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Comparative Analysis of Return on Equity and Cash Flow Generation in the Parma PDO Ham Sector

M. Iotti and G. Bonazzi
Department of Civil Engineering, Environment, Territory and Architecture-DICATeA,
University of Parma, Via del Taglio 10, 43126, Parma (PR), Italy

Abstract: The Parma PDO ham sector in Italy is characterized by a great presence of Small and Medium Enterprises (SMEs) and by high absorption of capital to finance investments in fixed assets and working capital. In fact, the aging of pork leg results in high capital requirements for a period of at least 12 months. The study applies the methodology for the analysis of the profitability and sustainability of a firm's management and suggests specific ratios to analyze the firms of the sector. To achieve this goal, the study analyzes the annual account data of a sample of 50 Parma PDO ham processing firms, showing that economic margins, traditionally applied to assess the sustainability of the management cycle, differ significantly from suggested financial margins. Also, Interest Coverage Ratios (ICRs) differ if calculated by applying an economic or a financial approach. The annual account data of the sample firms highlight the difficulties in credit access, expressed by applying a multiple regression mode to analyze return on equity and flow on equity. The analysis suggests a metric to measure more correctly Parma PDO ham processing firms' sustainability.

Key words: Flow on equity, free cash flow, interest coverage ratios, Parma PDO ham, working capital

INTRODUCTION

In Italy, the meat sector is characterized by herds of swine or heavy pigs that are bred to be processed for the production of typical Italian cold cuts, especially typical ham (PDO ham). These hams use fresh legs of pigs born, raised and slaughtered in a defined area because pigs must have characteristics of quality defined by specific production rules. Parma PDO is produced in accordance with Council Regulation (EC) 510/2006 and according to product specifications given by the Consorzio del Prosciutto di Parma producing heavy pork legs over nine months of age and weighing more than 150 kg with pigs bred and slaughtered in the territory of 10 regions of northern and central Italy while the processing of fresh ham can only be done within a limited territory in the province of Parma, south of the Via Emilia route. In 2012, total production was 9,025,762 fresh legs of Parma PDO ham, amounting to approximately €740 million. The average output of Parma PDO ham per firm in 2009 was 57.857 ham. Production is particularly concentrated to four municipalities contiguous to the south of the city of Parma (Langhirano, Lesignano de' Bagni, Sala Baganza and Felino). In 2012, the area in focus had 69.87% of the whole sector's firms or 156 firms. The concentration of firms supports the creation of induced activities in addition to increasing the activity rate of the resident population.

In the Parma PDO ham sector, craft and family-owned firms operate, flanked by large firms with more capital investments that can develop an annual production volume of more than 200,000 hams. The first type of firm is characterized by its smaller size and generally has a connection between ownership and control; the second type is characterized by its greater size and in some cases, operates in corporate groups and has easier access to credit and an equity capital market. The traditional firms have production plants with overlapping areas of processing and aging of fresh meat on more than one floor of the factory which is often not modernized. These firms often implement a policy of differentiation of production, working in submarkets with higher selling prices of production. The sector also has operating firms that have made investments in properties, plants and equipment to increase the efficiency of production; these firms are typically characterized by membership in large groups or operations with higher production volumes and on a larger scale with advantages in terms of reducing the unit cost of production. In general, all the firms in the sector are characterized by a long aging period and then having to face problems related to the high level of capital required. The firms in the sector often have difficulties related to the duration of the financial cycle because firms require large investments in start-up activity for the acquisition of industrial buildings, plants and equipment (Iotti and Bonazzi, 2013).

Corresponding Author: M. Iotti, Department of Civil Engineering, Environment, Territory and Architecture-DICATeA, University of Parma, Via del Taglio 10, 43126, Parma (PR), Italy Tel: + 39 (0)521 032509

Moreover, the capital requirement is inherent to the typical production or aging period which requires large volumes of capital and then expanding the capital requirement for equipment. In fact, the cycle of aging fresh meat demands an expansion of capital requirements in order to sustain the financial cycle. Parma PDO ham processing firms need to have large amounts of capital to finance investments in capital assets (properties, plants and equipment) and working capital (including the inventories of pork leg during aging, from a minimum of 12 up to 24 months and over). The firms in the sector are also characterized by difficulties in the main raw material market (fresh pork leg to be processed); in fact, the high concentration of abattoirs which often operate with a downstream integration with some ham processing firms, disadvantages the remaining firms that produce Parma PDO ham. At the same time, the distribution firms (large retailers), buying high volumes of the finished product (seasoned ham), are often able to influence the market price of the finished product. In this regard, the firms in the sector will implement, in some cases, the production of non-PDO hams and other meat products with a lesser size and shorter maturation period in order to increase inventory turnover and thereby reduce capital requirements.

In the Parma PDO ham sector, firms often have difficulties related to the duration of the financial cycle (Bonazzi *et al*., 2012) since they require high investments in fixed assets such as real estate, industrial space, plants and equipment for the production and maturation of meats. Sector firms use, in addition to equity, the following source of financing: Bank loans with a medium/long term, usually articulated in the technical form of a secured loan on real estate or, less frequently, as an unsecured claim, sometimes with collateral to pledge (usually on securities) or with a guarantee by signature, often by shareholders and/or a consortia of credit guarantees. These lines of credit are typically used to finance investments in properties, plants and equipment, specifically financing capital equipment. For the financing of working capital, firms prefer short-term lines of credit, such as advances on trade receivables, advances on contracts and advances on consignments of fresh pork leg to be processed. The firms in the sector can obtain lines of credit as mandated by Law 401/1985 which is a "Pledge on hams protected by designation of origin", to guarantee loans obtained which means, as stated in the text of the law, that these lines of credit "Considered the difficulties encountered by firms in the sector in obtaining the financial resources needed for the purchase of raw materials, as well as the very high cost of debt capital and given the considerable fixed capital employed for a minimum period of 9-12 months, corresponding to the expected time for curing ham, then regardless of the time marketing and sale of the product". Firms have a contractual obligation to repay debts on an amortization schedule of debts plus interest charges (so-called debt service) while for the different short-term financing lines, firms have to pay the cost of debts through monetization of supplies of goods acquired through the working capital cycle. It is then important to assess the sustainability of debt servicing and the overall sustainability of the business cycle. In this regard, it should be noted that there can be situations in which, even in the face of positive profits, firms in the sector have difficulty paying their debts due to the absorption of capital in the working capital cycle and investment cycle. Since the changes in inventories and sales not yet received have an impact as positive components of the production value, firms can have a misalignment between profit and cash flow such that, even with positive profits, firms are not able to sustain the payments of the financial cycle.

For firms in the sector of Parma PDO ham, there is therefore, a lag between the economic cycle and the financial cycle due to the cycle of the aging of meat which can lead to wrong strategic decisions with the risk of default for firms. It is therefore necessary to make an assessment of the sustainability of the financial cycle and the significance of the differences between profit and cash flow for firms of the sector. This is possible because the economic approach and the financial approach can give divergent results, as demonstrated in other sectors and several studies (Greenberg *et al*., 1986; Kwon, 1990; Dechow, 1994; Dechow and Dichev, 2002) have shown that such a situation occurs in particular in small and medium firms characterized by the absorption of working capital (Glancey, 1998; Kieschnick *et al*., 2008; Iotti and Bonazzi, 2014). Moreover (Rafuse, 1996), the majority of the firms' failures are due to a lack of working capital management and a firm's success depends on how frequently they are able to generate more cash. Other researchers (Shin and Soenen, 1998) emphasize that working capital management has a significant impact on the liquidity and the profitability of the firm. In the ham processing sector, this evaluation is particularly important in a situation involving a reduction of bank credit; in fact, firms' managers can make erroneous strategic decisions, even risk default for their firms, because of the time lag that exists between the business cycle and financial cycle. Since firms in the sector are often Small and Medium Entrprises (SMEs), it is important to identify correct ratios of analysis because SME firms have generally limited access to capital markets (stock market, venture capital, private equity) and debt financing (bank loans, structured

finance, syndicated loans) as evidenced in several researches (Grablowsky, 1976; Dunn and Cheatham, 1993; Peel and Wilson, 1996; Molina and Preve, 2009) even about cooperative firms (Bonazzi and Iotti, 2014).

From the dimensional point of view, on annual account data, the sector is mainly composed of Small and Medium Entrprises (SMEs) which constitute about 96% of the firms in the sector, using the SME definition contained in the European Commission Recommendation 2003/361/EC which is the reference to determine the conditions for SME qualification: "The category of micro, Small and Medium-sized Firms (SMEs) is made up of firms which employ fewer than 250 persons and whose annual turnover does not exceed EUR 50 million or whose annual balance sheet total not exceeding 43 million euro". In the sector, there has, in fact, been a decrease in the number of firms associated with the Consorzio del Prosciutto di Parma over the past decade, from 189 firms in 2003 to 156 firms in 2012 with the cessation of activities of 33 firms, accounting for 17.46% of firms in the sector and among these, 8 terminations resulted in bankruptcy proceedings. The numerous instances of bankruptcy in the sector generate an interest in the analysis which is applied to analyze the financial situation of firms and propose appropriate indicators that are predictive of crisis and enforceable by the managers of the firms. First, the analysis applies to a firm's sample comparison between profit margins and financial margins in order to highlight whether there are statistically significant differences. Moreover, the study analyzes Interest Coverage Ratios (ICRs) calculated by applying an economic and a financial approach. On this topic, the study highlights a comparison between traditional and nontraditional ICRs that can then be applied by firms and banks in the assessments of the sustainability of the interest charges. The data analysis is then developed by applying two multiple regression models to quantify the determinants of the generation of profit and cash flow to equity holders in Parma PDO ham processing firms. Data analysis of the sector, particularly during the current situation of economic crisis, aims to provide useful information to firms' management for evaluating the sustainability of their firm's financial cycle. The results of the study can be applied even by policy makers through public actions to support private firms, including public lines of credit, in order to correctly evaluate the financial viability of firms that have received public funds. It can then be possible to limit the risk of inefficient uses of collective resources. The study considers a sample of 50 firms with 2007 as the base year and the date extracted covers a five-year period from 2008-2012 and uses the annual accounts filed by limited firms each year with the registrar of firms at the chamber of commerce. For the analysis, a total of 250 years of firm dates have not been considered. Data analysis was performed using the SPSS statistical package, issue 19.

METHODOLOGY

The evaluation of convenience aims to determine whether the risk capital contributed by the entrepreneur gets remuneration due to the construction and management of the investment (Lagerkvist and Andersson, 1996). This payment must be higher than the opportunity cost of capital employed in alternative investments which are characterized by a similar risk profile (Damodaran, 1994; Francis *et al*., 2004). In evaluating convenience, we apply the principle of accrual accounting, the basis for the preparation of financial statements which quantifies (Dechow *et al*., 1998) operating profit in terms of profit which is defined as the change in the value of capital risk due to management (Onida, 1987). The approach to economic competence is affected by the legal criteria of accounting, including the principle of the protection of third parties called prudence which is referred to Article 2423 bis of the civil code; also, the economic approach does not take into account the actual time of manifestation of monetary operations. We can then observe situations of mismatch between the economic cycle and the financial cycle (Gitman, 1994). This time lag highlights the need to ensure the sustainability of the firm's financial cycle as this impacts business profits. This situation is highlighted by several studies relative to firms with high investments in durable goods (Fazzari and Petersen, 1993; Cleary, 1999; De Miguel and Pindado, 2001) and working capital (Kim *et al*., 1998; Howorth and Westhead, 2003; Padachi, 2006; Taylor, 2011). For a generic firm in a generic period, t, the balance sheet expresses investments (active section) and sources of capital (passive section). The general equation of the balance sheet, reclassifying data with a liquidity approach (i.e., according to financial criteria), is expressed as follows:

$$\begin{aligned} &FA_t + WCi_t^a + WCar_t^a + WCo_t^a + L_t = \\ &E_t^{cs} + E_t^r + \Pi_t^{pT} + WCap_t^p + WCo_t^p + DF_t^{M<12} + DF_t^{M>12} \end{aligned} \quad (1)$$

where, investments are expressed by FA (fixed assets), Wci^a (working capital assets, inventories), $WCar^a$ (working capital assets, trade receivables), WCo^a (working capital assets, other assets) and L (liquidity); the sources of capital are expressed by E^{cs} (share capital), E^r (reserves), Π^{pT} (profit after taxes), WCa^p (working capital debt, accounts payable), WCo^p (working capital debt, other values), $DF^{M<12}$ (financial debt due within 12 months)

and $DF^{M>12}$ (financial debt due after 12 months). The first component of Eq. 1, for a generic period, t, represents the invested capital that is, Total Assets (TA) and the second component represents the total sources of capital as the sum of equity capital ($E^T = E^{cs} + E^r + \Pi^{pT}$) and debt capita ($D^T = WCap^p + WCo^p + DF^{M<12} + DF^{M>12}$). We can then express the net position of financial credit and debt, for a generic time, t, as Net Financial Position (NFPt):

$$(DF_t^{M<12} + DF_t^{M>12}) - L_t = NFP_t \quad (2)$$

We then consider the net investment in working capital (NWC_t) that expresses the absorption of financial resources as a result of the acquisition, processing and sale cycle which is expressed as follows:

$$(WCi_t^a + WCar_t^a + WCo_t^a) - (WCap_t^p + WCo_t^p) = WC_t^{aT} - WC_t^{pT} = NWC_t \quad (3)$$

where, t is the generic period, WC^{aT} is the working capital of total assets and WC^{pT} is working capital of total debts; NWC quantifies the net resources generated ($NWC_t<0$) or absorbed ($NWC_t>0$) by the working capital management cycle (Love *et al*., 2007). The firms in the Parma PDO ham processing industry are often characterized by the absorption of capital to cover the cycle of processing of raw materials, so it is useful to express the reclassification of the balance sheet with the functional form as follows:

$$FA_t + NWC_t = NFP_t + E_t^T \quad (4)$$

The formulation of Eq. 4 directly expresses NWC having as sources of capital net financial position (NFP) and Equity Capital (E^T), where $NFP + E^T = NIC$ that is, net invested capital. The situation in which $NWC>0$ is defined the conservative strategy of working capital management because it has been shown (Hill *et al*., 2010) that $NWC>0$ is inversely related to financial crises. The situation in which $NWC_t<0$ is defined as the aggressive strategy of working capital management (Grablowsky, 1984; Weinraub and Visscher, 1998) and is considered to be directly related to the risk of financial distress. For a generic firm, given a generic period, t, the income statement quantifies the profits generated in favor of the equity holders which is expressed as follows:

$$\begin{aligned} &VP_t - (M_t + S_t + G_t + L_t + O_t) = EBITDA_t \\ &EBITDA_t - (D_t + A_t) = EBIT_t \\ &EBIT_t + SF_t + R_t + X_t - T_t = \Pi_t^{pT} \end{aligned} \quad (5)$$

where, VP is the value of production, M is raw material costs, S is service costs, G is charges for the use of third-party assets such as rent and leasing, L is labor costs and O is other operating costs. Earnings Before Interest, Taxes, Depreciations and Amortizations (EBITDA) is an intermediate profit margin that is applied to approximate the creation of liquidity before Depreciation (D) and Amortization (A). Earnings Before Interest and Taxes (EBIT) is the profit margin that expresses the operating income. The SF is the balance of the financial factor of income, given by the algebraic sum of financial costs (OF) and revenues (PF). The R is the balance of revaluations and devaluations of financial assets, X is the balance of extraordinary factor of income, T is income taxes and Π^{pT} is profits after taxes. The income statement quantifies profit as the difference between revenues and costs, applying the economic approach, which differs from the financial approach because the former is based on the creation of value while the second is based on cash flow. The economic approach is the basis for an income statement in accordance with the accrual principle as expressed in Article 2423 of the national civil code of the national civil code. For this reason, an income statement is not suitable for a financial analysis and to quantify cash flows. Moreover, we can consider income statements and balance sheets to possibly prepare financial statements, reclassifying annual account and income statement data. In the definition of cash flow relevant to management decisions, there was a change in researchers' approach. The first definition considers cash flow as the sum of an accounting result (profit or EBIT) plus depreciation and amortizations (Beaver, 1966); other researchers (Pogue *et al*., 1983) began to express the cash flow by taking into account the absorption or generation of cash by the working capital cycle and this approach was considered in several studies (Rayburn, 1986; Wilson, 1987; Finger, 1994; Lorek and Willinger, 1996). We can apply two methods to draft financial statements: The direct method as in (Dechow *et al*., 1998; Chittenden *et al*., 1998; Almeida *et al*., 2004) considers monetary revenues and costs as determinants of Cash Flow (CF); otherwise, the indirect method (Giacomino and Mielke, 1998; Carroll and Griffith, 2001) quantifies cash inflow generated by operations by deriving the analysis from an income margin (in this case, profit):

$$\begin{aligned} &\Pi_t^{pT} + (D_t + A_t) + SF_t = CF_t \\ &CF_t - (NWC_t - NWC_{t-1}) = OCF_t \\ &OCF_t - (FA_t - FA_{t-1}) - (D_t + A_t) = UFCF_t \\ &UFCF_t - SF = FCFE_t \end{aligned} \quad (6)$$

In Eq. 6, at a certain time, t, CF is cash flow, OCF is operating cash flow, UFCF is unlevered free cash flow and FCFE is free cash flow to equity. CF expresses the

potential cash flow (Pogue *et al*., 1983; Henry, 1996; Kim *et al*., 1998) and if we consider the change in net working capital from period t-1 to period t ($\Delta NWC_{t,t-1} = NWC_t - NWC_{t-1}$), we can demonstrate that $\Delta^{+}NWC_{t,t-1} \Rightarrow \Delta^{-}OCF_t$, showing that an increase in net working capital causes an increase in absorption of liquidity which reduces the Operating Cash Flow (OCF_t) and vice versa in the case of negative change ($\Delta^{-}NWC_{t,t-1} \Rightarrow \Delta^{+}OCF_t$). The increase in the final stock of inventory ($\Delta^{+}WCi^{a}_{t,t-1}$), as a positive component of profit, determines a reduction in Operating Cash Flow (OCF_t) of equal absolute value and the opposite sign and vice versa. The firms with positive profits, due to an increase in the value of inventories, record an equal reduction, in absolute value, of the operating cash flow (but of the opposite sign). The UFCF expresses the cash flow available for the payment of debt services and thus the financial margin used for assessing debt sustainability; FCFE is net cash flow available for payment of profit to shareholders in the form of dividends distribution. The values of the balance sheet are used in the calculation of financial ratios (Barnes, 1987) to evaluate the results of management with synthetic measures that facilitate comparison between firms. Whittington (1980) has identified two main uses of ratios: The first is to compare the results of a firm with a general standard; the second is to derive predictive information on management. The literature of bankruptcy prediction starts with the seminal study of Altman (1968), who tried to explain the state of financial distress of firms in the United States by applying financial ratios, including coverage ratios of debt service (Interest Coverage Ratios, abbreviated ICRs). The importance of ICRs has been demonstrated by several studies (Leland, 1994, 1998) that show that management control through ICRs reduces the volatility of an investment. ICRs are also applied as covenants in bank financing operations (Gray *et al*., 2006); these ICRs are often calculated with an economic approach (i.e., having EBIT and/or EBITDA as the numerator); these covenants occur in term sheets of financing operations (Dichev and Skinner, 2002). The intermediate profit margins (EBITDA and EBIT) are applied to approximate cash flow in the evaluation of the sustainability of the management cycle and to quantify debt service capacity; this is an economic approach that considers profit margins (EBITDA and/or EBIT) as the ratio's numerator. The ICRs thus calculated, however, do not consider the effect of uncollected credit, unpaid debts and changes in the value of inventories. ICRs calculated with an economic approach are expressed as follows:

$$\begin{aligned} ICR_1 &= EBITDA_t/SF_t \\ ICR_2 &= EBIT_t/SF_t \end{aligned} \quad (7)$$

ICR_1 and ICR_2 express the firm's ability to pay the cost of debt, in a given period, t, having EBITDA and EBIT, respectively, as the available margins considered (Healy, 1985; Sloan, 1996; Goldstein *et al*., 2001; Dothan, 2006). The evaluation on the basis of these ICRs may give erroneous results from overestimating or underestimating the debt service coverage capacity. This approach is, however, the most frequently applied in the practices of firms and even in rating systems to evaluate access to bank credit (Basel II and Basel III Accords). Firms can assume strategic decisions based on incorrect ICRs and at the same time, banks cannot properly evaluate credit scoring. To overcome this problem, the article suggests (Iotti and Bonazzi, 2013) and also applies ICRs calculated with a financial approach, having as the numerator financial values such as OCF and UFCF. We can express this as follows, for a given period, t:

$$\begin{aligned} ICR_3 &= OCF_t/SF_t \\ ICR_4 &= UFCF_t/SF_t \end{aligned} \quad (8)$$

ICR_3 and ICR_4 express a firm's capacity to pay the cost of debt, as borrowing costs (OF), using financial margins (OCF and UFCF); these ratios are classified as ICRs with a financial approach and are proposed in the article in a comparison between ICRs with an economic approach; we suggest this analysis to verify if the firms in the sample have significant differences in values between ICRs calculated by applying the two different approaches. This could be particularly relevant for Parma PDO ham processing firms that often have a high level of invested capital and at the same time, a high need for financial debt to cover investments in fixed assets and working capital.

With the aim of an assessment of the sustainability of a firm's cycle, sometimes the intermediate profit margins EBITDA and EBIT are applied as variables for the approximation of cash flow; it is then necessary to remember that these margins do not consider the effect of revenue not collected from customers, purchases not paid to suppliers and the changes in the value of the stock. Only, then, in a situation of a steady state (no change in the extension granted and received by customers and suppliers, no variation in the average days of inventory of stocks in the warehouse, no change in turnover, etc.) will we have equality (albeit with a lag time) between profit and financial margins. In any other situation, including simple variations in turnover, there will be a change in the steady state that causes a difference between profit and financial margins. Only in the long run will we have a new connection between these margins. Similarly, profit calculated with an economic approach may differ from the cash flow available for distribution to shareholders, in

consideration of the time lag between economic value creation and the time of occurrence of the financial cash flows. It is therefore appropriate to consider the financial approach by identifying financial margins to be compared with profit margins for the verification of the significance of any differences. In the article, to evaluate management's efficiency, we try to apply profit margins to quantify return on investment as several researchers have done in past years (Rosner, 2003; Lewellen, 2004; Love *et al*., 2007). The main measure of profitability ratios is highlighted by the performance of equity capital:

$$ROE_t = \prod_t^{pT} / (E_t^c + E_t^s + \prod_t^{pT}) \quad (9)$$

where, ROE (return on equity) expresses the economic annual return of equity capital (Cheng *et al*., 1996; Ohlson, 1980; Barnes, 1987). This ratio measures profitability but is affected by accounting conventions that are the basis of the calculation of profit. It is therefore, possible to have a situation in which equity holders, even in the presence of positive profits, are not able to distribute dividends. To overcome this problem, the work also proposes the application of the following:

$$FOE_t = FCFE_t / (E_t^c + E_t^s + \prod_t^{pT}) \quad (10)$$

where, FOE (flow on equity) expresses the annual financial performance of equity capital as already indicated by Bodenhorn (1964) and then by Moro Visconti (1999). In the article, we compare ROE_t and FOE_t values to quantify the correlation and difference between these ratios. We even apply two linear regression models to assess which are the explanatory variables of ROE_t and FOE_t in the Parma PDO ham sector firms considered in the sample.

RESULTS AND DISCUSSION

The analysis of the sample firms first considers asset data from 2008-2012 (Table 1) of the annual balance sheet; these data are of interest because they express the high level of capital intensity required for the Parma PDO ham processing activities of the firms in the sample, given the value of production (TA/VP mean is 107.11%). Sector firms are capital-intensive, considering fixed assets and the working capital cycle. The median data shows the importance of investments in fixed assets (FA: 17.10% of TA) and in the inventories of working capita WCi^a: 41.19% of TA). We must consider that product specifications require that Parma PDO ham is cured for at least 12 months. Often, however, firms sell ham seasoned for 24 months; in this way, firms can differentiate the production and raise the sales price. The increase in the curing period expands the working capital cycle because of the increase in final inventories. Consequently, we should note an increase in the requirements of capital to finance investments in working capital. These characteristics have the effect of increasing the capital needs to finance investments to improve the firm's efficiency. Accounts receivable ($WCar^a$) are also one of the major factors of asset investment (29.19% of TA); the high capital absorption due to this factor of asset investment is determined by large retail chains, whose bargaining power causes an increase in the average number of days for credit payments (accounts receivable). To cover their financial needs, the firms in the sample use financial debts as the first source of capital, given the fact that $DF^{M<12}$+$DF^{M>12}$ is 59.26% of the TA, with a prevalence of loans maturing within 12 months (40.51% of the TA) compared with loans maturing after 12 months (18.75%). The high level of financial debt increases financial dependence on the credit system, even increasing

Table 1: Balance sheet data of Parma PDO ham processing firms (2008-2012) reclassification of the balance sheet with financial approach

	Mean values		Mean values			
Values	€	%	€	%	Skewness	Kurtosis
FA	1,452,238	20.69	521,560	17.10	1.21	0.71
WCi^s	3,224,950	45.95	1,256,550	41.19	2.12	0.67
$WCar^a$	1,560,951	22.24	890,520	29.19	1.59	-0.20
WCo^s	654,558	9.33	325,580	10.67	1.69	-0.31
WC^{sT}	5,440,459	77.52	2,472,650	81.06	1.96	0.87
L	125,882	1.79	56,233	1.84	2.19	0.16
TA	7,018,579	100.00	3,050,443	100.00	2.58	0.12
E^T	1,129,763	16.10	423,556	13.89	2.52	0.37
$WCap^s$	1,230,652	17.53	621,554	20.38	1.84	0.53
WCo^s	345,548	4.92	197,556	6.48	1.62	0.12
WC^{sT}	1,576,200	22.46	819,110	26.85	1.83	0.36
$DF^{M<12}$	2,156,308	30.72	1,235,660	40.51	1.77	1.23
$DF^{M>12}$	1,056,578	15.05	572,117	18.75	1.91	1.01
DF^T	4,312,616	61.45	1,807,777	59.26	2.18	1.31
D^T	5,888,816	83.90	2,626,887	86.11	2.86	0.82
TS	7,018,579	100.00	3,050,443	100.00	1.82	0.68

Source: Authors' calculations

Table 2: Balance sheet data of Parma PDO ham processing firms (2008-2012) reclassification of the balance sheet with functional approach

	Mean values		Mean values			
Values	€	%	€	%	Skewness	Kurtosis
FA	1,452,238	27.32	521,560	23.98	1.53	0.71
NWC	3,864,259	72.68	1,653,540	76.02	2.19	5.48
NIC	5,316,497	100.00	2,175,100	100.00	1.67	1.45
E^T	1,129,763	21.25	423,556	19.47	1.85	2.18
NFP	4,186,734	78.75	1,751,544	80.53	1.87	2.56
E^T+NFP	5,316,497	100.00	2,175100	100.00	1.67	1.45

Source: Authors' calculations

Table 3: Income statement data of Parma PDO ham processing firms (2008-2012) reclassification of the income statement with value added approach

	Mean values					
Values	€	%	Mean values (€)	Standard dev (%)	Skewness	Kurtosis
VP	6,552,983	100.00	4,255,309	100.00	1.53	0.15
M	3,645,297	55.63	2,356,597	55.38	1.34	0.25
S	1,203,669	18.37	765,925	18.00	1.68	0.04
R	253,656	3.87	145,156	3.41	1.76	0.44
L	492,356	7.51	301,569	7.09	1.45	0.23
O	335,468	5.12	248,618	5.84	1.21	1.02
EBITDA	622,537	9.50	437,444	10.28	1.53	1.60
D	254,663	3.89	156,580	3.68	1.80	1.28
A	25,164	0.38	12,500	0.29	2.02	1.29
EBIT	342,710	5.23	268,364	6.31	1.44	0.71
SF	-191,568	-2.92	-138,456	-3.25	1.83	-0.21
R	8,265	0.13	-	0.00	0.59	0.22
X	26,504	0.40	1,560	0.04	10.15	-1.53
Π^{aT}	185,911	2.84	131,468	3.09	1.32	0.16
T	82,565	1.26	50,628	1.19	1.69	0.26
Π^{pT} (PROFIT)	103,346	1.58	80,840	1.90	1.44	0.17

Source: Authors' calculations

borrowing costs. Equity capital (ET) is, in fact, only 13.89% of the TA and it is lower than WC^{eT} which is equal to 26.85%. The analyzed capital structure shows that firms in the sector acquire a high debt level to finance investments given the fact that equity capital is the third source of capital.

The analysis of the balance sheet in functional form (Table 2) confirms the prevalence of investments in fixed assets (50.69% of NIC) and also highlights NWC>232 cases out of 250, having a median value of NWC that is 76.02% of NIC. This characteristic of the balance sheet of the sample firms expresses the high level of capital absorption in the cycle of working capital; in fact, the mean length of time to collect commercial credit as an account receivable (AR_DAYS) is 86.94 days (median value is 76.38), the mean length of time to pay commercial debt as an account payable (AP_DAYS) is 92.64 days (median value is 72.66) and the mean length of time for inventory stock (INV_DAYS) is 322.91 days (median value is 194.62). The average length of the business cycle (inventories plus accounts receivable less accounts payable) is 317.22 days (median value is 194.62). The analysis of the balance sheet in the functional form, then, confirms the dependence of Parma PDO ham processing firms on financial debt and consequently, the need for these firms to assess the sustainability of debt services.

Further information on the typical characteristics of the firms in the sector results from the analysis of economic data (Table 3); the average value of VP amounts to €6,552,983 and the largest factor of cost is raw materials (55.38% of VP). The cost of services is 18.00% of VP while labor costs are the third-largest cost with an incidence that is 7.09% of VP; EBITDA and EBIT are, respectively, 10.28 and 6.31% of VP. The balance of financial operation (SF) absorbs 3.25% of VP (i.e., 51.19% of EBIT). It thus appears that a relevant part of the intermediate profit margins (EBITDA and EBIT) is absorbed by the cost of bank charges due to financial debt. The income statement data confirm the high impact of interest charges on the results of the firms in the sample. Net profit (Π^{pT}) is €80,840 as the median value, equal to 1.90% of the VP value in the sample. Sample data permit the calculation of a financial statement that expresses cash flow availability due to the management cycle. The values of the financial statements of the firms thus calculated show an average CF that is 556.13% of net profit; the median absorption of capital due to the cycle of working capital amounted to €142,189 (i.e., 175.89% of net profit), from which it follows that the median OCF is €246,187 (304.54% of net profit). It is then possible to note an important absorption of liquidity because of investments in fixed assets, given that an increase in FA determines a decrease of UFCF at

Table 4: Financial statement of the Parma PDO ham processing sample firms (2008-2012)

	Mean values		Mean values			
Values	€	%	€	%	Skewness	Kurtosis
Π^{PT} (PROFIT)	103,346	100.00	80,840	100.00	-0.99	6.07
+D	254,663	246.42	156,580	193.69	2.01	4.68
+A	25,164	24.35	12,500	15.46	1.59	2.39
+SF	191,568	185.37	138,456	171.27	-1.83	3.27
CF	574,741	556.13	388,376	480.43	0.50	4.21
-/+ΔWCi^{a}	-165,321	-159.97	-85,669	-105.97	-0.72	2.43
-/+ΔWCar^{a}	-121,632	-117.69	-81,223	-100.47	-1.31	12.08
-/+ΔWCo^{a}	-3,652	-3.53	3,225	3.99	-6.75	74.53
ΔWC^{aT}	-290,605	-281.20	-163,667	-202.46	-1.34	11.80
+/-ΔWCap^{s}	16,455	15.92	18,995	23.50	-0.97	4.34
+/-ΔWCo^{s}	9,558	9.25	2,483	3.07	0.58	8.20
ΔWC^{sT}	26,013	25.17	21,478	26.57	-0.62	7.73
ΔNWC	-264,592	-256.03	-142,189	-175.89	-1.12	10.32
OCF	310,149	300.11	246,187	304.54	0.43	4.97
-/+ΔFA	-213,356	-206.45	-198,552	-245.61	-2.13	6.59
UFCF	96,793	93.66	47,635	58.93	-1.55	6.46
-SF	-191,568	-185.37	-138,456	-171.27	-1.83	3.27
FCFE	-94,775	-91.71	-90,821	-112.35	-1.71	5.00

Source: Authors' calculations

58.93% of net profit with absorption of cash equal to 245.61% of net profit. This means that, on average, considered firms are not able to cover the cost of debt without an increase in equity capital and/or increase in the level of financial debt; this necessity of coverage expresses a financial situation where FCFE<0, implying the impossibility of dividend distribution if any and/or NFP reimbursement.

The analysis of financial statements (Table 4) highlights some typical management characteristics of firms in the Parma PDO ham food processing sector: (1) The dynamics of working capital (NWC) absorb a significant amount of liquidity generated by operations (CF) as expressed by OCF values, (2) The investments in fixed assets further reduce financial margins available and (3) The balance of financial operations erodes UFCF completely given that FCFE mean and median values are negative. Given the current situation of a general economic crisis and consequent difficulty in credit access, it could be useful to assess the sustainability of the business cycle, also given the liquidity absorption highlighted by the firms' sample annual account data. To achieve this goal, we compare income margins with financial margins to assess whether there are correlations between these two types of values; moreover, we would quantify if there are significant differences between income and financial values. This case is particularly relevant to the sector since, for the majority of firms, an increase in the value of Net Working Capital (NWC) could generate difficulties in applying for additional sources of capital because of a firm's reduced capacity to obtain bank loans.

Descriptive statistics show that intermediate income margins (EBITDA and EBIT) have average values that are higher than financial margins (OCF and UFCF) and also, the median values of income margins are higher than financial margins. The EBITDA is positive in 243 cases, EBIT is positive in 215 cases and CF is positive in 239 while OCF is positive in 212 cases and UFCF only in 141 cases. The Π^{PT} (PROFIT) also has a value higher than FCFE; PROFIT is positive in 191 cases out of 250 while FCFE is positive only in 80 cases out of 250. The analysis thus shows that the application of intermediate margins (EBITDA) could overestimate the financial results available for the firm (UFCF and OCF), expressing that the difference between the income and financial cycles is significant. In particular, the investment cycle, as expressed by UFCF, absorbs a substantial amount of the liquidity of the sample firms as it is expressed by the median values of CF (€388,376), OCF (€246,187) and UFCF (€47,635) while EBITDA (€437,444) and EBIT (€268,364) have higher positive median values. The analysis of the results available for firms in the sample shows a shift between the income cycle and financial cycle. In fact, the median value of PROFIT is €80,840, while the median value of FCFE is -€90,821. The analysis of profit then leads to a distorted assessment of the financial situation of the firm and also the investments made by the shareholders and although, there is accounting remuneration, they are unable to generate available cash flows. In order to analyze the relation between analyzed values, we first verify the normality of the distribution of the income and financial margins and even the ICR ratios, applying the Kolmogorov-Smirnov D statistic, given the evidence of the non-normality of distributions for all considered ratios (Table 5).

The Kolmogorov-Smirnov D statistic (KSD) shows that all values do not follow the normal distribution, just

Table 5: Kolmogorov-Smirnov D statistic on normality of distribution

Values	Null hypothesis (H_0)	Significance	Decision
EBITDA	Distribution is normal	0.001**	Reject null hypothesis
EBIT	Distribution is normal	0.001**	Reject null hypothesis
$П^{pT}$	Distribution is normal	0.013*	Reject null hypothesis
CF	Distribution is normal	0.041*	Reject null hypothesis
OCF	Distribution is normal	0.040*	Reject null hypothesis
UFCF	Distribution is normal	0.011*	Reject null hypothesis
FCFE	Distribution is normal	0.000**	Reject null hypothesis
ICR_1	Distribution is normal	0.002**	Reject null hypothesis
ICR_2	Distribution is normal	0.002**	Reject null hypothesis
ICR_3	Distribution is normal	0.036*	Reject null hypothesis
ICR_4	Distribution is normal	0.009**	Reject null hypothesis

Source: Authors' calculations, ***Significant at 0.05 and 0.01 level (2-tailed), respectively

Table 6: Correlation between income and financial margins-parametric approach (Corr. Pearson)

Parameters	EBITDA	EBIT	PROFIT	CF	OCF	UFCF	FCFE
EBITDA							
Corr. Pearson							
Sig. (2-tailed)							
N							
EBIT							
Corr. Pearson	0.921**						
Sig. (2-tailed)	0.000						
N	250						
$П^{pT}$							
Corr. Pearson	0.810**	0.814**					
Sig. (2-tailed)	0.000	0.000					
N	250	250					
CF							
Corr. Pearson	0.981**	0.780**	0.652**				
Sig. (2-tailed)	0.000	0.000	0.000				
N	250	250	250				
OCF							
Corr. Pearson	0.725**	0.865**	0.812**	0.765**			
Sig. (2-tailed)	0.000	0.000	0.000	0.000			
N	250	250	250	250			
UFCF							
Corr. Pearson	0.250	0.203	0.153	0.590**	0.890**		
Sig. (2-tailed)	0.165	0.210	0.455	0.000	0.000		
N	250	250	250	250	250		
FCFE							
Corr. Pearson	0.200	0.286	0.148	0.120	0.108	0.135	
Sig. (2-tailed)	0.212	0.115	0.532	0.675	0.681	0.566	
N	250	250	250	250	250	250	

Source: Authors' calculations, ***Significant at 0.05 and 0.01 level (2-tailed), respectively

as in several studies in which the non-normality of the distributions of financial ratios is verified (Gombola *et al*., 1987).

The correlation calculated with the parametric approach, using the Pearson statistic (Table 6), shows significant correlations between income margins and financial margins with high significance (1.00%). Moreover, the correlations between UFCF/FCFE and other margins are rarely statistically significant, particularly for EBITDA, EBIT and CF. At the same time, there is no correlation between FCFE and PROFIT. Given the reduced sample size and considering the results of the KSD statistic, we also apply a nonparametric approach to the correlation (Spearman's ρ) that confirms the conclusions of the parametric correlation, decreasing, however, the significance of some correlations (Table 7), particularly for UFCF and other margins.

The comparisons between income margins and financial margins are performed by evaluating the significance of the difference between means (Table 8), calculating Student's t-value for paired samples. The analysis considers seven comparisons, including three with EBITDA and financial margins, three with EBIT and financial margins and one between PROFIT and FCFE. The pair-wise comparisons with a parametric approach show without exception, that in all comparisons, we can reject the null hypothesis of equality between means with a two-sided test with significance at 1.00%.

Table 7: Correlation between income and financial margins-non-parametric approach (Spearman's ρ)

Parameters	EBITDA	EBIT	PROFIT	CF	OCF	UFCF	FCFE
EBITDA							
Corr. ρ Spearman							
Sig. (2-code)							
N							
EBIT							
Corr. ρ Spearman	0.912**						
Sig. (2-code)	0.000						
N	250						
Π^{PT}							
Corr. ρ Spearman	0.653**	0.840**					
Sig. (2-code)	0.000	0.000					
N	250	250					
CF							
Corr. ρ Spearman	0.952**	0.832**	0.601**				
Sig. (2-code)	0.000	0.000	0.000				
N	250	250	250				
OCF							
Corr. ρ Spearman	0.887**	0.768**	0.825**	0.840**			
Sig. (2-code)	0.000	0.000	0.000	0.000			
N	250	250	250	250			
UFCF							
Corr. ρ Spearman	0.231	0.256	0.032	0.265	0.312		
Sig. (2-code)	0.212	0.223	0.850	0.198	0.156		
N	250	250	250	250	250		
FCFE							
Corr. ρ Spearman	0.035	0.260	0.002	0.302	0.236	0.605**	
Sig. (2-code)	0.876	0.225	0.901	0.162	0.201	0.000	
N	250	250	250	250	250	250	

Source: Authors' calculations, ***Significant at 0.05 and 0.01 level (2-tailed), respectively

Table 8: Comparison of economic and financial margins parametric approach for paired samples (t-Student)

	Values and statistics		
Couples of value	Mean	T	Sig. (2-tailed)
1 EBITDA-CF	206,140	8,513	0.000**
2 EBITDA-OCF	310,878	6,833	0.000**
3 EBITDA-UFCF	1,275,732	17,801	0.000**
4 EBIT-CF	-311,114	-8,245	0.000**
5 EBIT-OCF	-206,376	5.107	0.000**
6 EBIT-UFCF	185,052	4.090	0.000**
7 PROFIT-FCFE	100,102	3.349	0.002**

Source: Authors' calculations, ***Significant at 0.05 and 0.01 level (2-tailed), respectively

Table 9: Comparison of economic and financial margins non-parametric approach for paired samples (T-Wilcoxon)

Couple	T-Wilcoxon for paired sample stat.	T-Wilcoxon for paired sample stand. stat.	Observ.	Sig. (2-tailed)
1 EBITDA-CF	67	-3.941	250	0.000**
2 EBITDA-OCF	100	-3.377	250	0.001**
3 EBITDA-UFCF	9	-4.932	250	0.000**
4 EBIT-CF	538	4.112	250	0.000**
5 EBIT-OCF	304	3.111	250	0.002**
6 EBIT-UFCF	76	-3.787	250	0.000**
7 PROFIT-FCFE	132	2.829	250	0.045*

Source: Authors' calculations, ***Significant at 0.05 and 0.01 level (2-tailed), respectively

A nonparametric approach was also applied, given the non-normality of the margin distributions as expressed by applying the KSD statistic, just as the Wilcoxon statistic (Wilcoxon Matched-Pairs Signed-Ranks Test) for paired samples. The pair-wise comparison with a nonparametric approach (Table 9) confirms that in all comparisons, we can reject the null hypothesis of equality between the means with the two-sided test's significance at 1.00% in six cases and significance at 5.00% in one case.

The analysis shows that the Parma PDO ham firms' economic and financial margins are different even if they are related in some cases. In fact, the firms in the considered sample have a relevant absorption of capital in the cycle of working capital, particularly due to the long inventory cycle. Moreover, even if characterized by positive profit, firms may not be able to pay dividends given that profit is statistically higher than FCFE. In fact, firms in the sector suffer from a high level of cost of debt that completely erodes the flow of UFCF; such erosion

Table 10: Comparison of ICRs with economic and financial approach parametric approach for paired samples (t-Student)

	Values and statistics		
Couples of value	Mean	T	Sig. (2-tailed)
1 ICR_1-ICR_3	1.133	4.002	0.000**
2 ICR_1-ICR_4	2.298	4.650	0.000**
4 ICR_2-ICR_3	1.946	1.096	0.233
5 ICR_2-ICR_4	1.065	5.421	0.000**

Source: Authors' calculations, ***Significant at 0.05 and 0.01 level (2-tailed), respectively

Table 11: Comparison of ICRs with economic and financial approach non-parametric approach for paired samples (T-Wilcoxon)

Coppia	T-Wilcoxon for paired sample stat.	T-Wilcoxon for paired sample stand. stat.	Observ.	Sig. (2-tailed)
Couple 1 ICR_1-ICR_3	14	3.120	250	0.000**
Couple 2 ICR_1-ICR_4	10	4.059	250	0.000**
Couple 4 ICR_2-ICR_3	201	1.360	250	0.202
Couple 5 ICR_2-ICR_4	11	4.021	250	0.000**

Source: Authors' calculations, ***Significant at 0.05 and 0.01 level (2-tailed), respectively

does not emerge from the analysis of the income statement, where EBIT appears able to pay the cost of debt. This situation could make it more difficult to attract capital to the Parma PDO ham processing sector because the shareholders of the firms may have difficulties with the payment of their investment for the non-distribution of dividends. ICR analysis has revealed differences between profit margins which approximate liquidity creation and financial margins which directly express the amount of financial liquidity available to pay the cost of debt before the distribution of dividends. This result highlights that the Parma PDO ham processing firms considered in the sample may have difficulty in paying the interest on financial debt. For this reason, the research compares ICRs calculated with an economic approach (ICR_1 which is EBITDA-based and ICR_2 which is EBIT-based) and ICRs calculated with a financial approach (ICR_3 and ICR_4, OCF- and UFCF-based, respectively). Sustainability evaluations of the cost of debt are done by applying ICRs; this evaluation is important for firms to prevent a financial crisis. Banks could usefully apply ICRs to assess the creditworthiness of firms in the sector, particularly in the current state of reduced bank lending (credit crunch), given that the assessment of ICRs could offer a significant applied interest. The ICRs calculated using an income approach, taking EBITDA and EBIT as the numerator, then expressing ICR_1 and ICR_2, have average values of 3.165 and 1.942, respectively. The ICRs calculated with a financial approach (OCF and UFCF as the numerator) are ICR_3 and ICR_4 and have average values of 1.788 and 0.341, respectively. The comparison of the significance in differences between ICRs calculated with an income and a financial approach is carried out first (Table 10), calculating Student's t-value for paired samples, for six comparisons. The pair-wise comparisons with a parametric approach show, with the exception of the fifth couple's comparison, that we can reject the null hypothesis of equality between the means with a two-sided test with significance at 1.00%. Only for the comparison between ICR_2 (numerator: EBIT) and ICR_4 (numerator: OCF) does the analysis show equality between mean values, expressing that an EBIT-based ICR could approximate an OCF-based ICR correctly.

Also, the comparisons for pairs with a nonparametric approach highlight, yet with the exception of the comparison between ICR_2 and ICR_4, that in all comparisons, it is possible to reject the null hypothesis of equality between means for a two-sided test in all cases, with significance at 1.00%, using the Wilcoxon statistic (Wilcoxon Matched-Pairs Signed-Ranks Test) for paired samples (Table 11). We can then confirm the parametric approach's results.

The analysis of the ICRs shows, for the sample firms, that a sustainability assessment carried out by applying ICRs calculated with an economic approach could give incorrect results, even if these are the most frequently applied by firms and banks. The analysis then shows that it could be preferable to apply ICRs calculated with a financial approach as suggested in the study, particularly for Parma PDO ham processing firms which are characterized by a high level of cost of debt in relation to the value of production. Only financial ICRs are, in fact, able to correctly express a firm's capacity to pay the cost of debt considering the financial resources actually available. Regression analysis shows that profit margins (EBIT, EBITDA and PROFIT) are statistically different from financial margins (CF, OCF, UFCF and FCFE). This difference is determined by the capital structure of the Parma PDO ham processing firms. The analysis will therefore consider the determinants of economic (PROFIT) and cash flow (FCFE) margins available for equity holders, showing which variables are the determinants of these flows, in order to provide useful information for managing firms in the Parma PDO ham processing sector. To achieve this goal, regression

Table 12: Extract of the multiple regression model that shows the impact on FOE_t of independent variables -first model

	non-standardized coefficient		Standardized coefficient		
Model	B	Std. error	Beta	T	Sig.
(Constant)	-0.1125	0.033	-	6.702	0.000***
TO	0.2562	0.053	0.132	6.551	0.000***
INV_DAYS	64.658	66.630	0.056	-6.321	0.000*
AR_DAYS	-65.354	53.312	0.012	-5.121	0.000*
AP_DAYS	35.229	16.949	0.065	2.032	0.045*
DER	-0.0125	0.120	-0.012	2.881	0.005**
NFP_E	0.690	0.013	0.415	-8.325	0.000***
SIZE	0.011	0.241	0.066	2.080	0.041*
ROS	0.140	0.022	0.895	13.100	0.000**
$EBITDA_t$	0.186	0.053	0.121	1.612	0.110
$EBIT_t$	0.180	0.055	0.149	2.335	0.029*
$PROFIT_t$	0.061	0.098	0.132	1.069	0.196
$EBITDA_{t-1}$	0.084	0.025	0.125	2.221	0.038*
$EBIT_{t-1}$	0.110	0.064	0.356	0.496	0.560
$PROFIT_{t-1}$	0.182	0.126	0.325	0.110	0.780
CF_t	0.710	0.010	0.789	1.012	0.210
OCF_t	0.281	0.045	0.129	2.430	0.021*
$UFCF_t$	0.198	0.012	0.121	5.790	0.000***
CF_{t-1}	0.126	0.113	0.123	1.005	0.125
OCF_{t-1}	0.090	0.355	0.089	2.321	0.027**
$UFCF_{t-1}$	0. 291	0.981	0.565	2.223	0.031**

Source: Authors' calculations, First model, Eq. 11. Dependent variable: FOE_t, *,**Significant at 0.05 and 0.01 level (2-tailed), respectively

analysis aims to quantify the causal relationship between a variable to be explained (the dependent variable) and one or more explanatory variables (independent variables). The objective of the analysis is to identify the independent variables' capacity to explain the variation of the dependent variable, even quantifying their impact on the dependent variable. First, we would quantify the relation between financial and economic flow; the study would analyze if there was a relation between a financial return on equity capital for a given period, t (FOE_t) and some independent variables. The FOE expresses the amount of cash available for equity holders as expressed in the methodological part of the article. To achieve this aim, we consider the explanatory capacity of a linear regression model (first model). The model, as expressed in Eq. 11, considers FOE_t which expresses the financial return available for equity holders, as an independent variable for a given time (t). In the first regression models, the constant term is α, TO is turnover (VP/invested capital), INV_DAYS is the duration in days of the cycle of the inventories in stock, AR_DAYS is the duration in days of the average extension to customers, AP_DAYS is the duration in days of the average extension from suppliers, DER is debt-to-equity ratio (D/E), NFP_E is net financial position-to-equity ratio (NFP/E) and SIZE is the amount of capital invested in euro (total assets). The model then considers EBITDA, EBIT and PROFIT as explanatory variables, considered in values for the years t and t - 1 ($EBITDA_t$ and $EBITDA_{t-1}$, $EBIT_t$ and $EBIT_{t-1}$ and $PROFIT_t$ and $PROFIT_{t-1}$, respectively). At the same time, CF, OCF and UFCF are considered explanatory variables and considered in their values for years t and t-1, giving then another six explanatory variables (CF_t and CF_{t-1}, OCF_t and OCF_{t-1} and $UFCF_t$ and $UFCF_{t-1}$, respectively). The model could be expressed as follows:

$$FOE_t = \alpha+\beta_1 TO+\beta_2 INV\_DAYS+\beta_3 AR\_DAYS+\beta_4 AP\_DAYS+\beta B_5 DER+\beta_6 NFP\_E+\beta_7 SIZE+\beta_8 ROS+\beta_9 EBITDA_t+\beta_{10} EBIT_t+\beta_{11} PROFIT_t+\beta_{12}+EBITDA_{t-1}+\beta_{13} EBIT_{t-1}+\beta_{14} PROFIT_{t-1}+\beta_{15} CF_t+\beta_{16} OCF_t+\beta_{17} UFCF_t+\beta_{18} CFt_{-1}+\beta_{19} OCF_{t-1}+\beta_{20} UFCF_{t-1}+\varepsilon \quad (11)$$

The idea underlying this first model is that it could be possible to explain actual FOE (at a given time, t) considering a set of explanatory variables that express capital intensity (TO, SIZE), working capital cycle duration (INV_DAYS, AR_DAYS, AP_DAYS), debt level (DER, NFP_E), operative profitability (ROS), actual income margins (EBIT, EBITDA and PROFIT) and their respective values considered at t-1 ($EBIT_{t-1}$, $EBITDA_{t-1}$ and $PROFIT_{t-1}$), even considering actual financial margins (CF, OCF and UFCF) and their respective values considered at t-1 (CF_t, OCF_t and $UFCF_t$). Unless otherwise specified, all the explanatory variables are taken at a certain time, t. The first regression model, as expressed in Eq. 11, is analyzed in Table 12 and assumes a significant statistical capacity to explain FOE_t values.

In the considered model, the F statistic has high significance (F = 0.000); $R^2 = 0.964$ while adjusted R^2 has a value of 0.961, expressing the capacity of the model to explain a great part of the variability of FOE_t; the statistic

Table 13: Extract of the multiple regression model that shows the impact on ROE_t of independent variables-second model

	Non-standardized coefficient		Standardized coefficient		
Model	B	Std. error	Beta	T	Sig.
(Constant)	-0.1129	0.021	-	6.440	0.000***
TO	0.11295	0.098	0.689	6.230	0.000***
INV_DAYS	369.215	96.025	0.125	2.896	0.018*
AR_DAYS	981.658	12.098	0.098	4.311	0.000**
AP_DAYS	129.980	36.111	0.415	7.042	0.000**
DER	0.318	0.210	0.356	1.250	0.184
NFP_E	0.310	0.023	0.495	1.744	0.082
SIZE	0.158	0.365	0.167	3.506	0.001**
ROS	0.165	0.198	0.125	12.520	0.000**
$EBITDA_t$	0.139	0.985	0.365	2.633	0.009*
$EBIT_t$	0.984	0.146	0.124	3.554	0.001**
$EBITDA_{t-1}$	0.109	0.265	0.658	4.321	0.000***
$EBIT_{t-1}$	0.069	0.211	0.415	2.166	0.032*
CF_t	0.198	0.145	0.625	2.215	0.029*
OCF_t	0.221	0.658	0.326	1.989	0.046*
$UFCF_t$	0.912	0.985	0.011	1.445	0.142
$FCFE_t$	0.985	0.396	0.223	0.780	0.451
CF_{t-1}	0.653	0.996	0.018	0.067	0.952
OCF_{t-1}	0.125	0.124	0.069	0.261	0.781
$UFCF_{t-1}$	0.985	0.630	0.040	0.361	0.709
$FCFE_{t-1}$	0.148	0.124	0.125	0.266	0.754

Source: Authors' calculations Second model, Eq. 12, Dependent variable: ROE_t ***Significant at 0.05 and 0.01 level (2-tailed), respectively

DW is 2.110 and the majority of the variables are significant. First, TO has a positive effect on FOE values, expressing that an increase in turnover (then a decrease in the capital-intensive structure of assets) has a positive effect on the FCFE value. The explanatory variables of FOE generation are, in particular, values expressing the duration of the Working Capital (WC) cycle. The INV_DAYS and AR_DAYS have a negative sign, expressing that an increase in WC durations has a negative effect on the FOE result, due to a decrease in cash available. The AP_DAYS has a positive sign on FOE, expressing the opposite situation. The DER has a positive sign on FOE given that an increase in debt could generate cash while an increase in financial debt (NFP_E) has the opposite sign; in fact, an increase in NFP has an effect on increasing interest charges. Even ROS is particularly important in increasing the FOE value. Income and financial margins at a certain time, t, have an effect on FOE at the same time, t (particularly $PROFIT_t$ and $UFCF_t$). Income and financial margins at t-1 have a limited effect on FOE, with the exception of the OCF_{t-1} and $UFCF_{t-1}$ margins even with a relation significant only at the 0.05 level (two-tailed). $EBITDA_t$, $PROFIT_t$, CF_t, $EBIT_{t-1}$ and CF_{t-1} are not statistically significant. We would consider a second regression model to analyze if there was a relation between economic return on equity capital for a given period, t (ROE_t) and a set of independent variables as considered in the first regression model. ROE expresses the amount of PROFIT available for equity holders as expressed in the methodological part of the article. It then proposes an explanatory linear regression model (second model). In the second regression model, the constant term is α, TO is turnover (VP/invested capital), INV_DAYS is the duration in days of the cycle of the inventories in stock, AR_DAYS is the duration in days of the average extension to customers, AP_DAYS is the duration in days of the average extension from suppliers, DER is debt to equity ratio (D/E), NFP_E is net financial position to equity ratio (NFP/E) and SIZE is the amount of the capital invested in euro (total assets). The model then considers EBITDA and EBIT as explanatory variables, considered in values for the years t and t-1 ($EBITDA_t$ and $EBITDA_{t-1}$, $EBIT_t$). Obviously, PROFIT is not considered as an explanatory variable. At the same time, CF, OCF, UFCF and FCFE are considered explanatory variables and considered in their values for years t and t - 1, giving then another eight explanatory variables (CF_t and Cf_{t-1}, OCF_t and OCF_{t-1}, $UFCF_t$ and $UFCF_{t-1}$ and $FCFE_t$ and $FCEF_{t-1}$, respectively). The set of explanatory variables is the same as those considered in Eq. 11, with the exception of FCFE instead of PROFIT. We express the second model as follows:

$$ROE_t = \alpha+\beta_1TO+\beta_2INV\_DAYS+\beta_3AR\_DAYS+\beta_4AP\_DAYS+\beta B_5DER+\beta_6NFP\_E+\beta_7SIZE+\beta_8ROS+\beta_9EBITDA_t+\beta_{10}EBIT_t+\beta_{11}PROFIT_{t-1}+\beta_{12}+EBITDA_{t-1}+\beta_{13}EBIT_{t-1}+\beta_{14}OCF_{t-1}+\beta_{15}UFCF_t+\beta_{16}FCFE_t+\beta_{17}CF_{t-1}+\beta_{18}OCF_{t-1}+\beta_{19}UFCF_{t-1}+\beta_{19}FCFE_{t-1}+\varepsilon \quad (12)$$

The second regression model as expressed in Eq. 12 is analyzed in Table 13 and assumes a significant statistical capacity to explain FOEt values. The F statistic has high significance (F = 0.000); $R^2 = 0.886$ while adjusted

R^2 has a value of 0.851, expressing the capacity of the model to explain a great part of the variability of ROEt; the statistic DW is 1.902 and the majority of the variables are significant. First, TO has a positive effect on ROE values (as in SIZE), expressing that an increase in turnover has a positive effect on the PROFIT value. ROE generation is even affected by values expressing the duration of the Working Capital (WC) cycle. INV_DAYS, AR_DAYS and AP_DAYS have a positive sign, expressing that an increase in WC durations has a positive effect on the ROE result, even if this causes a decrease in cash available. DER and NFP are not statistically significant Obviously, ROS is particularly important in increasing the ROE value, just as EBIT and EBITDA at a certain time, t. DER, NFP_E, $EBITDA_t$, $UFCF_t$, $FCFE_t$, CF_{t-1}, OCF_{t-1}, $UFCF_{t-1}$ and $FCFE_{t-1}$ are not statistically significant.

CONCLUSION

The analysis of firms' samples in the sector of Parma PDO ham processing shows that these firms have characteristics of production and investment that affect capital structure. Parma PDO ham processing firms require large amounts of capital to finance investments in fixed assets (buildings, plants and equipment for Parma PDO ham processing) and working capital (particularly inventories, including finished goods and accounts receivable). Because of the absorption of capital due to the investment and working capital cycles and even considering the high level of financial debt, it is necessary to assess the sustainability of the business cycle. For this purpose, considering a sample of 50 firms over a five-year period (250 observations), the article calculates profit margins (EBITDA, EBIT and PROFIT) and financial margins (CF, OCF, UFCF and FCFE); the analysis highlights correlations between economic and financial margins, even if it is possible to note statistically significant differences. It thus appears that profit margins are not adequate to approximate financial margins in business valuations as it often happens in bank analyses and also in the analyses carried out by firms' management. The analysis also shows that Parma PDO ham processing firms often have difficulty paying interest charges and distributing dividends, even in the presence of positive profit, as expressed by UFCF and FCFE values, respectively. The result of the analysis is that the means of economic values (median for a nonparametric approach) are higher than the means of financial values. The firms in the sector, then, need control systems, particularly because debts are the primary source of capital, so it is important to analyze the relationship between sector firms and banks. The analyzed data show that there is difficulty in the sustainability of the financial management cycle for the firms sampled, particularly in the payment of the cost of debt. In fact, a sustainability evaluation is often carried out by applying traditional ICRs, calculated with an income (economic) approach (ICR_1, ICR_2); the analysis shows that economic ICRs have values higher than financial ICRs (ICR_3, ICR_4, ICR_5). These ICRs could then be applied with greater significance because they are able to express more correctly a firm's capacity to pay debt services. On this topic, policy makers could even consider these characteristics of the annual accounts of firms in the Parma PDO ham sector for aid policies. The use of ratios for a sustainability evaluation may have utility for a firm's owner to properly assess the sustainability of the management cycle and even for credit institutions that could assess with greater accuracy the creditworthiness of firms (even considering subsidiary guarantees issued by credit unions to improve the sustainability of the business cycle). At the same time, the method could be applied by policy makers, operating with direct (loans) or indirect (mutual guarantees) aid policies in favor of the Parma PDO ham sector. In fact, an increased capacity to evaluate the sustainability of the cycle of a firm that has received public funds is useful to reduce the risk of inefficient uses of collective resources.

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