***	**	-	-	-	-	***	-1.08E-05	
Horticolture	(0.054600)										(6.62E-06)	
FT3:	0.00548				*	***	***	***	***	***	1.72E-05	***
Permanent Crops	(0.009000)										(3.00E-06)	
FT4:	0.0438	***				***	*	***	***	***	2.25E-08	
Grazing Livestocks	(0.011700)										(6.11E-07)	
FT5:	0.148	***					*	***	-	***	-8.21E-06	***
Granivores	(0.022000)										(2.08E-06)	
FT6:	0.0911	***						***	***	***	2.43E-06	
Mixed Crops	(0.009280)										(1.34E-06)	
FT7:	0.278	***							***	***	-8.73E-06	**
Mixed Livestocks	(0.024600)										(3.09E-06)	
FT8: Mixed Crops	0.172	***								***	-3.57E-06	*
and Livestocks	(0.014600)										(1.39E-06)	
FT9:	-0.0750	***									-1.42E-06	
Others	(0.012200)										(7.33E-07)	

Robust standard errors in parentheses *** p<0.001, ** p<0.01, * p<0.05

Almost all farm types (with the exception of the residual small group of not classifiable farms) are more likely to directly sell their products than farms specialised in field crops (FT 1, our benchmark category). As expected, farms specialised in horticulture (as found by Aguglia et al. 2011) and mixed farm types show the highest probability of direct selling[2].

Overall, the economic size of farms shows a negative impact on the probability of selling directly to consumers. Different from findings of previous studies (Corsi et al., 2018) small farms are more

[2] The results of the chi-square test on equality among direct coefficients of farm types provided in table 3 rejects the hypotheses of equality for most of the one-to-one comparisons.

likely to choose the direct channel to market their output (standard output coefficient in Table 2). However, there is an important exception to this result: in the permanent crop sectors, larger farms (in terms of Utilized Agricultural Area, UAA) have a higher probability of directly selling (Table 3, last column). This may be due to the presence of farms specialised in wine and olive oil production within the group. The direct selling of these products is traditional in Italy and it is a standard marketing action to promote the image and the reputation of major brands in the wine sector, often associated with the provision of touristic services.

Farms and farmers that use Information Technology (IT) are strictly more likely to adopt direct selling (Table 2). Likely, these technologies are key instruments to handle the direct sale process and to promote and advertise the products. The use of IT is also likely to be associated with the process of creation of new business routines and social innovations[3]. Networking activities functional to the process of "reconnection" (biological, social and moral) are often reinforced by the creation of "virtual spaces" (Bos and Owen, 2016). Unsurprisingly, the coefficient for the variable "Farm has a web page" shows the stronger association with the presence of direct selling.

The presence of non-agricultural activities on farm positively (and strongly) affects the probability of direct selling (Table 2). Other activities include the provision of agritourism services, as well as manufacturing activities (such as production of food and non-food craft products)[4]. The presence of tourists on farm is an obvious opportunity for marketing the products, and the development of agritourism is widely recognised as a part of a multifunctional strategy of farms.

Moving to consider the context variables observed at the municipality and province level (Table 4) our analysis confirms some of the results of previous studies. Population density, as expected, increases the probability to directly sell.

[3] We adopt the definition of social innovation proposed by (Howaldt and Schwarz, 2010: 26)

[4] This result held true even when we estimated separately each activity.

Table 4. Multilevel linear probability model for direct sale: municipality and province-level context variables

Municipality Level Coefficients (Robust SE)				Province Level Coefficients (Robust SE)			
	Context variables		Spatially lagged context variables		Context variables		Spatially lagged context variables
Farmer markets density	0.0363		93.11 *	Solidarity Purchasing Group density	6.789	**	-77,041
	(0.1940)		(44.2600)		(2.187)		(47.537)
Square of farmer markets density	-0.249		463.8 ***	Square of SPG density	-81.57	*	1.83E+06
	(0.1960)		(133.7)		(34.22)		(898.341)
Second Pillar PAC expenditure intensity	-0.000444		-0.576	Roads density in plains	-0.0497		43.97
	(0.000394)		(0.4180)		(0.0665)		(343.6)
Population density	1.87E-05	**	-0.000574	Roads density in hills	-0.00481		541
	(7.15E-06)		(0.00159)		(0.0803)		(338.5)
Hill	-0.0612			Roads density in mountains	0.00605		686.7 *
	(0.0706)				(0.0533)		(329.8)
Mountain	-0.0827			Per capita number of tourist visitors	7.20E-05		-2.589
	(0.0566)				(0.000853)		(15.77)
				Agritourisms density	-2.435		-7,031
					(5.817)		(7.32)

Robust standard errors in parentheses.*** p<0.001, ** p<0.01, * p<0.05

Altitude seems to impact on the adoption of direct selling only in terms of accessibility. In facts, we find that the presence of a well-developed road network in the proximity of mountain areas positively affects the probability to start direct selling.

Despite the presence of agritourism works at the farm level as an opportunity for direct selling, the presence of touristic activities in the area doesn't seem to affect the choice of direct selling, both when considering the overall number of tourists and the density of agritourism activities.

The aggregate policy expenditure within the Second Pillar of the CAP at the municipality level does not show any significant impact, while at the farm level (see Table 2) the share of direct payments on individual farm revenues actually *reduces* the probability to use this channel. This result suggests that the reduction of entrepreneurial risks, implicit in the policy-driven support of farm revenues, may create a sort of path dependence in the management process, reducing the need

for innovation. Since smaller farms are, on average, more heavily dependent on public support, the result suggests a controversial outcome of the policy, contrasting the *higher* propensity of smaller farms (*coeteris paribus*) to choose direct selling. CAP direct payments under the First Pillar seems to disincentive the possible development of new, profitable forms of small farming activity that may fit with a possible transition towards more sustainable forms of supply chain (that is among the goals of the CAP).

Among the other context driving factors, the spatial distribution of FMs and SPGs is very significant. SPGs deploy their positive influence in the immediate context where the farms operate (significative and positive coefficient of the context variable). In the case of FMs, it is relevant their number in the neighbouring area rather than in the immediate context. In fact, only the coefficients for the spatially lagged version of this variable are statistically significant.

There is an important difference in the impact of these two forms of networking: FMs show increasing returns to scale (positive coefficient for the squared, lagged variable) while SPGs show diminishing returns. This suggests that the former need to reach a certain critical mass before actually becoming a fostering factor for direct sale: the presence of isolated or rare markets may not offer enough incentives to start direct sales, probably due to the investments required to join them (Bonanno et al., 2014). On the contrary, in the case of SPG even a small number of them may make the difference. The results suggest the existence of agglomeration economies that are typical of localised processes of social innovation, mainly based on knowledge sharing among the actors involved. The contribution of SPGs to the food supply transition seems more related to their cultural and lobbying function rather than to the market share they can reach.

Conclusion

The opportunity to pinpoint the whole cohort of farmers selling directly to the consumers in 2010 in Italy has allowed us to test in this study a set of hypotheses about the diffusion of direct selling.

The agri-food system is undergoing a process of change and several windows of opportunity are open. Among them, the re-localisation of consumers' choices has fostered the development, diffusion and use of technologies and practices suitable to reduce the distance (geographic, social and cultural) between production and consumption along the food supply chain. This paper follows on this lead and tries to evaluate which factors are likely to drive the transition towards a direct marketing with consumers.

A first set of factors fostering the transition are specific farmers' and farm's characteristics. To sell directly their products to consumers the farmer needs some selected capabilities (confirming our Hypo 2) such as the use of IT. These capabilities seem to depend more on the farmer's field of education than on farmer age and, in particular, a specific knowledge of production methods accessed through secondary and tertiary education in *agricultural* studies. From this point of view, the path towards a more sustainable food system appears to be a social phenomenon deeply shaped by the peculiar characteristics of agriculture as a production process.

The fact that small and organic farms are more likely to choose direct selling (confirming Hypo 3 and 4) may suggest that the transition towards a re-localised food supply is the outcome of a broad process of change propelled by a diversity of social, ethical and cultural rules and values. Large industrial farms are less interested in entering these new niche markets at an early stage of development. Furthermore, the results may also suggest that large farms do not have the right reputation and possibly, that their hierarchical internal organisation does not allow them to share the relevant knowledge about food the consumers are looking for.

A second set of factors that can foster the transition are embedded in the geographical context where the farm is located. As expected, the role of FMs and SPGs is relevant (confirming Hypo 1 and 5), and positively affects the probability of farmers' decision to directly sell their products. We believe that, in an early stage of development, these "spaces" of interaction among producers and consumers have a greater effect on the diffusion of the innovation (direct selling) and

of the knowledge related to it than the simple increase of local demand. The geographical proximity facilitates the circulation of knowledge required to foster such a co-produced innovation process. A farm located in such a geographical context, run by a farmer with a high absorptive capacity and a cognitive proximity (Hypo 2), has more probability to step into direct marketing.

While road density positively affects the diffusion of direct selling only near the mountain areas (partially confirming Hypo 8), population density shows a positive effect at the municipality level (confirming our Hypo 7), while the spatially lagged coefficient is not significant. Besides the obvious interpretation in terms of proximity to a large market, in our view, this result is compatible also with the strategic role of networking within innovative spaces and with the presence in the urban context of skilled consumers looking for a direct contact with producers as a source of reliable information on food. These insights support the idea that the diffusion of direct sales among farmers is a localised process of social innovation, mainly based on knowledge sharing among actors (farmers, consumers, local institutions). Most Likely, this is the reason why the presence of tourists in the area does not show any significant influence on direct selling (rejecting Hypo 6) if the farm is not directly involved in the supply of touristic services.

Within this process, what is the role played by the current sector policies? The results of our analysis suggest a controversial outcome of the CAP at the farm level, showing that the more direct payments become an important share of farm receipts, the more the inclination to innovate marketing channels declines (confirming Hypo 10). In addition, the non-significant coefficients related to the CAP expenditure within the Second Pillar provide evidence that the geographical distribution of CAP support is unlikely to counterbalance the lock-in mechanism working at the farm level (rejecting Hypo 9). We are convinced that the current configuration of the CAP, despite the reforms carried out during the last decade, still shows similar shortcomings about the issues we discuss here. Small and organic farms are more successful in the transition towards new forms of food supply chain probably due to the mutual support and trust with municipalities and local

communities, of which FM and SPG variables can be considered a proxy. An effective promotion of a multifunctional agriculture should create spaces of opportunity to market "non-commodity outputs" that are a joint output of farming (Oecd, 2001), such as environmental sustainability or local cultures on food. Such a result is more likely to be pursued by a policy designed to spread the relevant knowledge and enhance the institutional framework for local initiatives (Blay-Palmer et al., 2016) rather than by the direct monetary support of farm income.

Through the analysis of factors driving the choice of direct selling of farms, our analysis has only touched upon the different types of factors that may drive the re-localisation of the food system. We are aware of the limits of our case study. The cross-section nature of data used limited our analysis of causal relations, allowing us only to test a set of hypotheses on the relation existing between the choice of direct selling and a set of on-farm and context characteristics. A further limit concerns the specific country (Italy) where we study the innovation processes within the food system. In Italy, the average size of farms is small and this supports the rise of new marketing channels as they represent an opportunity in the survival of small, family-run businesses. Second, the food culture is very developed and associations such as Slow Food and Coldiretti are fostering the creation of innovative marketing channels for farmers through actions aiming at increasing among consumers the awareness and knowledge on the quality and sustainability of food. For all these reasons, the case study cannot be considered fully representative of the way direct selling is evolving worldwide. We are anyway convinced that it provides a valuable contribution in the understanding of the mechanisms that can foster its diffusion.

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Appendix

Despite a long-lasting tradition in some of the Italian regions, often linked to the presence of specific agricultural products like wine and olive oil, direct selling to consumers is still a minor marketing channel for Italian farms. In 2010 the farms selling their products directly to consumers, both on farm and off farm, were 270,579, corresponding to a share of 16.7% of the total (Table A1).

The majority (11.2%) participate only in farm direct selling while a minority sold directly to consumers off farm, both exclusively (3.7%) or in combination with on-farm direct selling (1.8%). On average, farms with direct selling are larger than others both in terms of Utilized Agricultural Area (UAA: 20.9%) and even more as regards labour employed (representing about one quarter of total labour units). Average values hide the uneven distribution of the phenomenon across different regions of Italy. The prevalence of farms with direct selling is variable across the 8,094 municipalities(Figure A.1). The map in figure 1 represents spatially smoothed values of the prevalence of farms with direct selling in order to emphasize the underlying pattern in the spatial distribution. The areas where farms with direct selling accounts for a larger share of the total seems linked both to the presence of large urban areas (as in the case of Milan, Turin and Rome) and to the relevance of permanent crops in the agricultural output mix (Piedmont, Tuscany and Apulia regions). The map suggests the presence of a relevant geographical dimension of the studied phenomenon.

The dependent variable of our analysis is the presence of direct-selling in the farm. With the Census data is impossible to calculate a share of farm revenues from the direct selling at the farm level. We built anyway an index of intensity in direct selling based on the number of products sold directly to consumers. To test the robustness of our results we ran the model including among the farms with direct selling only those reaching a given share of products directly marketed (respectively 20 and 50% of farm products), getting results similar to those we present in our paper. When we set the threshold at 50% the estimation coefficients things remain almost the same apart a

few variables that maintain the same sign as before but now turns to be significant. In particular, this happens for the role of age (whose sign remain negative but now significant) and the role of spatially lagged SPG (whose sign remain positive but now significant). These changes are not due to a change in the size of the coefficients but on a reduction of their standard error: this suggests that if we focus on farm where direct sale is the main channel of sale our results appear to be more clean cut and the relationship between independent and dependent variable is more systematic (so that we obtain smaller standard errors).

A set of variables referring to the subjective characteristics of farmers and the structural characteristics of farms have been defined to be used in the model as covariates. Table A.2 in the appendix provides the definition of variables and their descriptive statistics.

All data at the firm level were based on the Census dataset while a variety of sources were accessed to define context variables, referred to both at the municipality and the province level. The source for the number of farmer markets is Coldiretti, while data for SPGs were produced from the volunteer list registered on the official website of the Italian Network of SPGs (www.retegas.org). While the number of farmer markets is available per municipality, the number of SPGs is only available per province. The source of data on CAP expenditure at the territory level are the reports that AGEA, the Italian Agency in charge of CAP payments in Italy, periodically delivers to the European Commission (Sotte and Baldoni, 2016).

Our analysis exploits the information and the spatial dimension of Census data by focusing on three groups of determinants of direct sales:

(1) the characteristics of the farms and the farmers;

(2) the characteristics of the area where the farm is located (the context variables);

(3) the characteristics of the neighbouring areas (context variables weighted for the distance from the farm).

Given the structure of the Census and the administrative division of Italy this means that we take into account the fact that each observation (each farm) is located in a specific municipality that in turn is included in a province that in turn belongs to a given region: in econometrical terms it means that each observation is organized on 4 nested levels.

From a theoretical point of view, the spatial dimension can be represented by considering that each different level has a level-specific error term (that captures erratic component shared among all farms in that level). This is the structure used in multilevel regressions and that will be used in our estimations.

A further spatial dimension that can be included in our analysis is represented by spatially lagged variables, that is, variables representing the characteristics of distant contexts weighted for the distance from the farm. Including spatially lagged variables is equivalent to assuming that not only the characteristics of the area in the immediate proximity of a farm (the municipality or the province in our case) affect its decisions, but also the characteristics of more distant areas. In our specific case, we compute an inverse-distance spatial-weighting matrix that is composed of weights that are inversely related to the distances between the administrative units: this is done computing the inverse of the Euclidean distance obtained from the coordinates of the area where the farm is located (the province for some context variables and the municipalities for others).

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Table A1
Farms with direct selling in the Italian agriculture

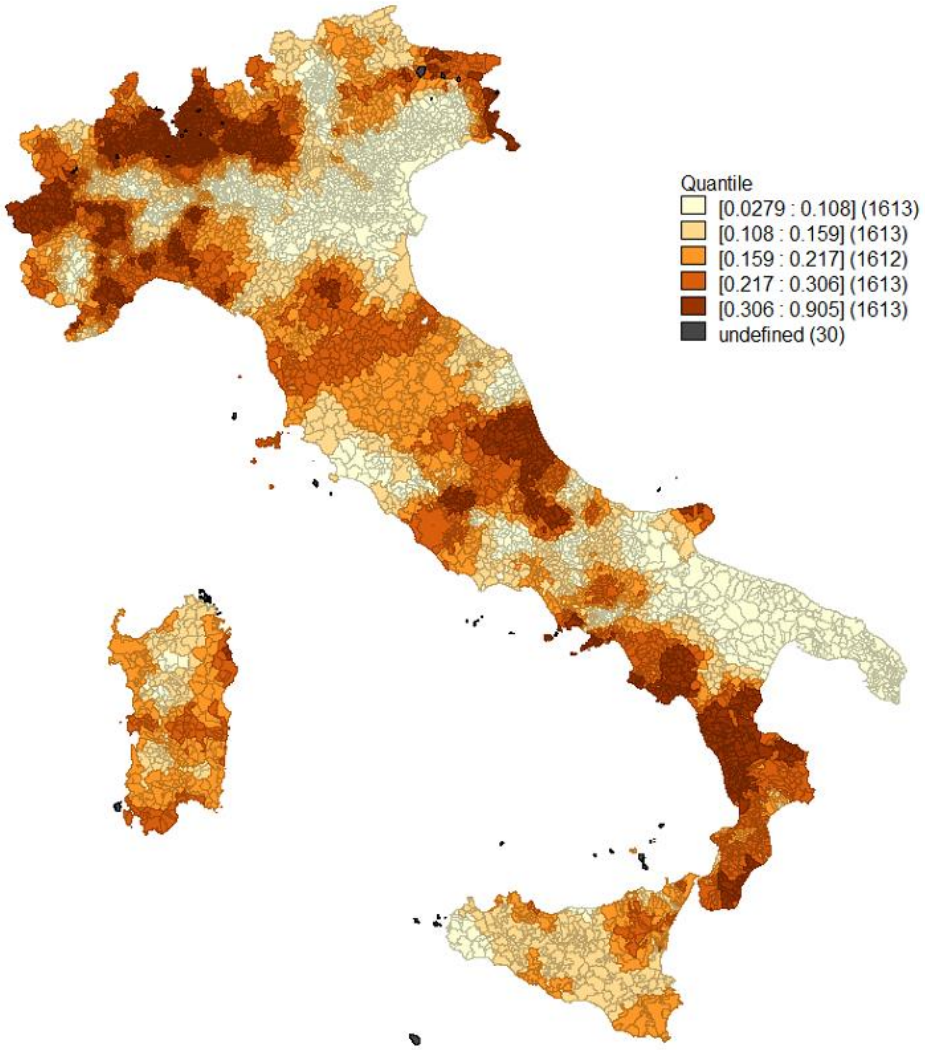
Number of farms	270,579
Share of total farms	16.70%
Share of total Utilized Agricultural Area	20.90%
Share of total Labour Units	26.30%

Source: own elaborations on census data

Table A2
Variables descriptive statistics

Variables	Mean or share	Standard error
Farm-level		
Age	59.05521	0.01153
Female	0.30715	0.00036
Lower Secondary Education	0.32025	0.00037
Intermediate Secondary Education in agriculture studies	0.00944	0.00008
Intermediate Secondary Education	0.03538	0.00015
Higher Secondary Education in agriculture studies	0.02445	0.00012
Higher Secondary Education	0.15371	0.00028
Tertiary Education in agriculture studies	0.00807	0.00007
Tertiary Education	0.05423	0.00018
Standard Output (Euro)	30 701.90000	192.72880
Share of CAP direct payment as on total revenues (%)	29.62278	0.02942
Labour intensity (labour days per ha of UAA)	0.72942	0.00292
Share of family labour	0.93660	0.00016
Only family labour	0.86323	0.00027
Farm produces organic products	0.02767	0.00013
Farm performs other activities	0.02078	0.00011
Farm has internet access	0.01200	0.00009
Farm has a web page	0.01792	0.00010
Farm uses IT devices	0.03760	0.00015
Utilized Agricultural Area (ha)	7.93150	0.02853
FT1: Fieldcrops	0.23676	0.00033
FT2: Horticulture	0.02332	0.00012
FT3: Permanent crops	0.54994	0.00039
FT4 Grazing livestock	0.07989	0.00021
FT5: Granivores	0.00577	0.00006
FT6: Mixed crops	0.06506	0.00019
FT7: Mixed livestock	0.00261	0.00004
FT8: Mixed crops and livestock	0.02196	0.00012
FT9: Other	0.01468	0.00009
Municipality level		
Farmer markets density (number per square km)	0.00271	0.00021
Second Pillar CAP expenditure intensity (Euros per ha of UAA)	1.22797	0.06068
Population Density (resident people per square km)	296.93870	7.02516
Plain	0.26261	0.00489
Hill	0.41609	0.00548
Mountain	0.31920	0.00518
Province level		
Number of Solidarity Purchasing Groups density (SPG per square km)	0.00444	0.00086
Roads density in plains (Km of roads per square km)	0.53390	0.02775
Roads density in hills (Km of roads per square km)	0.60415	0.02755
Roads density in mountains (Km of roads per square km)	0.49852	0.03234
Presence tourist visitors (number per resident people)	7.54854	0.92405
Agritourisms density (number per ha of UAA)	0.00046	0.00007

Figure A1 Prevalence of farms with direct selling
Spatially smoothed[1] ratios by Municipality



1. Neighbors defined according to a second level Rook distance