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The rise of A-to-Z farm outsourcing in France: a marker of contemporary changes in agricultural labor organization

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Abstract: Farm outsourcing, also known as custom farming, is an old and widespread practice in France. But statistics show a revival of the phenomenon over the last ten years with not only an accelerated development of farm outsourcing but also an evolution of practices. More and more farmers are outsourcing a growing number of agricultural operations, including "symbolic" operations and others involving highly specific resources. Some even delegate the management of several production activities, or even the entire farm. It is the latter, commonly referred to by professionals as A-to-Z, that is of interest here. While a few rare cases were observed at the end of the 1990s, this A-to-Z practice now concerns about 7% of French farms. This particular form of farm outsourcing, which we shall describe as full delegation, reflects a major change in the organization of agricultural labor and raises important research questions as well as policy issues. And yet, there are very few studies about A-to-Z and more generally custom farming compared to other forms of agricultural outsourcing. The objective of this paper is to propose a quantification and characterization of A-to-Z and an analysis of the determinants of its development. To do so, we develop a framework for analyzing the relational contracts underlying full delegation relationships. Our empirical study is based on a mixed methodology combining a qualitative analysis of the different types of A-to-Z organization and contracts, and a quantitative analysis of the phenomenon. The data used combines both secondary statistics and original data from in-depth surveys conducted with thirty farm contractors, as well as the 1,200 responses to a postal survey on outsourcing conducted with farmers in the South-West of France. Our study shows that this rapid growth of A-to-Z is counter-intuitive from the point of view of transaction cost theory, but is possible when one considers possible ex-ante incentive mechanisms (expectation of specialization gains, inclusion of a bonus based on the value of the output in the contract, participation of a third party), and informal incentive mechanisms, such as trust and reputation, built through repeated interactions.

Keywords: farm outsourcing, full delegation, specific asset, relational contracts, South-West France

Introduction

Outsourcing is one of the most common interfirm relationships. It has been proven to be an essential means for industrial companies to reorganize value chains and increase their competitive advantages. Initially focused on the simple use of generic and cheap external resources, industrial companies have quickly developed outsourcing as a "strategic" way of accessing specific assets, and have designed more complex and diverse interfirm relationships (Gereffi and Korzeniewicz, 1994; Milberg and Winkler, 2013). As in the industrial sector, outsourcing in agriculture is also a widespread phenomenon, even if its development was later on. There are two main types of outsourcing arrangements in agriculture, the "contract farming" type which includes all vertical arrangements linking a farm to a food industry (Wang et al., 2014), and the "farm outsourcing" or "custom farming" type. Characterized by a horizontal coordination, this latter commonly gives rise to the carrying out and execution of one or more cultivation operations (harvesting, tillage, sowing, etc.), or more rarely several livestock operations (removal of animals, prophylaxis). One can also observe "complete worksite" form of farm outsourcing, also known as A-to-Z, which consists in the full delegation to a third party of the conduct of all the technical tasks of a production, or even the entire management of a farm. We can distinguish two forms of A-to-Z: one "by abandonment", when the farmer no longer or only slightly engages in agricultural activity and delegates all of the operational, administrative and the decision-making responsibilities to one or more farm contractors; the other "by refocusing", when the farmer delegates all the production deemed less strategic or less interesting, in order to refocus on what he considers to be his core business. It is the A-to-Z that is of



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particular interest in this paper, but it cannot be studied in isolation from other farm outsourcing practices, since farmers usually start with delegating one or more tasks before shifting to A-to-Z.

Farm outsourcing has experienced unprecedented development in different parts of the world over the past twenty years (Chevalier, 2007; Igata *et al.*, 2008; de Oliveira and Zylbersztajn, 2017; Zhang *et al.*, 2017; Belton *et al.*, 2018, Forget *et al.*, 2019). In particular in France, between 2000 and 2016, the number of farms using custom services in a significant way (*i.e.* more than the equivalent of 30 days of custom services) increased by 53%, and the "A to Z" outsourcing, which is considered as very rare until the late 1990s (Harff and Lamarche, 1998; Anzalone and Purseigle, 2014), now concerns at least 26500 French farms (Forget *et al.*, 2019). Meanwhile, according to the French National Federation of Custom Operators¹, the number of agricultural custom companies and the number of custom workers increased by respectively 14% and 65%.

According to the French national statistical INSEE data, for cropping operations alone, the growth in outsourcing expenditures by French farmers has been 3% per year since 1994, whereas it was only 1.5% per year between 1979 and 1994. These expenses would now exceed more than $\notin 4$ billion, that is more than 9% of the value-added excluding subsidies of the crop production branch in France. Data from the 2016 National survey of farm structure nearly show more than 7% of French farms outsource heavily (*i.e.* more than the equivalent of 30 days of contracting). These farms account for 5.5% of the total value of agricultural production and 4.6% of agricultural labor force. What is surprising is that outsourcing concerns nowadays mostly the medium and large farms² since they represent 70% of the farms that outsource. It is also interesting to note that their number increased by more than 103% between 2000 and 2016, while the number of small farms that outsource decreased by 3% over the same period. In addition, among the farms that outsource significantly in 2016, more than three fourth reported that they contracted A-to-Z for crop production. Among those latter, grain, mixed crop-livestock, cow farms accounted for respectively 12,5%, 6% and 5,5% (Forget *et al.*, 2019).

Thus, not only are French farms increasingly outsource, but the phenomenon is now also affecting medium to large farms that have the capacity to do the work themselves. According to existing studies (Hébrard, 2001; Chevalier, 2007; Anzalone and Purseigle, 2014; Lerbourg and Dedieu, 2016; Forget *et al.*, 2019), two main reasons could explain this unprecedented use of outsourcing in France: reorganization of work on the farm around "core business" activities for those farmers who are still active, management of productive assets for those who retired without a farming heir or for those who have an off-farm job. But whatever the motivation, all of the farmers expect from outsourcing to contribute to improving their farm's overall performance and value, just like for any other enterprises (Arnold, 2000; Holcomb and Hitt, 2007).

However, despite its strong growth, there have been relatively few studies on A-to-Z farm outsourcing. This is all the more surprising as A-to-Z arrangements present specific features, raise puzzling research questions and have important policy implications. This study adds to the literature that explores the issue of agricultural outsourcing.

From a theoretical standpoint, outsourcing arrangements are indeed different from contract farming arrangements not only in terms of the nature of parties, but also in terms of the definition and transfer process of property and decision rights on assets. In farm outsourcing, both parties can be principal and agent. A farmer X owns the land and the crop, and delegates for different reasons the farming tasks to

¹ http://www.fnedt.org/

² Medium and large farms are those with an annual production value of more than €25,000.



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another farmer Y. Y owns the equipment, provides the labor, and carries out the work according to the instructions of X. The two partners are both agricultural producers and have a relatively more balanced bargaining power than in the case of contract farming since both owns specific assets (land and knowledge of the land characteristics for X, specific equipment and skills for Y). Both parties can compete with each other. The contracting incompleteness works against both and the risks of opportunistic behavior are likely to increase as farming operations involve strategic decision-making and the transfer of control over specific assets. This issue is the more acute for A-to-Z as it corresponds to a complete disjunction between control and property rights over specific assets. It is largely recognized from transaction cost theory that, in the presence of specific assets, the optimal governance that minimizes transaction costs is integration, *i.e.* ownership of assets (Williamson, 1991; Milgrom and Roberts, 1992). So how can we explain the rapid development of A-to-Z farm outsourcing?

Allen and Lueck's (2002) general framework of asset control provides an easy and tractable first approach to understand outsourcing decision. In their model, the value of the governance structure depends on the assets and the efforts involved in production on which moral hazard applies. The incentive mechanism appears through diminishing marginal cost of the different productive assets as their specialization increases. That is through outsourcing, farmers seek a better use of labor, equipment, land and financial resources. Farmers' expectations of specialization gain also reveals their strategic motives as they search for specialized assets to create value that cannot be realized through integration (Arnold, 2000; Holcomb and Hitt, 2007). But in the presence in the presence of high asset specificity, for the A-to-Z outsourcing choice to be optimal, one needs to extend the standard Allen and Lueck's transaction costs cum property rights framework and consider the inputs of Baker et al. (2002) on Relational Contract (RC). Since RC focuses on repeated interactions and non-contractible outputs, this latter makes possible efficient self-enforcing incentive mechanisms without having to change the property structure and decision rights allocation. In the context of repeated interactions, "informal promises" made on non-contractual outputs can constitute sufficient incentives to avoid opportunistic behavior insofar as the value of short-term defection is lower than the discounted value of long-term arrangement. In the case of farm outsourcing, the traditional contract is usually based on a flat rate per hectare that pays an average working time. However, to ensure the quality of the service, the farmer X can possibly promise a better payment if the contractor Y mobilizes specialized equipment and all of his expertise. Likewise, the outsourcing companies can also make promises on the output by putting forward their expertise and specialized equipment. In addition to promises, informal incentive mechanisms, such as reputation, trust and learning benefits, are also shown to be sufficient to make alternative options unattractive and engage stakeholders in a long-term relationship. Such enforcement mechanisms are the more credible as there exist alternative options that help to lower lock-in costs for both parties of the transaction (Ruzzier, 2012).

To explain the rise of A-to-Z, our theoretical propositions can thus be summarized as follows: An outsourcing relationship may be preferred to ownership when the farmer cannot afford to invest in specific factors of production (cases of small to medium farms) or when he expects gains in specialization (cases of medium to large farms), but this choice is not optimal in the presence of specific assets. With these latter, informal incentive mechanisms, such as promises, reputation, trust and learning benefits, are necessary and sufficient to make alternative options unattractive and to engage stakeholders in a long-term relationship.



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The rest of the article is structured as follows. In the next section of the article, we present the study mixed methodology developed to test our theoretical propositions. In a third a fourth sections, some major results will be respectively highlighted and discussed. Finally, we conclude with lessons learned in terms of public policy and the scope of this study.

A combined quantitative and qualitative methodology

A-to-Z cannot be well understood if isolated from the other outsourcing practices. This reason brings us to analyze the more common outsourcing of one or several tasks. Our empirical approach aims thus to study the determinants of outsourcing decision for increasing intensity of asset specificity, considering that A-to-Z exhibits the highest asset specificity. We use a mixed methodology which consists in combining quantitative and qualitative methods to study an emerging phenomenon for which few studies exist. The quantitative approach uses data from a postal survey conducted in 2017-18 on outsourcing practices (nature of outsourced work, reasons for outsourcing, criteria for selecting contractors, farm characteristics, general perceptions of outsourcing and social acceptability of A-to-Z) with 1200 farmers in southwestern France, chosen randomly within a list of farmers provided by different farmers' organizations. This region not only exhibits a large diversity of farming systems, but it is also a region where outsourcing is significantly developed, particularly A-to-Z (Figure 1) (also see Figure 2.7 in Forget *et al.*, 2019). Based on the postal code of the addresses, data of contractors from the French National Company Registry were merged with those of the farmers surveyed in order to characterize the local outsourcing market (Figure 2). All statistical calculations were performed with the R software.



Figure 1. Number of A-to-Z grain farms in South-West France. Source: by authors based on the 2010 French agricultural census.



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Figure 2. Number of farm contractors having the same postal code as a given farmer. Source: by authors based on 2019 Infogreffe data.

To empirically analyze the determinants of single-task outsourcing, we used the logistic regression commonly adopted for the study of discrete agricultural outsourcing choices (de Oliveira and Zylbersztain, 2017). We also add a negative binomial count model to look at the determinants of outsourcing of more than one task, including A-to-Z, with the assumption that the outsourcing of an increasing number of tasks follows a mixed Poisson-gama distribution. Several tests were performed on the residuals to validate our choice of the model (standard deviance residuals, standard Person residuals and Cook's distance). This latter model allows us to study the effect of the intensity of asset specificity, considering that this latter is positively correlated with the number of operations outsourced. Certain tasks, such as seeding or spraying, are highly asset specific, and we consider A-to-Z outsourcing to be the practice with the highest asset specificity, since it involves the management of the whole farming system. For the logistic model, the dependent variable is zero when operation x is not outsourced and one when it is. For the negative binomial model, the dependent variable refers to the number of operations outsourced, ranging from zero to seven operations including A-to-Z. For both models, the explanatory variables refer to five sets of determinants:

- Variables to capture asset specialization: those are some of the characteristics of the farmer and of the holding which influence the gains in specialization. Through these variables, we seek to measure labor constraints and therefore the possible gains in labor specialization, as well as surface constraints (surface too small to amortize specialized equipment) and therefore the possible gains in physical and human asset specialization.
- 2. Variables to capture the perceived benefits of outsourcing. Four main areas were identified during the in-depth interviews for the case studies of subcontractors and their clients: access to specific equipment (physical asset specificity), the possibility of refocusing on the core business,



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optimal organization of work on operations (time asset specificity), access to specific skills (human asset specificity).

- 3. Variables to capture farmer's intention to pursue outsourcing or not. These variables refer to the farmer's project for the next coming years. Farmers who are already outsourcing are likely to keep on re-organizing labor on the farm, to develop a new activity on the farm, to search for an off-farm job, or even to outsource more. This latter variable also helps to approach the repeated nature of the interaction.
- 4. The variable "number of custom companies having the same postal code as the farm" captures the state of the local outsourcing market. This variable results from the merging of our original database with information from the National Company Register. We consider that the more contractors there are, the lower the timeliness and lock-in costs will be. Moreover, following Balland's *et al.* (2015) and Brailly's (2016) research in economic geography, we consider that geographical proximity is also a good proxy for the relational dimension of contracts: everything is known when operating within a radius of about 10 to 25 kilometers, those who work well or poorly, those who pay correctly or not.
- 5. The variables "age", "crop types", "member of a machinery cooperative" and "number of machinery cooperatives having the same postal code as the farm" are introduced as control variables. We assume that a younger farmer will be less likely willing to use custom services. Outsourcing operations may indeed differ according to the type of culture, both in terms of their nature and the assets involved. Moreover, if the farmer shares a common equipment with other farmers within a machinery cooperative, it is very likely that he will not outsource.

The qualitative approach helps to better define the set of independent variables used for the empirical regression models. It also allows to deepen the analysis of contractual schemes and some of the determinants of outsourcing choices, in particular those related to informal incentive mechanisms difficult to measure quantitatively.

The qualitative approach relies upon case studies of 20 contractors conducted between 2013 and 2018³. The methodology used is the one commonly used in business sciences, which consists in characterizing a company as precisely as possible and analyzing its overall consistency through systematic data collection (Dul and Hak, 2007). In agricultural economics, this approach has been used to study agroholdings (Chaddad and Valentinov, 2017). The data collected include the company's history, its growth strategy and its organizational and governance structure, the outsourcing operations, the operational organization and governance of the outsourcing relationships (stakeholders, formal contracts and informal arrangements between stakeholders, decision-making processes) and the agents' perception of the advantages and disadvantages of outsourcing.

Results

The determinants of farmers' A-to-Z outsourcing choice

Descriptive statistics of the sample of farmers surveyed⁴

Within the survey sample, 851 farmers (71%) are outsourcing one operation or more, with 808 outsource up to 7 operations and 43 contracted A-to-Z. Those farmers are divided relatively evenly into four size

³ Several case studies of the largest custom companies can be found in Nguyen *et al.*, 2020.

⁴ More descriptive statistics on the sample of farmers surveyed and their practices can be found in Nguyen *et al.*, 2019.



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classes: 186 very small farms from 0 to 37 hectares, 225 from 38 to 61 hectares, 229 from 62 to 99 hectares and 211 very large farms over 100 hectares, with a regional average of about 60 hectares.

Outside of harvesting, we note a significant proportion of farmers who outsource operations that they used to do themselves, such as ploughing, seeding, phytosanitary treatment, fertilizer application and irrigation. According to the in-depth interviews, these operations, unlike harvesting, are traditionally those that are not outsourced because they have a strong impact on crop yield and require a certain know-how. They are also strong symbols of the farmer's identity. It is important for a farmer to be seen seeding by his neighboring farmer. To outsource those, a farmer needs to have good reasons.

Regarding more specifically A-to-Z, in the sample, 58 (4,6%) practice A-to-Z, which is less than the average rate for France (7%). Almost all of the A-to-Z cases here correspond the "abandonment-type" with full transfer to the contractor of all decision-making rights. In addition to all cultivation operations, the contractor takes charge of the administrative management of the farm (decisions on crop rotation and technical itinerary but also on input purchase and output marketing, filling in CAP declarations, etc.). The farmers are between 35 and 65 years-old and own either a grain farm (cereals and grain leguminous) or a small dairy farm which is about to go out of business. For 50%, farming is a secondary activity. Most of the A-to-Z farmers used to outsource several tasks. Concerning their perception of A-to-Z, more than half believe that there is no risk to lose their control on land nor their farmer's identity. 33% consider that A-to-Z is socially acceptable, against 14% in the total sample.

Among the easily observable criteria for choosing contractors, the four main ones are in order of importance: specialized technical skills (respectively 60% and 58% for the total sample and A-to-Z subsample), trust (respectively 48% and 60%), proximity (respectively 48% and 53%). The price criterion is only at the sixth position. The type of contract is not a concern since all contracts are more or less the same with a flat-rate payment per hectare and per type of operation. The outsourcing companies that provide the A-to-Z service, are usually large and can operate in networks. They are most often equipped with a large fleet of specialized machinery in precision agriculture and a skilled workforce with technical, agronomic and managerial expertise. Some of them also offer agronomic and strategic business consulting service in addition to simple outsourcing. The addition of such service plays an important role in building loyalty in the outsourcing relationship, as we will see thereafter.

Results of the logistic estimation of outsourcing choices

Table 1 presents the maximum likelihood estimates for the logistic regressions for single-task outsourcing (first 6 columns) and the results of the negative binomial model for multiple-task outsourcing including A-to-Z (last column).

We will first focus on the outsourcing of seeding, phytosanitary treatment and fertilizer application operations. Understanding the determinants of the outsourcing of tasks which farmers used not to outsource and which require specific assets (specialized equipment and skills) may help to understand the farmer's shift from single-task outsourcing towards A-to-Z. As expected, a farmer who seeks to hold an off-farm job, or to access to high-performance equipment and specific skills, is more likely to outsource. An average-sized farm is more likely to outsource than a very small or very large farm. In the study area where wheat and maize are the dominant crops, seeding is considered as a critical operation because it impacts yield in particular at the first stages of the crop growth (emergence and weed control). Unless he seeks to increase the crop performance or to test new practices before making the



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Variables	Ploughing	Seeding	Pesticide & Fertilizer applications	Pruning & Haying	Harvesting	Storage	Nb. of custom operations
Constant	-2.81*** (0.51)	-2.57*** (0.42)	-1.88*** (0.34)	-2.55*** (0.47)	-0.44 (0.34)	-3.27*** (0.60)	0.47*** (0.11
Proxies for Physical and Human Asset Specializations Off-farm iob (Yes)	-0.54 (0.40)	0.45 (0.28)	0.42 (0.26)	-1.63*** (0.47)	0.13 (0.29)	-0.61 (0.53)	0.35*** (0.08
No. of associated family managers	-0.16 (0.16)	-0.17 (0.12)	0.05 (0.10)	0.22* (0.12)	0.03 (0.11)	0.06 (0.17)	-0.03 (0.03
Hired employees (Yes)	1.00*** (0.33)	0.14 (0.27)	0.12 (0.23)	-0.05 (0.29)	-0.51** (0.24)	0.02 (0.40)	-0.08 (0.08
Non-family hired manager (Yes)	0.74* (0.39)	-0.34 (0.40)	0.25 (0.34)	0.10 (0.38)	-0.21 (0.33)	-1.52 (1.09)	0.002 (0.11
Diversification on-farm activities (Yes)	0.75** (0.32)	0.32 (0.26)	-0.05 (0.24)	-0.39 (0.30)	0.61** (0.26)	0.50 (0.38)	0.21*** (0.08
Nb. of small farms]38, 62 hectares]	-0.42 (0.36)	0.69** (0.29)	0.31 (0.25)	-0.07 (0.32)	0.22 (0.28)	-0.63 (0.46)	0.07 (0.08
Nb. of medium farms]62, 100 ha]	-0.82* (0.42)	0.66** (0.33)	0.24 (0.27)	-0.11 (0.35)	-0.17 (0.29)	-0.17 (0.46)	-0.04 (0.09
Nb. of large farms [100 ha and more)	-0.33 (0.56)	0.53 (0.47)	0.14 (0.34)	0.71 (0.48)	-0.76** (0.37)	-0.67 (0.61)	0.02 (0.11
Nb. of breeding ativities	-0.54 (0.33)	-0.01 (0.20)	0.14 (0.17)	0.33 (0.20)	-0.16 (0.18)	0.31 (0.27)	0.07 (0.06
Reasons for outsourcing							
Access to specialized equipment (Yes)	-0.07 (0.43)	0.57* (0.31)	0.08 (0.30)	0.89*** (0.32)	-0.49 (0.30)	-0.42 (0.64)	0.49*** (0.08
Need to focus on "core activities" (Yes)	0.86*** (0.30)	-0.48** (0.21)	-0.45** (0.19)	-0.03 (0.23)	0.42** (0.20)	0.30 (0.33)	-0.08 (0.06
Need to re-organize labor on the farm (Yes)	-0.63** (0.31)	-0.18 (0.24)	0.34 (0.21)	0.58** (0.27)	1.07*** (0.21)	0.56 (0.40)	0.16** (0.07
Access to specialized skills (Yes)	0.27 (0.32)	1.05*** (0.25)	0.29 (0.21)	-0.29 (0.25)	0.89*** (0.21)	-0.02 (0.37)	-0.02 (0.06
Farmer's project for the coming years							
Re-organizing labor on the farm	-0.18 (0.29)	0.10 (0.21)	-0.001 (0.18)	0.26 (0.22)	0.52*** (0.20)	0.68** (0.31)	-0.07 (0.06
Develop a new on-farm activity	0.43 (0.30)	0.26 (0.22)	0.09 (0.19)	-0.12 (0.26)	0.20 (0.21)	0.03 (0.33)	0.10 (0.06
Develop an off-farm activity	0.62* (0.38)	0.62* (0.33)	0.41 (0.31)	0.39 (0.35)	-0.04 (0.33)	-0.40 (0.65)	0.20** (0.10
Enlarge the farm's cultivation area	-0.60* (0.36)	-0.32 (0.26)	-0.08 (0.22)	0.14 (0.27)	-0.26 (0.23)	-0.15 (0.37)	-0.11 (0.07
Maintain the farm as it is	-0.20 (0.29)	-0.10 (0.21)	0.37** (0.18)	0.46** (0.23)	-0.19 (0.20)	-0.43 (0.33)	-0.01 (0.06
Keep and develop outsourcing	1.81*** (0.42)	1.33*** (0.37)	0.96*** (0.35)	0.78* (0.45)	-0.25 (0.40)	1.31*** (0.47)	0.56*** (0.10
Proxy for the state of the local outsourcing market and inter-kr Nb. of operators with same postal code as farmer	nowledge 0.03 (0.02)	0.03 (0.02)	0.04** (0.02)	-0.02 (0.02)	0.03* (0.02)	0.04 (0.03)	0.01 (0.01
Control variables							
Age	0.003 (0.16)	0.08 (0.12)	0.07 (0.10)	0.08 (0.13)	0.02 (0.11)	-0.12 (0.17)	0.03 (0.03
Area cultivated with cereals (hectares)	-0.46 (0.32)	-0.35 (0.26)	0.13 (0.11)	-1.28*** (0.33)	0.22 (0.16)	-0.06 (0.26)	0.04 (0.03
Area cultivated with vegetables (hectares)	-0.35 (1.70)	-0.54 (1.54)	-0.12 (0.18)	-1.94 (3.09)	0.19 (1.05)	-0.01 (0.30)	-0.05 (0.03
Area cultivated with fruit trees (hectares)	0.08 (0.12)	0.03 (0.10)	-0.04 (0.10)	-0.01 (0.10)	-0.12 (0.10)	0.08 (0.17)	-0.02 (0.03
Vineyard area (hectares)	0.02 (0.12)	-0.14 (0.17)	-0.41** (0.17)	0.26* (0.13)	-0.39*** (0.14)	-0.53 (0.41)	-0.02 (0.04
Area cultivated with special crops: flowers, etc. (hectares)	-0.07 (0.15)	-0.26 (0.31)	-0.09 (0.12)	-0.27 (0.31)	0.08 (0.14)	-0.18 (0.46)	-0.02 (0.02
Membership of a machinery cooperative (Yes)	-0.11 (0.28)	-0.35* (0.20)	-0.09 (0.18)	-0.27 (0.23)	-0.29 (0.19)	0.12 (0.30)	-0.15*** (0.06
Nb. of local machinery cooperatives	0.06 (0.04)	0.01 (0.03)	-0.02 (0.03)	-0.01 (0.03)	0.001 (0.03)	-0.05 (0.05)	-0.01 (0.01
Nb. of observations	808	808	808	808	808	808	85
Adjusted K2	05/ I.U	0.0959	0.0622	0.1843	0.2598	9/0.0	0.224
Log Likelihood	-224.31	-365.89	-452.29	-313.52	-401.58	-188.90	-1,424.70
Akaike Inf. Crit.	506.62	789.78	962.59	685.03	861.16	435.80	2,907.4



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investments, the farmer will likely not outsource especially if he is a member of a machinery cooperative. Unlike seeding, for the outsourcing of phytosanitary treatments, the greater number of local contractors increases the probability of outsourcing. A wine farm would contract all the more as the wine area is small. The surveys conducted indeed suggest that farmers now tend to outsource phytosanitary treatment because this operation is becoming more and more restrictive. Farmers who have small areas, do not want to bother and prefer to delegate this operation to a third party. The fact that both the variables "number of local contractors" and "intention to pursue outsourcing" are significant, also suggests that informal attributes of the transaction, such as the reputation of the contractor, may play a role when it comes to delegate an operation that may raise nowadays neighborhood conflicts. It is then interesting to note that for the harvest operation, a practice that we thought was different from the others because many farmers used to outsource harvesting and because it seems to require fewer specific assets, the acquisition of specific skills and the optimal organization of work, as well as the presence of contractors nearby, appear as factors that can significantly and positively impact the probability of outsourcing. Again, in-depth interviews with contractors and farmers suggest that while farmers have always delegated harvesting, they now expect custom harvesters to be more efficient, harvesting at the right time and as guickly as possible to optimize yield, especially with varieties of maize with shorter growth cycle.

Concerning A-to-Z, the results of the negative binomial regression model (table 1 – last column) tend to support our first and second propositions, since the access to high-performing specialized equipment and the expectation of labor specialization gains (possibility for off-farm job and diversification of on-farm activities) increase the probability of outsourcing an increasing number of operations, including those considered as strategic by the farmer. The repeated characteristic of the transaction captured through the fact that farmers are willing to outsource in the future also impacts positively the probability to increase the number of operations outsourced and the shift to A-to-Z. This latter result is confirmed by the testimony of interviewed farmers who reported that they first increased the number of tasks outsourced before contracting A-to-Z. But as with seeding, contrary to what is expected, the proximity variable is not significant. This suggests that farmer who practices A-to-Z may not find a contractor who offers this service nearby and may have to work with a contractor farther away.

The incentive mechanisms of A-to-Z contractual arrangements

The qualitative study of contractual arrangements aims to shed further light on the quantitative results on the respective roles of formal and informal incentive mechanisms in A-to-Z arrangements. For this purpose, we compare traditional outsourcing contracts with A-to-Z contracts, based on the written contracts collected and on in-depth surveys of contractors. In a very large majority of cases, when it is formalized (which is not always the case), the outsourcing relationship is based on an annual written contract tacitly renewed which specifies the nature of the operation carried out and a flat-rate payment per hectare and per type of operation. For farmers and contractors alike, the simplicity and the flexibility of such a contractual relationship are important, but they recognize that it does not provide the right incentives. Both parties often cite mutual trust and reputation as key factors of the success of the outsourcing relationship. However, it seems that these informal devices are not always sufficient especially since their effects cannot be observed *ex-ante*. They need to be built through work habits for them to become credible. This is probably the reason why in the case of A-to-Z, all contracts include a bonus based on the value of the output. This bonus is somewhat equivalent to a promise made in relational contracts. The observed formal contracts are thus composed of a fixed part (about 75% of the average total bill) and a variable part (25%) in the payment. The fixed part can vary from 400 to 500



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euros/hectare, depending on the state of the outsourcing market but also on the services provided in addition: agronomic and economic expertise (for example, advices on crop rotation and technical itinerary given market outlets or CAP incentives), input purchases, crop marketing or administrative service. Contractors often include these three latter services in the contract because this gives them the possibility to better negotiate sale contracts with equipment manufacturers, input suppliers and downstream food industries. The variable part of the contract is indexed on the net margin of each crop. By doing A-to-Z for several clients, a contractor can optimize both the cropping system and labor organization since he can manage all the plots as a single large entity.

According to the interviewers, such A-to-Z contractual schemes were designed to spread production and market risk between the service provider and the customer, and to encourage the former to optimize his performance not only in the management of the farm, but also in the management of relations with upstream and downstream stakeholders of the supply chains. In a few cases, farmers have hired a third party (advisor employed by a consulting company, crop manager employed by an agricultural cooperative). In Belgium and England, such intermediary between the farmer and the contractor is named "land manager" and his main role is to help design the contract and to control its execution. This last multi-partner governance scheme (Figure 3) could indeed prevail over all of the other modes of governance, especially since the land and the crops are highly valued. The farmer can keep the ownership of the land, its products, and the benefits of production subsidies, without having to bear the high costs of investment, hiring and controlling the work of agricultural hired workers. A contractor or any type of land-managing company can manage larger areas, break-even and partially benefit from usufruct without having to bear the exorbitant cost of acquiring the land.



Figure 3. A-to-Z outsourcing scheme governed by a land manager. Source: by authors based on a case study of one of the biggest French farm contractors.

Discussion

In the following discussion, we will focus on, firstly, the test of the theoretical proposition and secondly, the comparison of our results with other empirical studies on the subject.



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First, the empirical evidence globally validates our theoretical proposition, except for one central aspect, namely the measure of the role of informal incentive mechanisms in relational contracts. For Baker *et al.* (2002), these informal mechanisms may include observable and measurable monetary promises of payment or threats of sanctions, but also others that are more difficult to quantify, such as trust and reputation. To approach these latter quantitatively, we used a spatialized variable based on the concept of proximity (Balland *et al.*, 2013). It appears that the results of our regressions are not always as expected, as in the case of custom seeding. The qualitative analysis of contractual arrangements helps, however, to fill the gap by unveiling the importance of combining formal (possible scale economies, role of the manager, increasing negotiating power) and informal (expected gains on unpriced collective learning, reputation, trust) incentive mechanisms, to develop A-to-Z outsourcing.

Second, it is important to stress that, unlike for the industrial sector, there are very few studies addressing the issue of outsourcing with asset specificity in agriculture. Our results are in line with the qualitative results of Allen and Lueck (2002). In the presence of asset specificity, Allen and Lueck (2002) indeed show that the probability to outsource increases as timeliness costs decrease and specialization gains outweigh these costs. Quoting Isern (1981), the authors also argue that, in a context where contracts are mainly verbal, reputation and proximity can help to contain these costs. Our results differ however from those of De Oliveira and Zylberstztajn (2017) who studied the adoption of outsourcing with asset specificity in the case of coffee cultivation in Brazil. Using data from 105 surveys of coffee farmers and probit regressions to estimate a discrete choice model, they sought to test the hypothesis that the probability of outsourcing the coffee harvest decreases as asset specificity increases, for 4 types of specificity (physical, human, site, time). The evidence from Brazil shows that in the presence of specific assets, the tendency is more towards integration except when the farmer has a sufficient level of education to negotiate and manage the contract in his favor. Using case studies, Chaddad (2014), Chaddad and Valentinov (2017) also show that the integrated and hierarchical mode of governance adopted by large corporate farms, such as Brazilagro, which in 2013 held 8 farms for a total area of 180,000 hectares, makes it easier to develop an appropriate combination of intrafirm incentive and sanction mechanisms to address the problems of moral hazard and hold-ups associated with the presence of specific assets (equipment with expensive technologies, employment of qualified managers, etc.). According to us, the differences observed among the empirical studies are probably due to the fact that the institutional context does impact the arbitration of governance modes (Slangen et al. 2008; Scott, 2014). In Europe, growing economic uncertainties as well as difficulties to transmit farms are leading farmers to prefer outsourcing over ownership (Ball, 1987; Nye, 2018). And this is all the more so as the latter are becoming ever more expensive with the transition to triple-performing and digital precision agriculture promoted by European agricultural policies. The farmer can keep the ownership of the land, its products, and the benefits of production subsidies, without having to bear the high costs of investment, hiring and controlling the work of agricultural hired workers. The contractor can manage larger areas, break-even and partially benefit from usufruct without having to bear the exorbitant cost of acquiring the land.

Conclusion

Over the past two decades, France has experienced an unprecedented expansion of agricultural outsourcing. We observe in particular the development of outsourcing of operations that involve more and more specific assets (equipment with digital technologies, software to help decision making not only at the field level but also at the farm level, agronomic expertise but also expertise in strategic business management, etc.). This phenomenon is counter-intuitive from the point of view of transaction cost



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theory, but our study shows that this is possible when one considers possible *ex-ante* formal and informal incentive mechanisms.

In terms of policy implications, our study helps to highlight the social and economic issues surrounding the development of A-to-Z custom farming. The latter can contribute to improving the overall performance of farms in a context of increasing uncertainty or to maintaining the productive capacity of those without heirs or a hired farm manager. In general, the rise of farm outsourcing has indeed a significant impact on the organization of agricultural production at the territorial level and, more broadly, on the country's food security. It also seems to support the emergence of new businesses and markets, particularly in the areas of strategic consulting, site and land management. However, while agricultural outsourcing offers advantages, A-to-Z raises major questions. The first one is about the definition of the access to land, the status and profession of farmer, and therefore that of policies to support the traditional family farming model. The second concerns the issue of local food sovereignty. The third relates to the agricultural model supported by A-to-Z and its global performance, including the environmental performance. While this work focuses specifically on France, A-to-Z is developing rapidly in other countries worldwide (England, United-States, China, Brazil...) and thus deserves attention. From a research standpoint, these policy issues call for more empirical studies, with the main

methodological challenges being the measurement of informal mechanisms and the development of a truly dynamic approach that can rigorously integrates the temporal dimension of repeated interactions and makes informal incentives credible.

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