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Farmers' trade-off strategies between investment and private withdrawals, and the profitability of invested capital

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Abstract:

Farmers capitalize a significant share of their cash flow in their farm's professional assets. Indeed, the wealth generated on a farm can be allocated either to the immediate remuneration of the non-salaried workers or to the financing of investments, which can be considered as a deferred remuneration to be realized in the future. Based on the analysis of their annual cash flows and assets on their balance sheets, we document how this trade-off is implemented by a FADN sample of 1,374 French commercial farms over the period 2002-2018. It appears that the estimated internal rates of return of the investments are positive in most cases, with an average of 1.7%. We further identify five strategies based on the respective shares of the operating cash flow dedicated to either investments or private withdrawals.

Keywords: Farm, capitalization, investment, internal rate of return, professional assets

JEL Code: D25, G51, Q12, Q14

Stratégies d'arbitrage des agriculteurs entre investissement et prélèvements privés, et rentabilité des capitaux investis

Résumé :

Les agriculteurs capitalisent une part importante de leur trésorerie dans le patrimoine professionnel de leur exploitation. En effet, la richesse générée sur une exploitation peut être affectée, soit à la rémunération immédiate des actifs non-salariés, soit au financement d'investissements qui peuvent être considérés comme une rémunération différée s'ils sont réalisés dans le futur. À partir de l'analyse de leurs flux de trésorerie annuels et des actifs de leurs bilans, nous étudions la manière dont cet arbitrage est mis en œuvre par un échantillon de 1 374 exploitations agricoles françaises sur la période 2002-2018 issu du Rica. Il apparaît que les taux de rendement interne des investissements estimés sont positifs dans la plupart des cas, avec une moyenne de 1,7 %. Par ailleurs, nous identifions cinq stratégies basées sur les parts du flux de trésorerie consacrées respectivement, soit aux investissements, soit aux prélèvements privés.

Mots-clés : Exploitation agricole, capitalisation, investissement, taux de rentabilité interne, patrimoine professionnel

Classification JEL : D25, G51, Q12, Q14

1. Introduction

The long-term decline in the prices of agricultural products has led to a reduction in the gross income of the agricultural sector in real terms, from an index of 100 in 1980 to an index of 76 in 2019 in France. However, over this 40-year period, the per-farmer agricultural income improved in real terms, from index 100 in 1980 to index 277 in 2019 in France. Indeed, even if the sector-level income has decreased, it is shared among a number of non-salaried workers which declines more rapidly (Guillet *et al.*, 2019). Each year, once generated, farmers allocate this resource, on the one hand, to investments in agricultural capital (buildings, machinery, land, breeding livestock and perennial crops) and, on the other hand, to the actual remuneration of the non-salaried work force, by making private withdrawals from the farm's cash flow, in order to meet the living expenses of their families.

In practice, farmers allocate a significant share of their cash flow to financing investments in the farm's professional assets, as some authors had already noted in the 1980s (Butault, 1980; Ramaz-Beaujard, 1987). This logic of sustained investment, undertaken to increase labour productivity, leads to a significant increase in assets (or 'capitalization') in agriculture. As a result, successive surveys of household wealth by Insee, the French National Institute for Statistics and Economic Studies, show that, among self-employed workers, farmers exhibit the highest median wealth and average wealth (599,900 euros and 1,040,000 euros in 2015, respectively; Ferrante *et al.*, 2016). Moreover, they also show that this wealth mainly consists of professional assets (664,100 euros on average in 2015) and real estate (265,300 euros in 2015, primarily their main residence); for the same level of gross wealth, self-employed craftsmen and shopkeepers report a lower professional wealth (Lamarche and Romani, 2015).

The importance of professional capital for farmers makes it necessary to go beyond the simple analysis of their annual income when assessing the profitability of farms or the agricultural sector as a whole. Indeed, building up professional assets through investment represents capitalised income that may be realised in the future, at least partially (Jégouzo *et al.*, 1998; Vernimmen *et al.*, 2022). Future needs may take the form of a retirement capital to compensate for meagre pensions, savings against future consumption risks, or the handing over of a modern and efficient production tool to a child, an heir or a third party (Bourdieu *et al.*, 2014).

Then, the relevance of this trade-off in the allocation of resources between current and future consumption has to be questioned. This trade-off depends on the profitability of the investment, which can be measured by several methods, including the internal rate of return

(IRR). Among the various methods to support investment decision making (Huang *et al.*, 2022), the IRR appears to be a preferred criterion for managers because it provides an easy-to-interpret number which indicates that an investment is worthwhile when it exceeds the opportunity cost of capital (Vernimmen *et al.*, 2022). To the best of our knowledge, aside from the original work of Evison (2008, 2018), the IRR has been little used as a tool for evaluating and comparing returns on investment at the farm level in the agricultural sector.

The objective of this paper is therefore threefold. First, we document the trade-off between investment in assets and the remuneration of non-salaried workers for French commercial farms over the period 2002-2018. Second, based on the observed heterogeneity between farmers regarding this trade-off, we identify five main strategies that seem to guide farmers' behaviour in this respect. Third, we assess the relevance of the observed wealth allocation choices by estimating the IRR for the farms in our sample.

Following this introduction, we present the methodological framework in section 2, which is based on the analysis of financial flow data over a long period. Data are presented in section 3. Then we present the results in three stages in section 4. The first one evidences the trade-off between immediate and deferred remuneration; the second one presents the computed IRR values, and; the third one identifies the diversity of farm investment behaviours. We conclude in section 5.

2. Methodology

The analysis of annual cash flows and investments over a long period of time, of balance sheets at the beginning and end of the period, as well as of some off-balance-sheet elements (land and buildings available to farmers) allows to understand the process and the strategies for allocating the wealth generated by the agricultural production activity between professional assets and immediate remuneration. We also seek to evaluate the economic benefits of creating professional agricultural assets. To do this, we calculate the internal rate of return (IRR) of the agricultural business project of farmers. We act as if the farmer had invested in their farm in the first year of observation. This initial amount corresponds to the value of the assets on the opening balance sheet. Then, this investment produces wealth flows during the following years that are partially reinvested. Finally, we assume that the last year of observation corresponds to the end of the farmer's project, and that they resell their farm at the

value of the assets on the balance sheet. It is this hypothetical view that allows us to calculate the IRR to get an idea of the performance of the overall project over the planning horizon.

More specifically, the data used correspond firstly to three types of flows:

- Annual operating cash flows, measured as the difference between the annual gross farm income and the annual farm expenses, which correspond to the Operating Cash Surplus (OCS);
- Private withdrawals made by the non-salaried workers of the farm. These funds are assumed to be primarily used to meet the farm manager's living expenses, while they may be used to some extent to buy land, which in turn may be added to the professional asset without always appearing explicitly in the balance sheet;
- Investment flows that are expected to generate higher operating revenues in the future. By nature, investments affect several annual accounting periods. We consider net investment flows corresponding to the difference between purchase and sale of machinery, equipment, buildings, livestock, etc.

In addition, we used yearly balance sheet data at the beginning and the end of the studied period to collect the value of different types of assets (fixed assets at net book value, inventories, receivables and cash) and liabilities (equity, partners' current accounts, capital subsidies, financial debts and other debts). We also collected a list of professional assets that can be off-balance sheet, such as land and sometimes some buildings made available to farms by their operator(s).

From these data, the IRR could be estimated assuming that:

- The farm owners have made an initial investment to acquire the production facility, equal to the value of the assets on the balance sheet in the first observed year;
- Then they have generated annual Operating Cash Flows (OCF) during the observed period and have made annual private withdrawals and regular (often annual) investments during the observed period, resulting in reduced cash flows. These positive or negative operating cash surplus can be regarded as annual net revenues generated by the initial investment;
- Finally, we assume the farm owners have sold their production facility at the end of the observed period, which is equivalent to a positive cash flow generating divestment.

The farm market value in the last year of the observed period (time of its assumed hypothetical sale) is assessed as the value of the balance sheet assets at the net book value.

Our aim is then to find whether the investment was profitable or not, that is, whether this IRR is higher than the Weighted Average Cost of Capital (WACC). The WACC represents the average annual rate of return expected by the farmer who owns the business capital and the creditors who lend the money (*i.e.*, the bankers). Unfortunately, we cannot precisely estimate the WACC for each farm in the sample. Instead, it was estimated to be around 1.8%.[1]

As they occur at different times and cover a long period of time, the considered cash flows must be discounted to make them comparable. The discount rate to be considered is the interest rate, which allows the farmer to be financially rewarded for not having consumed the capital immediately. Then, the IRR is the discount rate that equates the present value of the net cash flows and the value of the initial investment.

To put it formally, let the Net Present Value (NPV) of the overall investment be

$$NPV(\tau) = -I_0 + \left(\sum_{t=1}^{T-1} \frac{NCF_t}{(1+\tau)^t}\right) + \frac{I_T}{(1+\tau)^T}$$

where $t = \{0,1,\ldots,T\}$ is the time index, T is the observation period horizon, I_0 is the initial (positive) investment, NCF_t are the annual Net Cash Flows (revenues – expenditures), I_T is the final (positive cash flow) divestment, and τ is the discount rate. Then, the IRR corresponds to the discount rate τ^* such that $NPV(\tau^*) = 0$ (Vernimmen *et al.*, 2022).

3. Data description and processing

Data come from the 'Réseau d'information comptable agricole' (Rica) database for metropolitan France, which is produced, managed and disseminated by the French Ministry for Agriculture and Food as part of the EU-wide Farm Accounting Data Network (FADN). Rica is an annual survey of roughly 7,000 to 7,500 French commercial farms, which contains bookkeeping information on the physical, structural, economic and financial characteristics of the sample farms. It is a rotating panel, with about 10 per cent of the sample being renewed each year. However, some farms may be observed for more than 15 consecutive years.

[1] We evaluated the WACC using an average rate of remuneration of partner accounts of 2% (including bonuses) and considering that farmers 'financed' 50% of the balance sheet liabilities, while the bankers 'financed' 40%. Further, we assumed that the State 'financed' the remaining 10% at no cost through equipment subsidies. The WACC would then equal (50×0.02 + 40×0.02 +10×0) / (40 + 10 + 50) = 1.8/100, or 1.8%.

After removing some outliers, we used the Rica 2002-2018 sub-sample consisting of the 1,374 farms which were present without interruption over the entire 17-year period (*i.e.*, the 2002-2018 balanced panel), which leads to 23,358 observations. As shown in Table 1, the farms considered belong to different types of farming; they also show a variety of legal statuses and sizes (not reported). The sample considered is therefore illustrative of the diversity of commercial farms in metropolitan France but, as an excerpt from the original Rica database, it is no longer statistically representative. As a result, we did not use the farm-specific weighting coefficients to extrapolate the results. However, the last column of Table 1 shows that, for year 2018, the share of farms in each type of farming in our balanced panel is close to that of the Rica full sample.

In order to calculate the cash flows of interest and to estimate the IRR, several accounting concepts were used and restated. Specifically, the farm's balance sheet liabilities consisted of:

- Fixed assets (equipment, buildings, shares held in cooperatives or mutual banks, technical installations, breeding animals, perennial crops, vineyards, orchards);
- Stocks (young animals, fodder, supplies, etc.);
- Receivables and available cash from which short-term debts were subtracted. This choice was made to define a net cash that corrects for the diversity of cash management behaviours[2].

Land was treated as a specific fixed asset. Namely, we excluded farmland owned by the farmers. Indeed, while for individual farms, the farmland is recorded as an asset on the balance sheet, for incorporated farms it was not possible to identify the land belonging to each partner. Therefore, in order to compare equivalent balance sheet situations, it was decided not to include farmland in the initial and final professional assets of the farmers.

[2] For example, a large amount of available cash could give the impression of a large surplus when in fact the farmer is using supplier credit very extensively.

Table 1. Shares of farms by type of farming

Type of farming	Balanced panel				Full sample
	2002		2018		2018
	Obs.	%	Obs.	%	%
Cereals, oilseeds and protein crops	272	*20%*	266	*19%*	*17%*
General field cropping	131	*10%*	128	*9%*	*8%*
Vegetables	37	*3%*	40	*3%*	*2%*
Flowers and other horticulture	24	*2%*	31	*2%*	*2%*
Quality wine and vineyards	168	*12%*	215	*16%*	*16%*
Other wine and vineyards	54	*4%*	12	*1%*	*1%*
Fruits and other permanent crops	43	*3%*	46	*3%*	*2%*
Specialist dairying	143	*10%*	181	*13%*	*15%*
Specialist cattle	98	*7%*	120	*9%*	*10%*
Cattle and dairying combined	41	*3%*	37	*3%*	*4%*
Sheep, goats and other grazing	68	*5%*	63	*5%*	*4%*
Granivores	22	*2%*	36	*3%*	*6%*
Mixed cropping	51	*4%*	20	*1%*	*2%*
Mixed livestock, mainly grazing	16	*1%*	16	*1%*	*1%*
Mixed livestock, mainly granivores	21	*2%*	21	*2%*	*2%*
Field crops and grazing combined	162	*12%*	113	*8%*	*6%*
Field crops and granivores combined	23	*2%*	29	*2%*	*2%*
Total	**1,374**	***100%***	**1,374**	***100%***	***100%***

Source: Rica 2002 and 2018, authors' calculations

It should be noted that, as recommended by Vernimmen *et al.* (2022), we did not consider the borrowed capital flows in order not to overestimate the IRR.

4. Results

4.1. The trade-off between immediate and deferred remuneration

Table 2 shows that, overall, the 1,374 farms considered generated 1.148 million euros of operating cash surplus (OCF) over the 17 years observed, or 67,500 euros per year on average. In the meantime, observed private withdrawals amounted to 632,000 euros (or 37,200 euros per year), which represents 55% of the OCF generated, while observed investments amounted to 582,000 euros (or 34,250 euros per year), which represents 51% of the overall OCF. Given the associated number of farmers, private withdrawals correspond to an immediate remuneration of the non-salaried labour equivalent to 1.60 SMIC[3] per annual family working unit (AFWU) on average.

In addition, it should be noted that the sum of private withdrawals and investment exceeds the OCF by 6 percentage points, which means that the overall cash position has deteriorated over the period. With the exception of cereals, oilseeds and protein crops on the one hand, and flowers and other horticulture on the other hand, this is true for all types of farming. Results also show that the OCF breaking down differs widely across sectors, with an allocation to private withdrawals ranging from 43% to 66%, while investments received from 41% to 68%. Nevertheless, at the individual level and apart from some very specific cases, it appears that at least 25% of the OCF is used for the immediate remuneration of the farmers (not reported).

[3] SMIC corresponds to the minimum wage and is generally used as a reference.

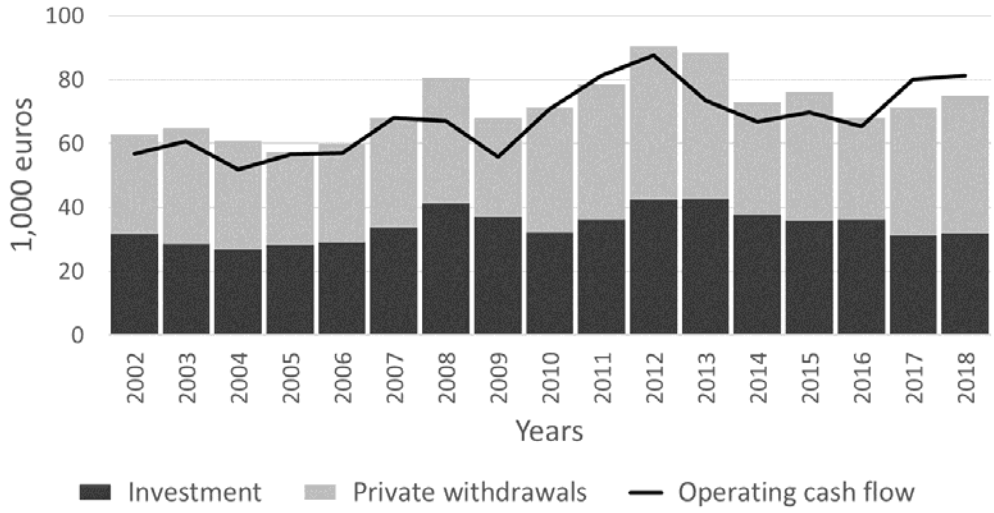
Table 2. Distribution of the operating cash flows between private withdrawals and investment (2002 to 2018)

Type of farming [a]	Obs.	OCF [b]	PRW [c]		INV [d]		PRW+INV
		(k€)	(k€)	*% of OCF*	(k€)	*% of OCF*	*% of OCF*
Cereals, oilseeds and protein crops	263	1,127	611	*54%*	508	*45%*	*99%*
General field cropping	120	1,554	901	*58%*	716	*46%*	*104%*
Vegetables	37	1,440	930	*65%*	690	*48%*	*112%*
Flowers and other horticulture	29	1,004	542	*54%*	418	*42%*	*96%*
Quality wine and vineyards	212	989	611	*62%*	461	*47%*	*108%*
Other wine and vineyards	13	1,189	787	*66%*	487	*41%*	*107%*
Fruits and other permanent crops	46	1,108	672	*61%*	586	*53%*	*114%*
Specialist dairying	162	1,212	650	*54%*	683	*56%*	*110%*
Specialist cattle	114	785	405	*52%*	401	*51%*	*103%*
Cattle and dairying combined	42	1,117	542	*49%*	760	*68%*	*117%*
Sheep, goats and other grazing	62	848	489	*58%*	358	*42%*	*100%*
Granivores	46	1,222	657	*54%*	647	*53%*	*107%*
Mixed cropping	32	882	509	*58%*	489	*55%*	*113%*
Mixed livestock, mainly grazing	15	1,267	569	*45%*	948	*75%*	*120%*
Mixed livestock, mainly granivores	28	1,154	596	*52%*	621	*54%*	*105%*
Field crops and grazing combined	132	1,460	711	*49%*	842	*58%*	*106%*
Field crops and granivores combined	21	1,025	436	*43%*	618	*60%*	*103%*
Total	**1,374**	**1,148**	**632**	***55%***	**582**	***51%***	***106%***

Notes: (a) median type of farming over the 17 years considered; (b) 'OCF' stands for operating cash flow; (c) 'PRW' stands for private withdrawals; (d) 'INV' stands for investment.

Source: Rica 2002 and 2018, authors' calculations

Figure 1. Annual breaking down of the OCF over the period considered (all farms)



Source: Rica 2002 to 2018, authors' calculations

Over the years, Figure 1 shows that several periods with different dynamics may be identified. First, a first period extends from 2002 to 2007, where the OCF was on average 60,000 euros per year, of which 50% were allocated to investments and 50% to family labour (1.3 SMIC/AFWU on average). A second period extends from 2009 to 2012, where the OCF increased steadily from 60,000 euros per year to 90,000 euros per year and allowed to raise both investments and the remuneration of family labour (up to 2 SMIC/AFWU). Finally, a third period extends from 2014 to 2018, where the OCF stabilized around 70,000 euros per year and a slightly higher share was devoted to private withdrawals to maintain the family labour remuneration, to the detriment of investment which decreased over this period. In between, 2008 and 2013 exhibit an unusual discrepancy between the amount of generated OCF and the sum of private withdrawals and investments, generating large deficits. Conversely, 2017 and 2018 show significant OCF surpluses, as if farmers had become more cautious.

4.2. Return on invested capital

The average estimated IRR was 1.7% (Table 3). It was greater than 1.4% for half of the farms, while a quarter had a negative IRR and another quarter an IRR greater than 3.3%. The IRR is positive in 76% of the cases and it is higher than the estimated WACC (1.8%, see footnote 1) for 48% of the farms, which corresponds to situations where the investment was globally

profitable[4]. IRRs are found to be quite normally distributed (Figure 2), with a nonetheless high level of heterogeneity, has evidenced by their large standard deviation (10.4%, see Table 3).

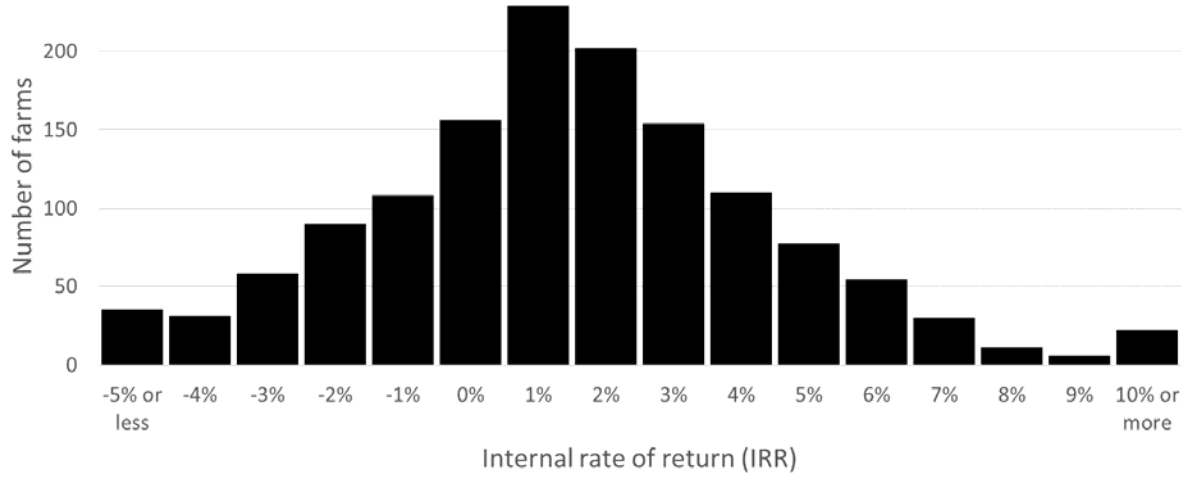
Table 3. Summary statistics for the estimated IRRs over the period 2002-2018 (1,374 farms)

Mean	Std	P1	P5	P10	P25	P50	P75	P90	P95	P99
1.7%	10.4%	-6.5%	-3.4%	-2.3%	-0.3%	1.4%	3.3%	5.3%	6.5%	11.2%

Notes: 'Std' stands for standard deviation; 'P1' stands for 1st decile, 'P5' for 5th decile, etc.

Source: Rica 2002 to 2018, authors' calculations

Figure 2. Distribution of the estimated IRRs over the period 2002-2018 (1,374 farms)



Source: Rica 2002 to 2018, authors' calculations

Analysing IRRs by type of farming (not reported) shows that average returns are fairly similar across sectors, generally lying between 1.3% and 2.1%. However, they range from 0.6% to 12.1%, mainly due to two types of production. On the one hand, horticulture farms have the highest IRR on average, but with the largest standard deviation, which may be due to the low number of observed farms in this sector (29). On the other hand, quality wine and vineyards farms have the lowest rate.

[4] Over the 2002-2018 period, the yield of the return on shares in France was close to 3.9% (Piard, 2019); over 1998 to 2017, the average annual return of life insurance funds in euros was 3.8%.

By definition, the IRR depends on four key variables: the level of cumulative OCF, the level of investment flows, the level of private withdrawals, and the overall level of net investment made (*i.e.*, the difference between final and initial assets). Then it may be argued that a positive IRR ultimately results only from an underpayment of the non-salaried workers. Indeed, a farmer who would limit private withdrawals (e.g., thanks to part-time farming and income sources outside agriculture) would increase the net present value, and hence the IRR. Symmetrically, a farmer may favour investment for fiscal reasons, as a result of existing incentives to reduce taxable income (tax rebates, investment deductions, over-depreciation, etc.). This is why it is interesting to identify different strategies for the allocation of the OCF between private withdrawals and investments.

4.3. Identifying OCF allocation strategies

We identified five main strategies according to the relative share of the OCF allocated to investments *versus* private withdrawals (Table 4):

- The first group corresponds to farms for which both private withdrawals and investments lie between 40% and 60% of the OCF; we name this strategy as 'balanced';
- The second group corresponds to farms for which either private withdrawals are above 60% and investments are above 50% of the OCS, or private withdrawals are above 50% and investments are above 60% of the OCS; we name this strategy as 'spender';
- The third group corresponds to farms for which either private withdrawals are above 60% and investments are below 50% of the OCS, or private withdrawals are above 50% and investments are below 40% of the OCS; we name this strategy as 'well-paid';
- The fourth group corresponds to farms for which either private withdrawals are below 40% and investments are above 50% of the OCS, or private withdrawals are below 50% and investments are above 60% of the OCS; we name this strategy as 'accumulator';
- The fifth group corresponds to farms for which either private withdrawals are below 40% and investments are below 50% of the OCS, or private withdrawals are below 50% and investments are below 40% of the OCS; we name this strategy as 'prudent';

Table 4. Distribution of the operating cash flows between private withdrawals and investment (2002 to 2018)

Strategy		1. Balanced	2. Spender	3. Well-paid	4. Accumulator	5. Prudent	Total
Number of farms		239	154	532	374	75	**1,374**
		17%	*11%*	*39%*	*27%*	*5%*	***100%***
Cumulated OCF	(k€)	1,307	1,151	1,258	959	788	**1,148**
Cumulated PRW	(k€)	662	768	881	261	316	**632**
Cumulated INV	(k€)	641	876	382	767	291	**582**
PRW / OCF	(%)	51%	67%	70%	27%	40%	**55%**
INV / OCF	(%)	49%	76%	30%	80%	37%	**51%**
(PRW + INV) / OCF	(%)	100%	143%	101%	107%	77%	**106%**
Average IRR	(%)	+1.9%	-0.7%	+1.5%	+2.7%	+3.1%	**1.7%**
Initial total assets	(k€)	403	426	380	383	370	**390**
Final total assets	(k€)	557	860	458	664	366	**571**
Asset evolution	(k€)	+154	+434	+77	+281	-4	**+182**
Asset evolution	(%)	+38%	+102%	+20%	+73%	-1%	**+47%**
Final equity	(k€)	338	376	266	382	226	**321**
Final total debt	(k€)	217	486	192	283	140	**251**
Final debt ratio	(%)	39%	57%	42%	43%	38%	**44%**

Notes: 'OCF' stands for operating cash flow; 'PRW' stands for private withdrawals; 'INV' stands for investment.

Source: Rica 2002 and 2018, authors' calculations

In the first ('balanced') strategy, which includes 239 farms (17% of the sample), farmers allocated their OCF almost equally to investments (49%) and private withdrawals (51%). This group gathers the farms with the highest OCF over the period (1.3 million euros). Their final assets in 2018 are close to the full-sample average and have increased in 17 years by more than 150,000 euros (+38%). Despite this significant growth in assets, farms in this group have maintained a debt ratio, as measured by the ratio of total debts to total assets in the last year, just below 40%. This balanced strategy allows these farms to achieve an average IRR of 1.9%, above the sample average.

The second ('spender') strategy includes 154 farms (11% of the sample) which both invested massively and retrieved large private withdrawals, so that the sum of the two greatly exceeds the OCF generated (143%). As a result, they more than doubled their capital to achieve the largest final assets on the balance sheet (almost 900,000 euros), but they are in a tight financial situation with the highest debt ratio of the sample (57%) and exhibit the lowest IRRs, which is negative on average for this group (-0.7%).

The third ('well-paid') strategy gathers the largest group of farms in the sample (532 farms or 39%). They chose to limit investments (around 380,000 euros in 17 years), which places them as the lowest investors in relative terms. On the contrary, they allocated 70% of the OCF generated to the remuneration of the non-salaried workers, more than twice worth investments. Unsurprisingly, it is in this group that the value of assets has increased the least (by less than 100,000 euros or 20%), leading these farms to hold one of the lowest amount of capital in 2018 even though they are among those with the highest cumulative OCF on average (over 1.2 million euros), and to exhibit a debt ratio in the average (42%). As the high level of remuneration is offset by low investments, this strategy leads to a somewhat limited IRR, estimated at 1.5% on average.

The fourth ('accumulator') strategy is the opposite of the previous one. Indeed, farmers in this group (374 farms or 27% of the sample) devote 80% of their OCF to investment on average and less than 27% to private withdrawals. Accordingly, they had a sustained investment effort close to that of 'spenders' and increased their total assets by 73% (+281,000 euros in 17 years) to reach a final level of more than 660,000 euros, among the highest in the sample. And since, in the meantime, they limited the remuneration of non-salaried workers, they exhibit a debt ratio close to the sample average (43%) and achieved among the best IRRs (2.7% on average).

Finally, the fifth ('prudent') strategy is made up of farms that did not fully distribute the OCF generated over the period. This is the smaller group, with only 75 farms (5% of the sample). Similar to the 'balanced' strategy, they allocated as much to investments as to private withdrawals, but no more than 80% of the total OCF. In other word, it is not because they wanted to immediately remunerate the non-salaried workers that they limited investments. They therefore seem to seek savings and a reduced risk exposure, hence the name chosen for this strategy. As a result, the average IRR is highest (3.1%) and the debt ratio is limited (38%).

5. Conclusion

In this paper, we have argued that the wealth generated on a farm is allocated either to the immediate remuneration of the non-salaried workers or to the financing of investments, which can be considered as a deferred remuneration to be realized in the future. The approach adopted, which relies on the net present value theory and the estimation of an internal rate of return (IRR), contributes to inform the study of the profitability of capital invested in agriculture. In this sense, it complements the earlier work of Evison (2008, 2014) who compared returns from competing land uses and proposed the use of IRR.

We documented how this trade-off is implemented by a sample of 1,374 French commercial farms of the Rica database over the period 2002-2018. On average, the amount spent on investments accounted for 51% of the operating cash flow of more than 1 million euros which was generated over the years considered, while the amount dedicated to private withdrawals represented 55%. This led to an estimated IRR of 1.7%, which is of the same order of magnitude as the estimated weighted average cost of capital. However, as the IRRs calculated here take into account the actual private withdrawals of farmers, which can be very heterogeneous, it would be interesting in a sensitivity analysis to calculate alternative IRRs by considering homogeneous private withdrawals for all farmers. This would also allow us to compare our results with other similar analyses (e.g., Jeanneaux and Velay, 2021). Furthermore, we were able to identify five strategies based on the respective shares of the OCF dedicated to either investments or private withdrawals. The two largest groups of farms in our sample allocated all of the OCF generated, and devoted a higher share to either immediate remuneration ('well-paid' strategy) or to investments ('accumulator' strategy). Other strategies were possible though, with some farmers investing a lot while others being very frugal. Overall, it appears that the more the assets have increased over the period, the more profitable the farm (as

measured by a higher IRR), provided private withdrawals are contained in favour of investments. The money thus 'lent' to the firm is not lost, since a farmer who ceases activity can recover it by selling the farm, and a partner who wants to quit may also transform their capital shares into liquidity.

Moreover, such assets can be used as collateral to ease access to business or private loans, or as self-insurance against loss of income. They also constitute a reserve of value for oneself and one's heirs. However, the current level of capitalisation in agriculture makes it difficult for people with no agricultural family background to enter the profession when faced with the need to invest such large amounts.

Finally, the method adopted here to estimate the IRR relies on the strong assumption that the farm is eventually sold at its net book value, which may not be the case in practice. It would be therefore interesting to compare net book values with other market values estimated with other methods (Jeanneaux *et al.*, 2022) to discuss the appropriateness, or not, of our approach. Alternatively, rather than computing an IRR based on such an arbitrary assumption, we plan to adopt a complementary strategy which would consist in estimating the minimum realization value necessary to ensure that the investment was profitable, and to compare this threshold value with the net book value observed. This would allow to separate the farms that are likely to prove profitable from those for which the necessary resale value is so high that they are unlikely to be, thus helping to inform the debate on the transmissibility of farms and the renewal of generations in agriculture.

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