Received: 29 March 2021 | Revised: 13 May 2022 | Accepted: 30 May 2022

DOI: 10.1002/agr.21752

RESEARCH ARTICLE

Agribusiness WILEY

Farm valuation: A comparison of methods for French farms

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Funding information
French National Research Agency (Agence Nationale de la Recherche-ANR) with research project FARM_VALUE "Farm value and farm transfer: perspectives from economics and sociology",
Grant/Award Number: ANR-15-CE36-0006

Abstract

Farm transfer is increasingly seen as fundamental to the development of agriculture. One of the major challenges is to assess farm value in the context of an opaque market for farms. We contribute to the scarce literature on farm valuation by empirically applying three valuation methods to the Farm Accountancy Data Network database for France in 2017 and 2018 and for five types of farming. The three methods—the fundamental method, the patrimonial method, and the financial method—are well known for the valuation of companies, but have yet to be implemented widely for farms in the empirical literature. The results show that wine-growing farms have the highest values on average. Pig and beef farms have high average patrimonial values, reflecting their high capital intensity, but beef farms have the lowest average values calculated with methods based on cash flows, revealing unfavorable market conditions for these farms. The results further reveal that total farm output drives the value upward, but that high farm labor, indebtedness, and age contribute to reducing value. Our findings also highlight that, in practice, the differences in values across methods may be substantial.

Abbreviations: AWUs, annual working units; CAPM, capital asset pricing model; DCFs, discounted cash-flows; EBITDA, earnings before interest, taxes, depreciation, and amortization; EU, European Union; FADN, Farm Accountancy Data Network; Ha, hectare; LAV, liquidation and accounting valuation; LSU, livestock units; OLS, ordinary least squares; TFAs, total farm assets; UAA, utilized agricultural area; WCR, working capital requirement.

KEYWORDS
agricultural production, FADN, France, farm value, valuation methods

JEL CLASSIFICATION
D22, G32, Q12

1 | INTRODUCTION

Statistics clearly show a continuous decline in the number of farms in most industrialized countries. This is true for the European Union (EU) (European Commission, 2012) and for France (Giroux, 2011). Hence, successful farm transfers, that is, transfers to farmers with a strong survival rate, are crucial to the renewal of agriculture (Lepage et al., 2011). However, transfer decisions and procedures are often difficult and stressful. Besides the psychological and administrative difficulties, financial issues may prevent or delay farm transfers (Leonard et al., 2017). Retiring farmers usually expect poor pensions and therefore want to sell their farm at a high price, while successors face high start-up costs and financial constraints (Ingram & Kirwan, 2011; Leonard et al., 2020; Lobley et al., 2010). Thus, while retiring farmers expect a high price from the transaction, new entrants may be discouraged by the burden of financial pressure at the beginning of their venture. On the other hand, a high farm value may also be a positive signal for the successor as it may indicate strong economic health and high productive capacity of assets (Calus et al., 2008; Mishra & El-Osta, 2008). Hence, a correct and balanced valuation of farm assets makes it possible to better define transaction prices and thus improve the functioning of the market for farms, and farm transfers (Stover & Helling, 1996). For this, understanding how values are set, and what drives them, is key. This paper aims at contributing to this question, by providing an empirical application on French farms.

One of the major challenges is to assess farm value in a context where the market for farms is opaque. According to Garcia et al. (2017, p. 121), "*the opacity of the farm market means that valuations are based primarily on expert estimates rather than on actual transaction prices*." The farm market may even not exist. Even if they are subject to sales and acquisitions, businesses in general and farms in particular are too heterogeneous and the terms of the transactions too disparate for these transactions to constitute a market. In the absence of a very active market confronting a centralized supply and demand, the price formation process is not explicit. Consequently, the economic analysis of farm values implies proposing reference prices. It can help find an equilibrium price, at the intersection of the minimum price required by sellers and the maximum acceptable price to buyers. Farm valuation also allows for an assessment of the amount of financing required to purchase a farm. This amount is recognized as a major constraint to farm transfers (Gaté & Latruffe, 2016). In summary, farm assets do not have an observable price, but they still are "marketable" in the sense that they can be transferred (Batsch, 2006). It is therefore crucial to estimate the value of the farm taken over as accurately as possible.

From a theoretical point of view, there are several methods available to experts to assess the full value of a farm. More specifically, three methods are used: the fundamental method, the financial method, and the patrimonial method. However, there is a general lack of data and empirical studies, and it is therefore not clear empirically whether the values obtained using different methods differ much. The originality of this article is to contribute to this issue by providing the first assessment of the full value of a farm using a large and representative database, namely, the Farm Accountancy Data Network (FADN) database for France for the years 2017 and 2018, as well as its drivers.

The rest of the paper is organized as follows. Section 2 explains the methods for farm valuation, and Section 3 describes the methodology and data used to apply the methods. Section 4 presents the results, and Section 5 discusses them and concludes.

2 | METHODS TO ASSESS FARM VALUE

The valuation process in farming raises many issues. The first is related to the nature of the assets to be valued. A farm is made up of tangible assets (buildings, land, machinery, and livestock) and intangible assets (production rights, customers, and workers' skills), which need to be accounted for in valuation, directly or indirectly, quantitatively or qualitatively. The valuation process becomes more complex in cases where the farm is a holding controlling several affiliated companies. The second issue relates to the choice of valuation methods, with two main categories of methods. The first set of methods is based on cash flows and profitability generated by the assets, while the second set of methods is based on the separately valued assets, as explained below.

2.1 | Theoretical valuation of businesses

The literature is abundant on business valuation methods (Damodaran, 2012), which are generally based on four methods, used separately or in combination.

The discounted cash-flows (DCF) method, also known as the capitalization method or return value method, is part of the first set of methods, as it is based on the ability of the company to generate cash flows. It relates the value of an asset to the present value of expected future cash flows on that asset. Such a technique is described in specialist works (Damodaran, 2012) and is very widely used by professionals.

The liquidation and accounting valuation (LAV), also known as the patrimonial value method, is part of the second set of methods. It is built around the valuation of a firm's existing assets, with accounting or market estimates of the value. This approach generally uses a revalued net asset method to better link the market price of assets to the net book value of balance sheet assets. In this context, recent work has focused on the inclusion of intangible assets (European Commission, 2003).

The third method is the dividend discount method, which is based on the future income-generating potential of businesses. This is an equity valuation method, focusing on investors in a company's shares and valuing their stake by discounting the expected cash flows to those investors at a rate of return appropriate to the risk of the company's shares. Some models consider only dividends as cash flows to equity. However, there are broader definitions of cash flow to equity, which may include share buybacks, potential dividends, free cash flow, and/or the expected price of shares at the end of the holding period (Damodaran, 2005). This approach, based on the value of equity, is different from the LAV and DCF methods, which provide the value of the farm as a whole.

Finally, the "multiples" approach is based on an analysis of comparable financial metrics (mostly used on stock markets). It relies on comparable transactions of assets, which allow comparing firms and defining value ranges. This comparison approach seeks to value similar firms using the same financial metrics. The final price is set through negotiation between the buyer and the seller until convergence on the final transaction price is achieved. Current academic studies have focused on the choice of value drivers, such as the earnings before interest, taxes, depreciation, and amortization (EBITDA), to be considered to improve the relevance of the valuation using "multiples" (Chastenet & Marion, 2015; Harbula, 2009; Nissim & Penman, 2001).

2.2 | Valuation in farming

Although the literature on business valuation is extensive, only a few works have focused on the specific case of agricultural valuation (Barthélémy, 1997; Eves, 2007; Murray et al., 1983). For France, Barthélémy (1997) was the first to compare valuation methods but only in a conceptual approach and not with an empirical application. When the issue of valuation is addressed in agriculture, it mainly focuses on land value (e.g., Garcia et al., 2017; Ma & Swinton, 2012; Oltmans, 2007), thus neglecting the farm as an indivisible whole. While farm value and property are regularly monitored in the United States (e.g., Nickerson et al., 2012), this is not the case in Europe, where usually only land value is recorded in the case of a farm sale.

Land values may be separated into categories depending on whether the land is built on or not, but there is no widely available database on the selling prices of farm property excluding land, or of the farm as an indivisible whole. Among studies focusing solely on land value, some used financial valuation methods. Barry (1980) used the capital asset pricing model (CAPM) to provide a valuation based on financial markets. Following this approach, Baker et al. (2014) used the beta coefficient estimated with CAPM to assess farmland value by comparison with market returns. Garcia et al. (2017) developed a methodology that is particularly applicable to the valuation of nonmarket goods, or markets where little information is available, as may be the case with the valuation of agricultural land. Burt (1986) used the fundamental method that consists in discounting cash flows to estimate the value. By contrast, to the best of our knowledge, no academic study has focused on farm valuation where the farm is considered as an indivisible whole, taking into account both the value of farm assets and the profitability generated by these assets. Other approaches have emphasized the role of real growth in net rental income from land as alternative explanations for the dramatic real growth in the United States' farmland prices in the 1970s (Alston, 1986).

In practice, three methods are mainly used in agriculture by professionals (Barthélémy, 1997; Wahlen et al., 2013). Below we describe each of these methods used to value the farm as a whole and not just the value of equity invested by farm owners.

(1) The "fundamental method" (or DCF method), which consists in valuing the farm as an industrial project that will generate cash flows in the future. The farm value is the sum of the future net cash flows discounted at a particular rate. In this method, one needs to accurately estimate future cash flows (investment and operating flows) and to set the discount rate, which can be viewed as the required rate of return for that project. It seems relevant to consider that the sum of the future net cash flows can finance both fixed assets and working capital requirement (WCR). Because WCR represents the amount of money necessary to finance the gap between disbursements (payments to suppliers) and receipts (payments from customers), it is assimilated to long-term structural assets requiring long-term financing.

(2) The "patrimonial method" (or LAV method), based on the market value of all tangible assets on the farm. Each asset is estimated separately. The estimation can be done with the book value of assets based on information in the balance sheet. In practice, the value of assets is most often estimated at their current market value. In addition, practitioners of this method sometimes try to take into account taxation, intangible assets, the environment in which the farm is located, and the dynamism of the farm market. It is however often not possible to take these elements into account, due to the limitations of the data. This is the case in our study. The total patrimonial value of the assets corresponds to total farm assets (TFAs). TFAs reflect the total present value of the farm and form the basis of investment valuation (Calus et al., 2008). Assets include the present value of the land owned, soil improvement, buildings and constructions, permanent crops, and production rights. They also include temporary assets corresponding to the present value of animals, machinery, and liquid assets (Calus et al., 2008). To compare this method to the others, only fixed assets (i.e., invested in the long run) and the corresponding WCR, as stated before, need to be considered. In our case study, the present value of the land owned is not accounted for because most of the farmland is rented in France, due to the French Agricultural Holding Act (1946) which has ensured the long-term security of land use. Moreover, liquid assets correspond to WCR (inventories plus receivables minus short-term payables).

(3) The "financial method," based on the estimation of the farm investor's potential remuneration, which can be assimilated to the profit. This net profit (farm income from which the farm manager's labor remuneration is subtracted) provides a return on the capital invested by the farm owner and can be used to assess the value of equity by retaining a standard required return on invested capital. Indeed, given the net profit (potential dividend) and the expected rate of return on capital, it is possible to calculate the value of the capital to be invested, which is the value of equity. To assess the overall farm value and make it comparable with other methods, long-term liabilities are added to equity.

Various classifications of these valuation methods can be done. Direct valuation methods (financial method) value equity directly, while indirect valuation methods (fundamental method and patrimonial method) value the firm as an indivisible whole (without considering real profitability in the case of the patrimonial method) and then subtract the value of debt to get the equity value. Moreover, one method is directly based on farm assets (patrimonial method), while the others consider the ability of the farm to create value (fundamental method and financial method). The choice of a specific method is therefore linked to the variety of farm situations (transfer vs. sale, total vs. partial sale of assets), to the negotiating parties, and to the evaluators' requirements. According to experts who evaluate the value of farms (Eves, 2007), the patrimonial method is usually chosen by transferring farmers. By contrast, the fundamental method is generally used by successors, namely, young farmers taking over farms, or by existing farmers who wish to expand their farms. The financial method is sometimes used by investors who want to compare the returns on their invested capital.

3 | EMPIRICAL FRAMEWORK

We explain here how the theoretical methods are applied empirically to our data, and our approach to investigating the drivers of the value.

3.1 | Farm value

The three methods described in Section 2 are used to calculate values as follows.

(1) In the fundamental method, the value (*Fundamental value*) is computed as follows:

$$Fundamental \quad value = \frac{Cash \quad flows\text{-}Personal \quad drawings}{r/(1-(1+r)^{-T})}, \tag{1}$$

where r is the discount rate, that is, the rate of return, which is assumed here to be 3%. This rate of return is based on the yield on rented agricultural land (Agrifrance, 2018). Since farm performance, including yield, cash flow, and income, is affected by production risk (e.g., drought) and price volatility (Finger et al., 2018), we present results for 1 year (2018) and check for robustness for the year before (2017).

In the fundamental method, the farm value is the sum of the future net DCFs. That means the net cash flow is used to fund assets every year and not to pay the farmer. The (gross) cash flow is close to EBITDA, and then we subtract personal drawings because the farm manager's remuneration has not yet been considered. T is the time horizon, assumed here to be 9 years. This period corresponds to that of a legal long-term land lease in France, and matches bank loans for setting up a farm. The loans are generally repaid over this 9-year period as if this period corresponded to the duration of the return on investment. Personal drawings correspond to cash withdrawn from the farm for family living, taxes, and savings.

(2) In the patrimonial method, the value (*Patrimonial value*) is obtained with

$$Patrimonial\ value = Value\ of\ fixed\ assets + Working\ capital\ requirement. \tag{2}$$

The value of fixed assets is calculated by aggregating buildings, machinery, and livestock. The value of net working capital corresponds to current assets minus current liabilities.

(3) In the financial method, the value (*Financial value*) is given by

$$Financial\ value = \frac{EBITDA\text{-}Personal\ drawings - Depreciation - Financial\ fees}{r} + Long\ term\ liabilities, \tag{3}$$

where r is the rate of return on capital, assumed here to be 3%. Because this financial value corresponds to equity only, we add the value of long-term liabilities to estimate the whole farm value.

In addition, the following assumptions are made. First, as regards personal drawings made by farmers, which are part of their income, real personal drawings are observed in our dataset. However, they correspond to the transferring farmer's remuneration and not to those of the incoming farmer. Personal drawings may vary depending on the geographical area so as to represent an opportunity cost of working in agriculture, as well as from 1 year to another. However, there is a lack of data to estimate values of real personal drawings. For this reason, we rely on a standard remuneration based on the production costs method developed by IDELE (French livestock institute),[1] and use personal drawings equivalent to 1.5 times the French minimum annual wage, that is, €21,000/year.

Second, as the legal status of the land complicates matters, we assume that all farms fully lease their land. We thus removed the land value from assets in the balance sheet, land loans on the liabilities side of the balance sheet, and all taxes on land ownership, as if the farm had no land in ownership. As the annual rent, we use the average rental value paid per hectare for farms with leased land, and the average rental in the agricultural region where the farm is located for a farm in full ownership.

3.2 | Drivers of farm value

After computing the different farm values, we investigate which farm characteristics drive these values, and whether drivers are similar across the values obtained using the different methods. We expect the value of a farm to result partly from internal drivers, namely, the combination of capacity to produce, farm size, labor, farm experience, and financial risks, all of which influence farm profitability and value of assets.

We consider two dependent variables in separate regressions, namely, the fundamental value and the patrimonial value. Our econometric model is based on a theoretical framework relying on a profitability function as described by Gloy et al. (2002). The function includes production, finance, and human resources aspects, which are thus considered in our framework. In addition, regarding the fundamental value regression, this value depends on the farmer's ability to be profitable, and therefore on drivers that explain farm economic performance or profitability. As for the patrimonial value, since it reveals the farmer's past choices which also have an effect on wealth in the long term, the regression incorporates the profitability and experience of farmers, structurally and not cyclically.

Therefore, as in Kryszak et al. (2021), we assume that farm value is influenced by several structural and managerial decisions taken by farmers which are drivers of profitability. A prominent factor of profitability and farm performance in general is the size of the farm, which is introduced as an independent variable via the farmland area (Bojnec & Latruffe, 2013; Hadrich & Olson, 2011; Kryszak et al., 2021). Following Grifell-Tatjé and Lovell (1999), we propose to break down the profit into a price effect and a quantity effect. This is the reason why we introduce the total farm output as an independent variable in the model. This variable also includes subsidies which have a direct impact on profitability (Enjolras et al., 2014). More precisely, we expect a positive effect of the capacity to produce (proxied here by the annual total farm output) on the farm value because it reflects the size of the farm and its ability to produce (Joubert & Cloete, 2011). For the same reason, we also expect a positive link between the farm size (proxied here in terms of utilized agricultural area [UAA]) and the farm value. The greater the size, the more weather hazards are spread (Wan et al., 2016) and the higher the labor productivity, increasing farm profitability (van der Meulen et al., 2014).

[1] http://idele.fr/no_cache/recherche/publication/idelesolr/recommends/la-methode-nationale-de-calcul-des-couts-de-production-en-elevage-herbivores.html.

Because the level of debt is a determinant of the profitability through a leverage effect (Gloy & LaDue, 2003; Kryszak et al., 2021; Mugera et al., 2016), we introduce the debt-to-assets ratio in the model. We expect that disproportionate use of debt contributes to an increase in the return on equity.

Profitability and performance in the long term are also influenced by human resources, namely, skills, experience, and so forth (Gloy et al., 2002; Micheels, 2014.). This is why we include the age of the farmer as a proxy of their experience and know-how. Debruyne (2010) highlighted the role of farmers' managerial ability in the farm value, which is closely linked to the farmer's age. The link may be positive as older farmers have greater experience, which may contribute to a higher value (Calus et al., 2008). On the other hand, younger farmers who are at the beginning of their farm lifecycle invest and develop the farm, contributing to a higher value (Gale, 1994).

We also take into account the number of workers, whose effect on profitability is ambiguous: a greater labor force may imply greater production costs but can also improve profitability from greater effort when, for example, the labor force receives employee benefits or work in good working conditions (Skevas et al., 2021). In addition, a large labor force may contribute to profitability as it increases the availability of adequate skills (Tey & Brindal, 2015), but it may also lead to supervision problems, transaction costs, and hence lower profitability. A large labor force may also be a substitute for assets, reducing the farm value.

The model explaining the value, and estimated with ordinary least squares (OLS), thus takes the following form:

$$Value_i = \alpha + \beta_1 UAA_i + \beta_2 TFL_i + \beta_3 DAR_i + \beta_4 FA_i + \beta_5 TFO_i + \varepsilon, \tag{4}$$

where i is the farm, UAA_i the utilized agricultural area, TFL_i the total farm labor, DAR_i the debt-to-asset ratio, FA_i the farmer's age, TFO_i the total farm output, $\alpha, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ are the coefficients to be estimated, and ε is the idiosyncratic error.

3.3 | Dataset

This section presents the data on which we applied the computations of values and the econometric model for assessing the drivers of values. To investigate this in France in as broad a context as possible, we use the database of the French FADN. This database contains accounting and structural information for a sample of French farms that are representative of production and regions in France, which makes it suitable for calculating farms' economic parameters. This database is an annual survey of about 7000 farms with a rotating rate of about 11%, managed by the French Ministry of Agriculture and feeding the EU FADN. Surveyed farms have a commercial activity whose total standard output is above a given threshold (€25,000).[2] The years used for the analysis are 2018, the most recent year available when we started this study, and 2017, for robustness checks.

We consider five types of farming, that is, five groups of farms categorized based on their main production:[3] field crop farms (the sample size is 900 for 2017 and 878 for 2018); wine-growing farms (the sample size is 1013 and 1054); dairy farms (the sample size is 989 and 973); beef farms (the sample size is 688 and 709); and pig farms (the sample size is 182 and 205). These five types of farming represent the main types of French agricultural production. Table 1 displays the average characteristics of farms according to the type of farming for year 2018 (year 2017 in Table A1).

Table 1 shows that, in France in 2018, wine-growing farms were more labor intensive than beef farms. Wine-growing farms produced twice as much in value, whereas they needed 2.3 times as many workers. Field crop farms

[2]For more information about the EU FADN data, see https://ec.europa.eu/info/food-farming-fisheries/farming/facts-and-figures/farms-farming-and-innovation/structures-and-economics/economics/fadn_en

"The Standard Output (SO) is the average monetary value of the agricultural output at farm-gate price of each agricultural product (crop or livestock) in a given region," see https://ec.europa.eu/agriculture/rica/methodology1_en.cfm

[3]For example, a farm is classified in the field crop type of farming when at least two-thirds of the value of its total output comes from field crops.

TABLE 1 Summary statistics for the farms in the 2018 French FADN sample

	Field crop farms	Wine-growing farms	Dairy farms	Beef farms	Pig farms
Number of farms	877	1054	973	709	205
Utilized agricultural area (UAA) (ha)	148 (131) /85/	31 (20) /37/	112 (99) /64/	126 (110) /70/	78 (66) /55/
Total farm labor(annual working units—AWUs)[a]	1.4 (1.0) /0.68/	3.4 (2.4) /2.8/	2.1 (2.0) /1.2/	1.5 (1.0) /0.7/	2.5 (2.0) /1.8/
Including nonhired labor (AWU)	1.24 (1.0) /0.53/	1.4 (1.0) /0.7/	1.8 (2.0) /0.8/	1.4 (1.0) /0.6/	1.5 (1.0) /0.7/
Farmer's age (years)	52.7 (55.0) /10/	51.9 (53.0) /10/	50.0 (51.0) /8.6/	50.8 (52.0) /8.7/	49.7 (52.0) /8.4/
Total farm output (thousand €)	211.7 (178.6) /130.0/	305.7 (200.7) /300.1/	289.3 (250.1) /189.8/	153.0 (132.7) /97.3/	600.7 (495.5) /417.6/
Grape production (hundred liters)	–	1374 (887) /1521/	–	–	–
Milk production (thousand liters)	–	–	478.3 (408.1) /321.4/	–	–
EBITDA	67.6 (53.1) /56.4/	108.9 (72.6) /122.4/	94.1 (77.5) /69.2/	53.0 (45.8) 40.6	96.7 (67.5) 98.2
Equity (thousand €)	230 (183) /231/	451 (306) /482/	285 (246) /203/	311 (283) /178/	240 (193) /251/
Debt-to-asset ratio	46% (36%) /45%/	33% (28%) /26%/	45% (44%) /26%/	30% (27%) /20%/	67% (63%) /35%/
Livestock units (LSU)[b]	–	–	127 (110) /79/	139 (117) /84/	545 (448) /412/

TABLE 1 (Continued)

	Field crop farms	Wine-growing farms	Dairy farms	Beef farms	Pig farms
Number of suckler cows	–	–	–	80	–
				(70)	
				/44/	

Note: This table provides the average value and, in brackets, the median value and, with a slash, the standard deviation.

Abbreviations: EBITDA, earnings before interest, taxes, depreciation, and amortization; FADN, Farm Accountancy Data Network.

[a]One annual working unit "corresponds to the work performed by one person who is occupied on an agricultural holding on a full-time basis." (see https://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Annual_work_unit_%28AWU%29).

[b]The livestock unit is "a reference unit which facilitates the aggregation of livestock from various species and age as per convention, via the use of specific coefficients established initially on the basis of the nutritional or feed requirement of each type of animal." (see https://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Livestock_unit_(LSU)).

Source: The authors, based on the French FADN data for year 2018.

required more agricultural land than pig farms. Wine-growing farms and pig farms used more paid labor than the other three types of farming. Pig farms were twice as indebted as wine-growing and beef farms. Finally, the average age of the farm holder in 2018 was 50 years old and over.

4 | RESULTS

On the basis of the presentation of the different farm valuation methods we present the empirical results in three key points: A presentation of the values according to the different methods by comparing five farming systems, the value in terms of "multiples," and the drivers that could explain the values computed.

4.1 | Farm value with the three methods

Table 2 provides descriptive statistics for the values obtained using the three above-described methods for the five types of farming in our sample in 2018. We show the absolute value for the whole farm, as well as a value related to the number of nonhired annual working unit (AWU), the UAA, and EBITDA (in some relevant cases), to avoid size effects and allow comparisons across types of farming.

A comparison between figures shows large differences across valuation methods, related to the method itself and to the type of farming. If we first consider each type of farming and the average absolute values per farm, Table 2 and Figure 1 show that for beef and pig farms the highest values on average are obtained with the patrimonial method which, by definition, measures the value of farm assets, including buildings and equipment and stocks. Beef and pig farms are highly capital-intensive farms, which contributes to a higher patrimonial value. By contrast, for the other three types of farming, the highest value on average is based on profit. More precisely, for field crop farms and dairy farms, the highest average values are returned by the fundamental method. For dairy farms, the fundamental and patrimonial values are close and high. This suggests that these types of farming are profitable and that most of the wealth is invested and therefore leads to an increase in assets. As for wine-growing farms, the highest value on average by far is the financial method, which is explained by the fact that wine-growing farms are the most profitable.

TABLE 2 Descriptive statistics of farm values in the 2018 French FADN sample

	Field crop farms		Wine-growing farms		Dairy farms		Beef farms		Pig farms	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
(1) *Fundamental value*										
Per farm in €	381,876	249,222	844,928	485,219	480,105	393,303	230,682	177,519	587,737	386,729
€/Total AWU	285,581	201,541	256,719	207,616	221,069	199,319	151,718	141,237	224,101	210,139
€/Nonhired AWU	319,220	214,225	692,152	404,332	264,333	229,215	90,794	79,045	428,963	293,581
€/ha UAA	2137	2003	73,084	23,022	3950	3806	1665	1632	10,141	5460
€/LSU	–	–	–	–	3482	3472	1373	1534	1004	971
€/€ Total output	1.2	1.4	1.6	2.5	1.3	1.5	1	1.4	0.8	0.9
(2) *Patrimonial value*										
Per farm in €	254,781	187,558	488,480	303,743	449,110	348,201	357,587	297,096	610,754	406,997
€/Total AWU	189,968	146,627	153,423	128,175	213,698	192,113	248,238	231,915	250,106	200,699
€/Nonhired AWU	214,017	159,960	395,515	242,373	254,134	221,237	273,548	248,087	437,666	285,908
€/ha UAA	1700	1490	37,470	14,675	4053	3653	2989	2759	16,582	6465
€/LSU	–	–	–	–	3524	3289	2577	2504	1223	1030
€/€ Total output	1.1	1.1	1.8	1.5	1.5	1.5	2.4	2.3	1.0	0.9
(3) *Financial value*										
Per farm in €	218,049	−1232	1,441,684	685,588	351,733	151,807	−188,784	−230,648	247,520	−158,359
€/Total AWU	164,920	−800	403,493	291,670	117,976	79,203	−173,757	−184,717	10,699	−61,638
€/Nonhired AWU	181,674	−1230	1,201,977	535,627	264,333	229,215	−180,025	−201,318	149,130	−96,707
€/ha UAA	474	−6	148,480	30,215	1314	1658	−2889	−2243	−14,864	−1677
€/LSU	–	–	–	–	1034	1515	−2902	−2056	−597	−331
€/Total output	−1.1	−0.01	−1.4	3.6	−0.2	0.6	−3.7	−1.9	−0.6	−0.2

Abbreviations: AWU, annual working unit; FADN, Farm Accountancy Data Network; LSU, livestock unit; UAA, utilized agricultural area.

Source: The authors, based on the French FADN data for year 2018.

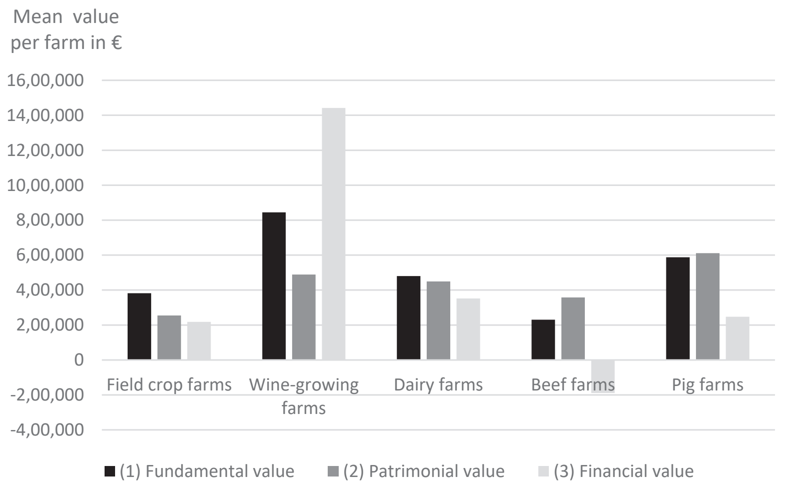

FIGURE 1 Mean values per farm (Euros) in the 2018 French Farm Accountancy Data Network sample

From a methodological point of view, we observe that the most volatile values are provided by the financial method, which considers farming activity as an investment. This method provides positive median values for profitable farms (wine and dairy farms) and negative median values for nonprofitable farms (field crop farms, beef farms, and pig farms), thus reflecting their operational risk. In this case, the value can be seen as an incentive to invest or not within a given sector according to the expected profitability.

The comparison between types of farming, based on relative values per nonhired AWU, reveals that wine-growing farms have the highest valuation on average of all types of farming using the fundamental and financial methods. We note a huge difference with the financial method, revealing a much higher profit in wine-growing farms than in other farms. The exception is the patrimonial method, where pig farms have the highest average value per AWU, revealing the high capital intensity of this type of farming compared with the other types.

Beef farms have on average the lowest value per nonhired AWU obtained with the fundamental and financial, suggesting unfavorable market conditions. These very volatile values reflect the contrasted situation of beef farms: a high amount of invested capital, high sales, but low or negative financial return. With the patrimonial method, the lowest average value per nonhired AWU is for field crop farms, revealing lower assets in those farms than in the other farms. Valuation techniques thus emphasize these sectoral differences and show the crucial role of investments made on the farms.

The fundamental and patrimonial values for 2018 were then compared with the values for the year 2017. The results show (Tables 2 and A2) the same trends and ordering for the 2017 as for the 2018 values. The patrimonial value for 2017 is quite close to the one in the year 2018, whatever the type of farming. This value is stable, which is perfectly consistent since the composition of balance sheet assets is fairly stable over time and not very sensitive to the economic climate. By contrast, the fundamental value can vary according to the year and the type of farming. As this value is highly dependent on profitability, a bad year influences the value of the farm. For field crop farms, the fundamental values are fairly close in 2017 and 2018. For viticulture, for example, the fundamental value is much higher in 2018 than that in 2017, consistent with the fact that the year 2017 was marked by strong climatic hazards (drought, in particular). On the contrary, for pig and dairy farms the year 2018 was worse than 2017. For these two types of farming, it is the market hazards (price fluctuations) that have had an effect on profitability and therefore on the fundamental value. This highlights the importance for practitioners to calculate the fundamental for several years to eliminate annual cyclical fluctuations.

TABLE 3 Correlation coefficients between farm values (absolute values per farm) in the 2018 French FADN sample

	Fundamental value × Financial value	Fundamental value × Patrimonial value	Financial value × Patrimonial value
Field crop farms	0.66	0.61	0.39
Wine-growing farms	0.86	0.68	0.57
Dairy farms	0.72	0.62	0.45
Beef farms	0.61	0.54	0.30
Pig farms	0.74	0.58	0.42

Abbreviation: FADN, Farm Accountancy Data Network.
Source: The authors, based on the French FADN data for the year 2018.

Table 3 displays correlations between methods for each type of farming, which show that financial values and patrimonial values are not highly correlated (the highest correlation coefficient is 0.57, for wine-growing farms, while the lowest is for beef farms, 0.30). These divergent results are consistent with the way these values are calculated. When we estimate the correlation coefficients between farm values related to AWU or UAA (not shown in Table 3), the correlation is lower. In terms of value per farm, the correlation coefficients between the fundamental values and the financial values are the highest of the three cross-method comparisons. The lowest coefficient of all types of farming is as high as 0.61 (for beef farms), while the highest correlation is for wine-growing farms (0.86).

4.2 | Synthetic indicators of farm values

Table 4 shows synthetic indicators for the year 2018, the so-called "multiples" in finance, that provide a brief overview of the farm value compared with key indicators. For instance, the value (based on the fundamental method) per hectare of a wine-growing farm (without considering the price of the land) is much higher than that for a field crop farm (median of €23,022/ha for wine-growing farms vs. €2002/ha for field crop farms), which reflects the land intensity of production. If we compute the value per total output, the value varies quite considerably according to the type of farming. It takes 2.5 years of total farm output to cover the value of wine-growing farms, while the respective figures are 1.5 for dairy farms, 1.4 for field crop farms and beef farms, and 0.9 for pig farms. Moreover, we observe a large variability in this value across methods and types of farming.

Alternative valuation methods provide median values in line with previous findings: higher for the patrimonial method. If one considers the average value in relation to total farm production, it takes only one total farm output to cover the value of a pig farm, but 2.5 for a beef farm, which needs more assets to produce than other farming systems. These results give an interesting insight into the specificities of agricultural systems. On the one hand, beef systems require high assets (2.3 years of total farm output) for a low capacity to give economic value to the assets (1 year of total farm output with the fundamental value). On the other hand, wine-growing systems seem to be more consistent with comparable values, for example, patrimonial value and fundamental value: 1.8 and 1.6 years of total farm output, respectively.

The fundamental and patrimonial values for 2018 were compared with the values for the year 2017. The comparison of results (Tables 4 and A3) shows orders of magnitude that is consistent from one reference to another (UAA and total output) between the 2 years. The patrimonial value provides very stable year-to-year results for all types of farming and references (UAA and total output). Except for the mean of pig farms, the annual variation of all "multiples" is lower than 10%, and in most cases lower than 5%. The most stable results are observed for field crop

TABLE 4 Synthetic indicators ("multiples") of farm values in the 2018 French FADN sample

	Field crop farms		Wine-growing farms		Dairy farms		Beef farms		Pig farms	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
UAA (ha)	148	131	31	20	112	99	126	110	78	66
Total farm output (€)	221.5	178.6	305.7	200.7	289.3	250.1	153.0	132.7	600.7	495.5
(1) *Fundamental value*										
€/ha UAA	2137	2002	73,084	23,022	3950	3806	1665	1632	10,141	5460
€/€ Total output	1.2	1.4	1.6	2.5	1.3	1.5	1	1.4	0.8	0.9
(2) *Patrimonial value*										
€/ha UAA	1700	1488	37,470	14,675	4053	3653	2989	2759	16,582	6465
€/€ Total output	1.1	1.1	1.8	1.5	1.5	1.5	2.4	2.3	1	0.9
(3) *Financial value*										
€/ha UAA	474	−6	148,480	30,215	1314	1658	−2889	−2243	-14,864	−1677
€/€ Total output	−1.1	−0.01	−1.4	3.6	−0.2	0.6	-3.7	−1.9	−0.6	−0.2

Abbreviations: FADN, Farm Accountancy Data Network; UAA, utilized agricultural area.
Source: The authors, based on the French FADN data for year 2018.

farms, either for the mean or the median, with year-to-year variations of less than 10%. Such a result is explained by the combined stability of the value of farm assets recorded in the balance sheet and its total output. These results confirm the relevance of the use of synthetic indicators in relation to the patrimonial value. By contrast, "multiples" obtained from the fundamental value are more volatile, which is consistent with the inherent instability of values obtained with this method. Their use according to this reference is therefore more questionable.

4.3 | Explaining farm value

To assess the internal drivers of farm value, we estimate OLS regressions that explain the obtained values according to the main financial, individual, and structural indicators of the farm based on our theoretical framework (Section 3.2). We present the results for fundamental and patrimonial values for the year 2018. Table 5 shows the results for the value for the whole farm, while Table 6 shows the results for values related to total farm labor.

The results first show that, with the exception of beef farms, the signs and significance are consistent for each type of farming, whatever the valuation method used. Both sets of regressions (for the whole farm value in Table 5 and for the value per AWU in Table 6) reveal the same findings. All farm values are positively driven by the total output of the farm, which reflects both the size of the farm and its ability to produce, and may be considered as a signal of the farm's viability. Farmland size has a differentiated role on value: a negative link for field crop farms and for the fundamental values for wine-growing farms and beef farms; a positive link for dairy farms, for pig farms, and for the patrimonial values for beef farms. It may seem counterintuitive to observe a negative coefficient for UAA, that is, a decrease in the total value of the farm with an increase in the UAA. However, a greater area does not always have a direct effect on production per hectare. Productive intensity (output/ha) is lower on large farms than on small farms in field crop, wine-growing, and beef farms in our sample. For field crop production, an increase in land size may not result in positive returns to scale; on the contrary, it may result in additional costs (transport and equipment) or lower production per hectare due to a lower ability to control production and act quickly to control

TABLE 5 Drivers of value per farm: OLS estimates in the 2018 French FADN sample

Dependent variable	Field crop farms		Wine-growing farms		Dairy farms		Beef farms		Pig farms	
	Fundamental value	Patrimonial value	Fundamental value	Patrimonial value	Fundamental value	Fundamental value	Patrimonial value	Patrimonial value	Fundamental value	Patrimonial value
UAA	−1898***	−224	−3543***	−256	764***	−581***	241***	612***	3735***	2409***
Total farm labor	−167,630***	−16,409	−172,037***	−1935	−86,541***	−81,813**	−1992	-6265	−120,200***	−50,192***
Debt-to-asset ratio	−205,053	−110,649***	−675,184***	−301,152***	−527,266***	−276,387***	−5285	−101,944***	−415,181***	−91,782
Farmer's age	−2179**	−2749***	−2230	−1240	−2033	−1661**	−1365***	−3124***	−27	−3593
Total farm output	4.678***	1.544***	5.057***	1.641***	2.494***	3.389***	2.050***	1.472**	1.605***	1.192***
Constant	115,739**	180,058***	322,614***	164,196***	169,988***	74,670	87,313***	170,298***	−88,514	72,626
Number of observations	878	878	1054	1054	973	710	710	973	205	205
Fisher test	512.67	256.77	1095.95	532.85	477.99	327.69	533.81	539.71	56.39	100.30
Prob > *F*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R^2	0.7462	0.5955	0.8395	0.7177	0.7119	0.6995	0.7913	0.7362	0.5862	0.7159

Abbreviations: FADN, Farm Accountancy Data Network; OLS, ordinary least squares; UAA, utilized agricultural area.

*p < 0.10 **p < 0.05 ***p < 0.01.

Source: The authors, based on the French FADN data for the year 2018.

TABLE 6 Drivers of value per AWU of farm labor: OLS estimates in the 2018 French FADN sample

Dependent variable	Field crop farms		Wine-growing farms		Dairy farms		Beef farms		Pig farms	
	Fundamental value	Patrimonial value	Fundamental value	Patrimonial value	Fundamental value	Fundamental value	Patrimonial value	Patrimonial value	Fundamental value	Patrimonial value
UAA	−1241***	−190*	−1317***	−119	188	244***	−269***	114	925***	732***
Total farm labor	−298,298***	−124,537***	−115,454***	−36,202***	−112,718***	−73,213***	−152,174***	−145,473***	−92,954***	−83,720***
Debt-to-asset ratio	−145,526***	−82,189***	−187,216***	−95,690***	−280,450***	−59,675***	−205,648***	−18,390	−203,771***	−60,541**
Farmer's age	−2240***	−2285***	−1335	−94	−3193***	−3207***	−2006***	−1971***	−2209	−4003***
Total farm output	4.68***	1.11***	1.39***	0.4***	1.046***	0.534***	1.99***	1.27***	0.54***	0.41***
Constant	375,395***	314,908***	389,848***	191,854***	423,496***	374,719***	270,004***	87,313***	309,327***	398,797***
Number of observa-tions	878	878	1054	1054	973	973	710	710	205	205
Fisher test	292.83	144.77	148.39	82.71	181.12	139.75	146.76	180.86	32.94	39.64
Prob > *F*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
R^2	0.6267	0.4536	0.4145	0.2829	0.4836	0.4165	0.5104	0.5612	0.4529	0.4990

Abbreviations: AWU, annual working unit; FADN, Farm Accountancy Data Network; OLS, ordinary least squares; UAA, utilized agricultural area.

*p < 0.10 **p < 0.05 ***p < 0.01.

Source: The authors, based on the French FADN data for the year 2018.

diseases. For wine production, the larger the vineyard, the less possible it is to devote the entire area to high-quality wine. In beef farms, farmers aim mainly at increasing labor productivity rather than land productivity and may adopt an extensive system with a low stocking rate. As a result, for these three systems, we observe a decrease in production per hectare as farm size increases. For dairy and pig farms, the link may be positive because these productions are more intensive and more technology dependent and land is a limiting factor.

The farmer's age has a negative link with the value for all types of farming, suggesting the dynamism of young farmers: the older the farmers, the less likely they are to adopt innovation (Howley et al., 2012). Lower innovation implies poorer productivity gains and lower farm profitability, and thus a lower fundamental value. In addition, lower innovation leads to lower asset renewal and therefore lower capital accumulation, which explains the decrease in the patrimonial value with the farmer's age. This result is not relevant for wine-growing farms as age is not significant. We observe a negative link between total farm labor force and farm value for all types of farming, confirming the expectation that a large labor force may increase costs and/or imply lower assets. Indeed, in all types of farming, a minimum number/level of assets is required to start production. Thus, when integrating a new worker on the farm, it is not necessary to add the same initial quantity of assets. Farmers seek to find the optimal level of labor productivity by adjusting the amount of assets. Finally, for all types of farming, the results do not confirm our expectation of a positive effect of indebtedness on value, as the link is negative. This may indicate that the solvency risks associated with debt prevail.

5 | DISCUSSION AND CONCLUDING REMARKS

5.1 | Main results and limitations

In this paper, we contribute to the scarce literature on farm valuation by empirically applying four valuation methods to a wide database, the FADN database for France for the years 2017 and 2018 and for five groups of farms, depending on their main production specialization. The three valuation methods—the fundamental method, the patrimonial method, and the financial method—are well known for the valuation of businesses, but have yet to be used widely in the literature for farms. We also performed regressions to understand the internal (farm) drivers behind the values.

Our results show differences across methods, since they measure different aspects of farm value. Wine-growing farms have the highest values on average. Pig and beef farms (suckler cow systems) have high average patrimonial values, reflecting their high capital intensity, but beef farms have the lowest average values calculated with methods based on profit (fundamental and financial methods), revealing unfavorable market conditions for these farms. The results further reveal that total farm output drives values upward, but that farm labor, farm indebtedness, farmer's age, and, in some cases, farmland contribute to reducing the value.

We acknowledge some limitations in our computations. First, we have calculated values based on only 2 years of data, 2017 and 2018, which does not allow for control of fluctuations of values due to external events. Indeed, two methods are based on profit (fundamental and financial) and therefore depend on the economic context of the year of calculation: price volatility, yield variability due to weather and pest conditions, the level of personal drawings to finance unpaid labor, and off-farm financial liabilities. For these reasons, it would be interesting to calculate the value over a 3-year average, or to assess the role of profit variability across years in the farm's annual value. Indeed, we show that fundamental values could be different from 1 year to another.

Second, we made some assumptions which may necessitate improvement in future research. Namely, we used the yield on rented agricultural land as a consistent opportunity cost of investment in agriculture, and this is set as 3%. Another possibility is to use a weighted average cost of capital. In our data, this rate would have been 2%. A sensitivity analysis may be useful. Also, because farmers' personal drawings may vary strongly from one farm to another and from 1 year to another, we could not estimate values for real personal drawings. Instead, we considered here an average situation with personal drawings equivalent to 1.5 times the French minimum wage per year, that is, €21,000/year. Further research could focus on a way to improve the calculation of personal drawings.

Third, we considered that all farms in the five types of farming fully lease their land. However, farm values may be different if the value of the land that farmers actually own is considered. For example, for a field crop farm, we calculated a fundamental value (excluding land ownership) close to €320,000 on average. Considering the case of a farm owning 10 ha priced at €10,000/ha, the farm value could be increased by €100,000, that is, a total value of the farm of €420,000. However, the farmer faces a trade-off between owning more land and investing in other assets (equipment, buildings, livestock, inventories, etc.). If a large expanse of land is purchased, less investment is made and therefore less innovation, potentially affecting the value (fundamental and patrimonial) of the farm. Integrating land owned into the calculations of farm value would therefore be more precise but would need careful consideration.

The assessment of the drivers of farm value underlines that some farm characteristics, such as land, labor, and indebtedness influence values. However, future research is needed on the drivers of farm value. First, our assessment with cross-section OLS does not fully capture the causality between the explanatory variables that we considered to be the drivers and the dependent variable (the farm value). The results could reflect a correlation between the explanatory variable and the farm value, but the causality might be the reverse. In businesses, for example, a high value could attract investors and therefore enable the business to increase its size or performance (proxied by size and total output in our regression). This is less the case in French agriculture where farms are mainly small family businesses without external shareholders. However, the reverse causality could be advocated for the link between value and farmer age. As explained by Piet et al. (2021), when a farmer would like to exit farming and transfer their farm, a high value may attract potential successors despite the financial burden from a high value. A high value may indeed stand for high performance and farm durability. Thus, a high value may cause a young farmer to be the head of the farm. To robustly assess the causality, panel data are preferable.

5.2 | Implications for practitioners and future research

Although refinements are possible for the empirical computation of values, our study, which is the first to compare farm values obtained with different methods using a large and representative database, provides interesting empirical insights and implications. From a theoretical point of view, it is clear that the methods are based on different, sometimes opposing, concepts; nevertheless, our empirical findings highlight that in practice the differences in values across methods may be substantial. An implication for practitioners (advisors and experts responsible for estimating the value of farms) is to systematically use at least two methods to compute and compare values. One suggestion is to use the fundamental method and the patrimonial method because of their complementarity. While the former is based on the profitability of the farm, the latter evaluates the physical characteristics of the farm and therefore its functionality. Although the approach of computing several values is already used by some experts (as shown, e.g., in a survey among 30 experts in France, see Desjeux et al., 2017), it is not clear how the experts present the values to the parties (e.g., the transferring farmer and the successor): a range of possible values, or a combination (e.g., averages) of the values, or a recommendation on the maximum value, and so forth. A larger-scale survey of the practices of experts would be insightful.

Another recommendation for practitioners is to record the values that they set for farms and compare them with the real market value, to increase the transparency of the real transaction prices and to reduce the opacity of the farm market. A correct and balanced valuation of farm assets would allow for a better definition of transaction prices, thus improving the functioning of the market. In addition, there is a need to provide a clear and relevant market benchmark for value by providing “multiples,” as these synthetic indicators represent a brief overview of the value of the farm in relation to key indicators and provide a clear comparison across farms.

Finally, practitioners could investigate whether the novel method, suggested by Ouellet and Perrier (2018) to account for the specificity of farmers who transfer to retire, is feasible. Transferors who are heading towards a new stage in their life will be faced with financial needs which depend on their plans, the retirement pension they can expect and the savings they already have. Thus, for the transferor, the farm could have a re-employment value, that is, a sum of money for a new use that comes directly from the sale of the farm. The sale price could therefore be set mainly according to the needs of the retired transferor, including compensation for the children who do not take over the farm. This method is interesting but specific information needs to be collected from transferring farmers.

From an academic point of view, future research should focus on disentangling intangible aspects in the valuation of farms. Here we assessed the value of farms with methods generally used for businesses, whose objective is profit maximization. This is not always the case, however, for farms. Farmers may have nonpecuniary incentives for farming such as independence in decision-making or working with nature. This may lead to loss-making production strategies or nonoptimal investment decisions (Howley, 2015). In the case of a transaction, this is nicely summarized by Carmon and Ariely (2000): "*sellers tend to focus on their sentiment toward surrendering the item, and selling prices are hence more heavily influenced by variables such as benefits of possessing the item*." As suggested by Hirigoyen (2014), emotional value, which captures the regret felt by some family farm members during disinvestment operations, is integrated into the valuation made by transferring farmers. Symbolic capital accumulated by transferring farmers, representing the recognition and reputation of the farmers, plays a role in retirement decision-making and is therefore certainly considered by transferors when they value their farm (Conway et al., 2016). In addition, knowledge and professional values that would be transferred by the transferring farmer to the successor during the transfer phase are also valued, as well as the type of successor (e.g., intrafamily or farmer, external to farming) (Jacques-Jouvenot, 2014; Kerbler, 2012). However, giving a quantitative value to these intangible aspects would need specific information that is not available in classical economic databases.

From a methodological point of view, what could also be insightful is to compare the values obtained with different methods, both in terms of level (e.g., rank test) and in terms of drivers. For the latter, a specific econometric regression could be carried out where the dependent variable would be the difference in value between two methods. This could reveal the main sources of difference between methods, and could help sellers and buyers more easily reach a deal when they negotiate the price. Such an assessment would, however, need to statistically select the drivers (e.g., Bayesian model averaging) since there is no theoretical framework that could be used to explain differences between methods (Enjolras et al., 2014; Howley et al., 2012; Leonard et al., 2017).

ACKNOWLEDGMENTS

The authors acknowledge financial support from the French National Research Agency (Agence Nationale de la Recherche-ANR) in the framework of the research project FARM_VALUE "Farm value and farm transfer: perspectives from economics and sociology" (ANR-15-CE36-0006). Remote access to the French FADN data, provided by the Ministry of Agriculture and used in this study, has been made possible within a secure environment offered by distance access through CASD ("Centre d'accès sécurisé aux données," Ref. 10.34724/CASD).

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the French Ministry of Agriculture. Restrictions apply to the availability of these data, which were used under license for this study. Data are available from distance access through CASD ("Centre d'accès sécurisé aux données"—https://www.casd.eu/en/) with the permission of the French Ministry of Agriculture.

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How to cite this article: Jeanneaux, P., Desjeux, Y., Enjolras, G., & Latruffe, L. (2022). Farm valuation: A comparison of methods for French farms. *Agribusiness*, 1–24. https://doi.org/10.1002/agr.21752

APPENDIX

See Tables A1–A3

TABLE A1 Summary statistics for the farms in the 2017 French FADN sample

	Field crop farms	Wine-growing farms	Dairy farms	Beef farms	Pig farms
Number of farms	900	1013	989	688	182
Utilized agricultural area (UAA) (ha)	151	30.4	111	125	78
	(131)	(19.3)	(97)	(109)	(64)
	/86/	/37.5/	/62/	/70/	/55/
Total farm labor (annual working units —AWU)[a]	1.45	3.4	2.1	1.48	2.50
	(1.0)	(2.4)	(2.0)	(1.0)	(2.0)
	/0.72/	/3.0/	/1.1/	/0.71/	/1.85/
Including nonhired labor (AWU)	1.28	1.4	1.77	1.36	1.47
	(1.0)	(1.0)	(2.0)	(1.0)	(1.0)
	/0.56/	/0.65/	/0.8/	/0.61/	/0.69/
Farmer's age (years)	52.5	52.0	49.8	50.4	49.7
	(55.0)	(53.0)	(51.0)	(51.0)	(51.5)
	/10.27/	/10/	/8.6/	/8.6/	/8.5/
Total farm output (thousand €)	211.6	280.1	284.6	152.4	640.5
	(179.6)	(178.7)	(248.3)	(131.0)	(521.8)
	/129.5/	/318.8/	/177.9/	/97.1/	/473.1/
EBITDA	67.7	86.6	101.5	51.2	146.7
	(54.5)	(55.4)	(87.2)	(43.0)	(112.8)
	/55.5/	/117.0/	/69.8/	/44.4/	/112.5/
Equity (thousand €)	224.2	439.7	277	315.8	250
	(176.1)	(296.5)	(241.6)	(287.7)	(203)
	/225/	/503.9/	/185.3/	/177.9/	/245/
Debt-to-asset ratio	47%	34%	45%	30%	64%
	(38%)	(28%)	(44%)	(27%)	(62%)
	/42%/	/26%/	/25%/	/19%/	/32%/

Note: This table provides the average value and, in brackets, the median value and, with a slash, the standard deviation.

Abbreviations: EBITDA, earnings before interest, taxes, depreciation, and amortization; FADN, Farm Accountancy Data Network.

[a]One annual working unit “corresponds to the work performed by one person who is occupied on an agricultural holding on a full-time basis.” (see https://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Annual_work_unit_%28AWU%29).

Source: The authors, based on the French FADN data for year 2017.

TABLE A2 Descriptive statistics of farm values in the 2017 French FADN sample

	Field crop farms		Wine-growing farms		Dairy farms		Beef farms		Pig farms	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
(1) *Fundamental value*										
Per farm in €	388,798	269,262	663,782	357,039	539,687	447,329	256,722	204,282	975,398	706,631
€/Nonhired AWU	323,910	238,136	528,308	293,348	301,170	274,324	187,971	170,327	735,131	477,054
€/ha UAA	2147	2066	58,232	16,095	4718	4516	1896	1942	20,535	11,469
€/€ Total output	1.3	1.5	1.82	2.04	1.62	1.79	1.27	1.63	1.31	1.38
(2) *Patrimonial value*										
Per farm in €	274,458	206,050	462,385	289,419	443,344	362,367	372,356	328,560	618,507	410,088
€/Nonhired AWU	227,384	174,587	403,284	236,227	252,233	224,900	283,790	257,376	455,980	301,847
€/ha UAA	1771	1598	35,647	14,278	4098	3718	3139	2849	13,795	6844
€/€ Total output	1.2	1.2	1.84	1.66	1.57	1.5	2.52	2.39	0.95	0.85

Abbreviations: AWU, annual working unit; FADN, Farm Accountancy Data Network; UAA, utilized agricultural area.

Source: The authors, based on the French FADN data for year 2017.

TABLE A3 Synthetic indicators ("multiples") of farm values in the 2017 French FADN sample

	Field crop farms		Wine-growing farms		Dairy farms		Beef farms		Pig farms	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
UAA (ha)	151	131	30	19	111	97	125	109	78	64
Total farm output (€)	221.7	179.5	280.1	178.7	284.6	248.3	152.4	131	640.5	521.8
(1) *Fundamental value*										
€/ha UAA	2147	2066	58,232	16,095	4718	4516	1896	1164	20,565	11,469
€/€ Total output	1.3	1.5	1.8	2.0	1.6	1.8	1.3	1.6	1.3	1.4
(2) *Patrimonial value*										
€/ha UAA	1771	1598	35,647	14,278	4098	3718	3139	2849	13,795	6844
€/€ Total output	1.2	1.2	1.8	1.7	1.6	1.5	2.5	2.4	0.9	0.8

Abbreviations: FADN, Farm Accountancy Data Network; UAA, utilized agricultural area.

Source: The authors, based on the French FADN data for year 2017.