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An Analysis of the Annual Accounts of Highway Firms in Italy Applying a Comparative Approach Through Income and Financial Margins Assessments

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Abstract: Firms operating in the highway sector in Italy are characterized by high investment and high capital intensity; these firms in fact manage public infrastructure which requires investments in maintenance and Fixed Assets (FA). The highway sector in Italy has undergone increased concentration which has reduced the number of firms operating, increased their average size and created high barriers to entry. In this context, companies in the sector have reported very positive income results in recent years and an exploration of this topic could prove useful in analyzing whether these earnings have generated adequate financial flows to support investments and in defining whether a correlation exists between earnings and cash flow generation. The research analyzes a sample of 12 firms that have licensed 1,776 km of highway (148, on average for each highway). This is about 26% of all highways in Italy or 45% when not considering Autostrade per l'Italia concessions. Analysis confirms the high level of capital intensity required for highway activities (the median value of TA:S is 4,425), particularly because of investments in fixed assets (the median value of FA:S is 3,378). The data show that Net Working Capital (NWC) is negative and is-29.71% of Net Invested Capital (NIC), expressing the application of a so-called aggressive strategy of capital management. Again, the analysis shows that income margins (EBITDA, EBIT and profit) are frequently correlated with financial margins (CF, OCF, UFCF and FCFE) but the shift between economic and financial cycles shows that financial margins cannot be properly approximated by applying income margins. These margins differ in a statistically significant way as shown by applying a nonparametric approach for paired samples (Wilcoxon-T) to compare means. To improve the results, future research could analyze cash flow to equity and profit generation which could be useful in developing analyses to compare profitability of highway firms with other types of firms, even in other European and non-European countries.

Key words: Italian highways, free cash flow to equity, operating cycle, net working capital, highway firms

INTRODUCTION

Features of the highway sector are ripe for analysis, given that this sector is characterized by entry barriers caused by the necessity of investments in the realization of highway networks and for firms to be able to participate in tenders and concessions. These large investments limit the number of potential companies entering the sector, promote the formation of oligopolies and industry concentration and create a need for frequent state intervention to regulate the sector. In addition, the sector manages, in Italy and in other European countries, major routes of transfer for people and goods and as such the functioning of the sector is crucial to the transport systems in these countries and to the development of their economies.

In addition, the study of the sector is important when analyzing the profitability of companies in connection with their investments in maintenance and modernization of highways as such an analysis provides an indicator of a proper balance in the use of public concession instruments to provide and constantly maintain highway services for communities. In this vein, it must also be noted that given the service revenues and profitability of

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the highway sector at least as far as the management and maintenance of highways, the sector does not provide for the use of public funds allocated by the government. However when overtime or extensive research is agreed upon (for example, the construction of a third or fourth lane on a specific route or the development of a new stretch of highway), there has been a reduction in public aid over time in recent years in favor of new forms of financing. For example, the construction of the Brescia-Bergamo-Milan highway (the first example of a highway financed without charges to the state budget) was funded in part by shareholders' equity and in part through a long-term financial loan by the Cassa depositi e Prestiti, by the European Investment Bank and by other major Italian banks.

With regard to the financial results of the concessionaires, in 2012, revenues of firms amounted to 6.533 billion euro, of which approximately 1.728 billion (over 25%) was transferred between state VAT (596 million) and ANAS fees (1.132 billion) that is the premium on the rate used by the state for the maintenance of those networks; the remaining 4.805 billion went to dealerships. These values, divided by approximately 5,700 km, ensure that every kilometer of highway in Italy allows annual revenues of approximately 1,150,000 euro (300,000 euro to the state and 850,000 to dealerships). Toll revenues must be added to the revenues from sub-concessions and other activities undertaken by highway companies, part of which (between 2 and 20%) is turned over to the state.

Over the past two decades, there has been an increase in revenues of 270%, from 2.5 billion euro in 1993 to 6.5 billion in 2012. To understand the specificity of the sector, it must be recognized that the history of the highway sector in Italy began in April of 1922 when engineer Piero Puricelli developed the project of the Milano-Laghi highway an 84 km highway that seemed to have a stable customer base as it offered a connection to the classic resorts of the bourgeoisie of Milan. On December 1, 1922, the Società Anonima Autostrade di Milano was formed in Milan and obtained a concession for the construction and operation of a highway between Milan and the Alpine lakes. This was the first highway built in Italy. The highway concession included an obligation for the dealer to build roads and the ability to calculate toll revenues. Grants to build and operate businesses in the highway sector were governed by Law 1137/1929 which allowed for the responsibility of running public researchs as well as municipalities and provinces to be assigned to private consortia. Through these concessions, businesses acquired the ability to build highways with partial contributions from the state and to manage them for a specified period of time.

In 1928, the Azienda Autonoma Statale della Strada (AASS) was established and came to manage a road network of about 20,000 km in poor condition. In 1946 at the end of World War II, the AASS became the National Autonomous Company of National Roads (Azienda Nazionale Autonoma delle Strade or ANAS) which had the task of constructing and operating new roads and highways, including through the provision of concessions to other institutions, public or private. ANAS was established by Decree Law (DL) 38/1946 and DL 547/1948 subsequently entrusted it with the construction of new highways directly or concession to public or private entities. This concession to public and private entities could cover construction and management for only a period of time, thus determining the so-called concessions of highway construction and operation.

In Italy, the construction of highway networks was initiated with DL 5477/1948. In 1950, the company Autostrade S.p.A. was founded with limited shares and a majority public ownership as the Institute for Industrial Reconstruction (IRI) owned at least 51% of its capital. In 1956, the first agreement for the construction and operation of the Milanresearchers Rome-Naples route was signed and later of other routes which in some cases had previously been managed by ANAS. DL 463/1955 fixed a maximum concession duration of 30 years. The financing of highways was established to be 60% by the dealer and no more than 40% by the state.

The subsequent DL 287/1971 states that the sole purpose of highway concessionaires is the construction and operation of activities on licensed highways. The same act also provides that loans contracted for the construction of new works by concessionaires under public scrutiny are guaranteed by the state for the repayment of the principal and for interest payments until the full amount of the total investment for the construction of works is recouped, deducting the state's contribution.

The instrument through which the state operates this warranty is the Central Guarantee Fund (FCG) for highways which was established in 1968. With DL 287/1971 regarding the renewal of concessions, rules for all concessionaires were standardized and each held the title for only its own concessions. With the renewal of agreements with all concessionaires, the issuance of licenses for the construction of highways was suspended; in fact, this suspension was established by DL 492/1975, following which no more highway concessionaires were created and the research performed by existing companies focused only on adjustments such as additional lanes, fittings, etc. and on infrastructure projects necessitated by exceptional events. Only in 1999

did the IRI, through a public offering, put up for sale its stake in Autostrade S.p.A. and the Benetton group bought it with a majority. Then, in 2002, through a tender offer, it achieved an absolute majority. The group Gavio at the same time, purchased shares offered for sale by local governments, financial intermediaries and private entrepreneurs. Some public entities still remained shareholders of some concessionaires.

On December 19, 2002, ANAS approved new bylaws and appointed a board of directors and a supervisory board and as of January 1, 2003, it has been operating as a stock company. An attempt to grant a new set of concessions was carried out by DL 286/2006 which established a "single agreement", including in a single text the concession agreements and subsequent addenda adopted which limited tariff increases as a function of actual investments. It also provided innovative clauses under which, in the event of a persistent and serious breach, a concession could be terminated. This attempt was thwarted, however, both in the courts and with complaints to the European Commission (EC) which led to the initiation of infringement proceedings The EC infringement was then closed with single legal agreements signed in 2007, followed by the entry into force of DL 101/2008. A subsequent approval "en bloc" with agreements signed between 2009 and 2010 came with DL 191/2009.

Only indirectly is Directive 2014/23/EU which entered into force on April 17, 2014 and whose transposition by member states is expected by April 18, 2016, bound to affect the awarding of new concession contracts (directive concessions) under this framework. DL 138/2002, converted into DL 178/2002, transformed ANAS into a stock company. In 2012, the European highway network covered over 77,000 km, more than half distributed throughout Spain (14,701 km), Germany (13,879 km) and France (11,412 km). Italy with its 6,668 km, comprises about 8.5% of the European network. In 1970, Europe had about 15,000 km of highways and Italy with its 3,913 km, represented more than 25% of the total highways, second only to Germany (4,461 km). The Italian highway network, along with the German and French, experienced significant growth in the seventies which explains the slowdown of growth in recent years, more so than in countries such as Spain and Portugal. However, unlike Germany and France which maintained steady growth until at least the 2000s, the Italian highway system underwent a sharp slow down in its development in the 1980s and has remained virtually unchanged since.

This slow down has had consequences in terms of congestion of the highway network as measured by comparing the length of the network and the percentage of cars moving today on Italian highways. If, in fact, the Italian highway network currently comprises about 9% of the European network, it also comprises 15% of cars crossing the entire European highway network with a rate of highway density among the lowest in Europe, thus signaling problems of network congestion. Italy with 1.8 km of highway for every 10,000 cars, remains below the European average (3.4 km-10,000 cars) and far from the values of Spain (6.53), France (3.58) and Germany (2.99), thus highlighting the risks of congestion of highway traffic not only above the European average but also with respect to only those countries with major highway infrastructures (Spain, Germany and France).

In 2014, the Italian highway network had an extension of 6,757.8 km (5,820 km under concession and the remaining under the charge of ANAS) with a density of 22.4 km of highway per 1,000 km^2 of Italian territory for which there were 27 concessionaires. Autostrade per l'Italia now controls over 50% of the concessionary network. Along the network of highways in Italy, there are four border tunnels (Mont Blanc, Brenner, Frejus and St. Bernard) for a length of about 25 km, over 630 tunnels longer than 100 m and 1,555 bridges and viaducts representing almost 20% of the entire network. There are also 241 parking spaces, 485 stations for the collection of tolls and over 4,000 ports. The concessionary network is made up of 8,208 km of sound-absorbent pavement, 791 km of noise barriers and 625 photovoltaic plants that produce 12,279 MW per hour. Viability is ensured by 1,874 employees.

The Italian highway system has an extension lower than that of other types of transport, such as the rail network, spanning almost 17,000 km and the road network, spanning 30,000 km. However because of its linking role and the opportunity it affords private cars to travel over long distances, the highway network is the most used transport infrastructure: It is estimated that half of all passengers rely on cars in 70% of cases; the percentage drops to 47% for freight transport. From the birth of the highway until 2010, highway traffic has shown steady growth due to the increase in the number of cars present and improving socioeconomic conditions in Italy. This increase in highway traffic has necessitated an increase in infrastructure, though the highway system has remained virtually unchanged since, the 1980s. According to the European Commission, in Italy in 2011, 94.2% of passenger traffic moved on wheels as did 90% of freight traffic, well above the European average (91.4% for passenger traffic and 72.7% for freight) and its economic size in 2009 was estimated at 3.1% of GDP.

MATERIALS AND METHODS

Annual accounts are the main documents used for external reporting. These are compulsory documents comprising a balance sheet and an income statement which is governed by the Italian Civil Code, Article 2423 et seq. The document is drawn up by the board of directors of a company and submitted for approval to its shareholders. Financial statements were amended into Italian legislation by the content of the Fourth Council Directive of 1978 which started the process of unification at the European level in terms of financial statements. This process was part of the context of harmonization of corporate legislation, initiated in 1968 with the adoption of the first community directive. The national legislature implemented EEC Directives IV and VII with Legislative Decree n. 127 on April 9, 1991 with which community provisions were transposed into national legislation via a radical alteration of the entire body of legislation relating to financial statements of public companies, contained in the Civil Code.

Article 2423 of the Civil Code regulates financial statements as a whole, comprising balance sheets, income statements and notes. The second paragraph refers to a general clause regarding the preparation of financial statements, according to which "the budget must be clearly stated and must represent a true and fair view of the assets and financial situation of the company and the results of operations". This civil law introduced rigid mandatory schemes for the preparation of balance sheets and income statements through Articles 2424 and 2425, respectively. The compulsory statutory scheme emerges in the first paragraph of Article 2423-ter which states that the items are further set in Articles 2424 and 2425. However, this legislation allows further subdivisions or groupings, considering the obligation to add items not included in the annual account where their content is not included in the statutory form.

Regarding the presentation format of the balance sheet, the legislation imposes a pattern of contrasting sections divided into balance sheet assets, expressive of the investments made by the business entity and balance sheet liabilities and equity, expressive of sources financing the business. The model of the balance sheet was developed through the formation of four to five homogeneous categories of items, active and passive, divided into further subcategories. The balance sheet assets assume a classification of numbers based on the destination of investments that is, based on the type of use for which the investment is targeted in the management of the business. By contrast, balance sheet liabilities are classified on the basis of the origins of sources of financing that is the parties who have made funds available for the financing of units, divided first including equity and debt capital. The legislation then suggests a partial reclassification of receivables and payables and the underlying maturity, distinguishing between funds maturing before and after 12 months, the limit of which is conventionally referred to as being short, thus determining the time of realization of assets (loans) and settlement of liabilities (debts or funding sources) that is, the time of conversion of the currency assets and liabilities of the budget.

The balance sheet is further divided into macro classes. Macro class A is receivables from shareholders for capital contributions. These are amounts due to shareholders by the company in fulfillment of the subscription of share capital; the presence of this item shows the cases in which share capital is fully subscribed but paid only partially and, therefore, according to the principle of prudence, it is necessary to highlight any nonpayment as that fact expresses a reduction of share capital below the nominal value. Macro class B expresses fixed assets, divided into intangible, tangible and financial. Fixed assets are qualified by Article 2424-bis of the Civil Code: "assets intended for long-term use" in the business cycle. Concerning the valuation of property (Article 2426), fixed asset "are stated at cost of acquisition or production" and "the cost of fixed assets, tangible or intangible whose use is limited in time must be amortized each year over their estimated period of benefit."

Macro class C expresses current assets and is divided into four classes: inventories, accounts receivable, financial assets other than fixed assets and financial liquidity. Current assets express the complex of assets intended for use in management of the current cycle. Finally, macro class D includes accrued and deferred charges. Proceeding in the analysis of the balance sheet, the Civil Code has designated the passive section of the balance sheet for complex sources of financing. Shareholders' equity comprises macro class A of the liabilities in the balance sheet and is formed by the nominal value of share capital subscribed by the shareholders (even if not fully paid), reserves (clearly and singularly indicated) and profit (or losses as a negative) for the year and carried forward. The provisions for risks and charges are classified in macro class B to address risks and charges for a specific risk, not with standing the law creating generic provisions for risks and then only when the risk is certain or likely.

Macro class C of the balance sheet expresses termination indemnities paid to workers (called TFR in Italy, set aside pursuant to Article 2120 of the Civil Code), debts accrued by the company with respect to employees

and amounts to be paid to employees upon termination of employment, resignation, dismissal or retirement. The passive macro class D of the balance sheet expresses amounts due to third parties as sources of financing for the firm. Balance sheet liabilities are classified on the basis of the origins of funding sources with partial financial reclassification, in view of the indication required by law of the amounts due after one year. Debts are divided into financial debts (such as bonds and convertible bonds amounts due to shareholders for loans, bank debts and debts to other financial institutions) and operating debts (such as down payments, accounts payable and debt securities credit).

The legislation requires the provision of amounts owed to group companies but no further information regarding genesis finances or operating costs (such as accounts payable to subsidiaries, affiliates and parent companies). These are provided for in the categories for taxes payable, such as tax liabilities and payables to social security. Finally as a residual item, other debts must be listed. Balance sheet liabilities are closed by passive macro class E which expresses accruals and deferred income. In our research, we apply the approach of annual account analysis used for the agri-food sector with capital-intensive characteristics (Iotti and Bonazzi, 2015a) and have developed this approach using the following balance sheet assets and liabilities:

$$\begin{aligned} &A + Bfa^{int} + Bfa^{tan} + Bfa^{fin} + Cwc^{ar<12m} + Cwc^{ar>12m} + \\ &Cwc^{o<12m} + Cwc^{o>12m} + Cwc^{i} + Cwc^{ql} + Cl + D = \\ &= AE^{sc} + AE^{r} + AE^{\Pi} + A? + B + C + Df^{<12m} + Df^{>12m} \\ &+ Dwc^{ap<12m} + Dwc^{ap>12m} + Dwc^{o<12m} + Dwc^{o>12m} + E \end{aligned} \quad (1)$$

In Eq. 1, the left side expresses the total of the balance sheet and the Total investment (TA); the right side expresses the total liabilities and the Total Sources of financing (TS). On the left side, A represents receivables from shareholders for capital contributions, Bfa^{int} represents intangible fixed assets, Bfa^{tan} represents tangible fixed assets, Bfa^{fin} represents financial fixed assets and $Bfa^{int}+Bfa^{tan}+Bfa^{fin}$ = BFA where BFA represents the total investment in fixed assets. $Cwc^{ar<12m}$ represents working capital accounts receivable due within 12 months, $Cwc^{ar>12m}$ represents working capital accounts receivable due after 12 months, $Cwc^{o<12m}$ represents working capital other credits due within 12 months, $Cwc^{o>12m}$represents working capital other credits due after 12 months, Cwc^{i} represents working capital inventories, Cwc^{ql} represents working capital invoices of near liquid financial assets, Cl represents working capital liquidity and D represents active accrued accruals and deferrals.

In Eq. 1, on the right side, AE^{sc} represents share capital, AE^{r} represents reserves, A^{Π} represents retained profit from previous years, AΠ represents net profit from the year and $AE^{sc}+AE^{sc}+A^{\Pi}+A\Pi-A$ = ET where ET represents total shareholder capital, namely equity. B represents provisions for risks and charges and C represents termination indemnities paid to workers. $Df^{<12m}$ represents financial debts due within 12 months, $Df^{>12m}$ represents financial debts due after 12 months, $Dwc^{ap<12m}$ represents accounts payable of working capital due within 12 months, $Dwc^{ap>12m}$ represents accounts payable of working capital due after 12 months, $Dw^{co<12m}$ represents other working capital debts expiring within 12 months and $Dw^{co<12m}$ represents other working capital debts expiring after 12 months. For the purposes of our research, we have decided to express Eq. 1 in functional form; this form expresses the four major functions of the capital company: investments in fixed assets (BFA), investments or financing with Net Working Capital (NWC), investments or financing with Net Financial Position (NFP) and financing via equity (ET). We have expressed NWC as follows:

$$\begin{aligned} NWC = (&Cwc^{ar<12m} + Cwc^{ar>12m} + Cwc^{o<12m} + Cwc^{o>12m} + \\ &Cwc^{i} + D) - \left[\begin{array}{c} B + C + (Dwc^{ap<12m} + Dwc^{ap>12m} + Dwc^{o<12m} \\ + Dwc^{o>12m}) + E \end{array} \right] \end{aligned} \quad (2)$$

If NWC >0, NWC absorbs financial resources and means that the operating cycle of investments has a duration greater than zero. This expresses conventionally that the average duration of loans plus approximate stock duration less the average duration of debts in working capital is greater than zero. NWC >0 signifies a capital absorption, while NWC <0 signifies no generation of capital within the working capital cycle. NWC expresses the absorption of financial resources through purchasing, transformation and sales (Hill *et al*., 2010; Caballero *et al*., 2014; Darun *et al*., 2015). NWC quantifies the resources created (NWC <0) or absorbed (NWC >0) within the working capital management cycle (Love *et al*., 2007; Caballero *et al*., 2013). In Eq. 2 B, C and E are considered among the sources of financing for NWC. To express the role of financial debt between the sources of funds, we then express NFP as follows:

$$NFP = (Df^{<12m} + Df^{>12m}) - (Cwc^{ql} + Cl) \quad (3)$$

If is NFP <0, NFP absorbs financial resources which means that the firm has active financial resources plus financial borrowing. If NFP >0, the firm uses financial debt between the sources of funds and has active financial

resources less financial borrowing. Considering Eq. 1-3 as a set, we can express in Eq. 4 the balance sheet in strictly functional form as follows:

$$BFA + NWC = NFP + ET \quad (4)$$

In Eq. 4, we have the hypothesis that BFA = 0, NWC = 0, NFP = 0 and ET = 0. This hypothesis is certainly verified for BFA which may have a minimum value equal to zero and for ET which if negative determines the failure of the company. There are also three possible further ways to express Eq. 4, namely BFA+NWC+NFP = ET, BFA = NWC+NFP+ET and BFA+NFP = NWC+ET. We express that BFA+NWC = NIC where NIC is net invested capital and NFP+ET = NTS where NTS is net total source (of capital). We will use Eq. 4 to analyze the balance sheets of the firms in the sample. Again, Italian law requires the drafting within the balance sheet, of income statements aiming to quantify the result for the year in terms of net profit by the sum of positive and negative invoices. National law regulates that the income statement be formatted vertically in order to make explicit some intermediate profit results. In accordance with the principle of economic competence, the income statement is articulated in operational management areas.

Macro class A expresses the value of production as the value of production obtained by the firm, including not only production from sales but also from transformation processes. The value of production is divided into five classes, namely revenues from sales and services (A1), changes in inventories of works in progress and semifinished and finished products (A2), changes in products made upon order (A3), increases in internal construction (A4) and other income (A5). The production value is then added algebraic ally to the total cost of production, presented in macro class B where the cost of production is accounted on an accrual basis according to the nature of the cost, expressed in consumption of factors of production. Production costs are divided into nine classes: costs for raw materials, supplies, consumables and goods (B6); service costs (B7); costs for use of third-party assets (B8); personnel costs (B9); depreciation and amortization (B10); changes in inventories of raw materials, supplies, consumables and goods (B11); provisions for risk (B12); other accruals (B13); and other operating charges (B14).

The difference between value and cost of production, macro class A, unless B is designated for operating income or Earnings Before Interest and Tax (EBIT) is defined as the balance of the current operations of the company. To determine the cost of debt that is to determine how much capital the company has borrowed to finance its activities and to quantify its possible financial income, the legislation requires the insertion of macro class C and loss accounts, expressive of financial income and expenses. Macro class C includes income from equity investments (C15), other financial income (C16) and interest and other financial expenses (C17) as well as gains and losses stemming from foreign currency transactions (C17-bis). Additionally, Italian law has designated macro class D to be expressive of value adjustments of financial assets. Macro class D is divided into classes for revaluations and write-downs. Revaluations are class D18 and class D19 is write-downs of financial assets, including permanent loss of value.

Macro class E is expressive of extraordinary income and charges. The income statement form required by Italian law has been used in this research, in which we also apply the approach to income statement analysis used for capital-intensive characteristics of the agri-food sector (Iotti and Bonazzi, 2015a). In developing this approach, we have used the following equation for income statements:

$$\begin{aligned} &(S \pm \Delta Cwc^{i} + Cp + Os) - (Mc + Sc + Rc + Lc + Oc) = \\ &EBITDA,\ EBITDA - (Dc + Ac) = EBIT \\ &EBIT + (Ir\text{-}Ic) + (Rr - Dc) + (Xr\text{-}Xc) = \Pi^{bT} \\ &\Pi^{bT} - T = \Pi \end{aligned} \quad (5)$$

In Eq. 5, S expresses the company's sales, ΔCwc^{i} represents the change in inventory value calculated according to the principle of prudence, Cp represents the capitalization of costs for internal construction of fixed assets and Os expresses other sales. Mc represents the costs of raw materials, Sc the costs of services, Rc the costs of renting and leasing and Oc other costs. EBITDA is earnings before interest, tax depreciations and amortizations. It approximates the creation of liquidity without consideration of nonmonetary costs (Dc+Ac). Dc and Ac represent depreciations and amortizations. EBIT is earnings before interest and tax as an intermediate profit margin expressing the company's current operating income. Ir represents interest revenue, Ic represents interest charge and Ir-Ic = SF where SF represents the balance of financial management. Rr represents revaluation and Dc devaluation and Rr-Dc = SR where SR is the balance of revaluations and impairments of financial assets management. Xr represents extraordinary revenue while Xc represents extraordinary charges and Xr-Xc = SX where SX represents the balance of extraordinary management. Π^{bT} represents profit before taxes while T represents income taxes. Π represents net profit. It is worth noting that the income statement does not take into

account the actual time of manifestation of monetary operations and as such income margins (considered here as the variables EBITDA, EBIT and Π) do not express necessary cash flow generation as shown by several studies relating to companies with large investments in fixed assets (Fazzari and Petersen, 1993; Cleary, 1999; De Miguel and Pindado, 2001; Bagella *et al*., 2001; Caggese and Cunat, 2013) and working capital (Howorth and Westhead, 2003; Padachi, 2006; Caggese, 2007; Ukaegbu, 2014; Kroes and Manikas, 2014). In defining cash flow and its impact on various management decisions, an early definition has expressed cash flow as the sum of an accounting result (profit or EBIT) plus depreciation and amortizations (Breaver, 1966).

Other researchers (Gombola and Ketz, 1983) have expressed cash flows with consideration of the absorption or generation of cash during the working capital cycle (Rayburn, 1986; Wilson, 1987; Finger, 1994; Lorek and Willinger, 1996; Sweeney, 2014).

Researchers apply two methods to draft cash flow statements (Bradbury, 2011): The direct method (Dechow *et al*., 1998; Chittenden *et al*., 2000; Almeida *et al*., 2004; Farshadfar and Monem, 2013; Clacher *et al*., 2013) considers monetary revenues and costs as determinants of cash flow (CF) whereas the indirect method (Giacomino and Mielke, 1988; Carroll and Griffith, 2001; Bond *et al*., 2012) derives the quantification of CF from an income margin. In our research, we have applied this second method and would express cash flow statements as follows:

$$\Pi + (Dc + Ac) + SF = CF,\ CF \pm \Delta NWC = OCF$$
$$OCF \pm BFA = UFCF,\ UFCF - SF = FCFE \quad (6)$$

In Eq. 6, CF represents cash flow, OCF represents operating cash flow, UFCF represents unlevered free cash flow and FCFE represents cash flow to equity and free cash flow to equity. UFCF represents cash flow available for the remuneration of financial debt and equity capital, while FCFE represents cash available for distribution to shareholders. Cash flow statement margins are applied to calculate Interest Coverage margins (ICRs), particularly in capital-intensive firms (Iotti and Bonazzi, 2015b). Again, only if it is verified that FCFE >0 is it possible to pay a dividend to shareholders. If UFCF <0, the firm is not able to pay the cost of debt even if economic margins (EBITA, EBIT and Π) are positive.

On this topic, it should be noted that even in cases of positive profits, firms may have difficulty repaying their debts because of the absorption of capital. The joint application of economic and financial approaches for the assessment of management can also give different results as shown for other sectors by several studies (Greenberg *et al*., 1986; Dechow and Dichev, 2002; Sgroi *et al*., 2015).

RESULTS AND DISCUSSION

Data collection and research plan: To perform the analysis, we defined a sample of 12 companies operating in the highway sector in Italy. All 12 companies in the sample are active with ATECO 2007 code "522120: Management of roads, bridges, tunnels".

In the sample, we have not considered Autostrade per l'Italia which because of the size of its grant (2,854 km) would cause asymmetry in investments and sales in the sample firms. Overall, 12 companies have licensed 1,776 km of highway (148 on average for each highway) that is about 26% of all highways in Italy (45% without the weight of Autostrade per l'Italia).

The 12 companies have been chosen based on availability in the database "Computerized analysis of Italian firms", referred to as AIDA, of at least three years of data. The data analysis has been performed using the SPSS statistical package issue 19.

In the research, we have considered the following 12 highway concessionaires: Società Autostrada Torino researchers Alessandria researchers Piacenza S.p.A. (10 years of data), Autostrada del Brennero S.p.A. (10 years of data), Autostrada Brescia Verona Vicenza Padova S.p.A. (4 years of data), Strada dei Parchi S.p.A. (10 years of data), Autovie Venete S.p.A. (10 years of data), Autostrada dei Fiori S.p.A. (10 years of data), Concessioni Autostradali Venete S.p.A. (6 years of data), Autostrada Torino researchers Ivrea researchers Valle d' Aosta S.p.A. (10 years of data), Autostrada Torino researchers Savona S.p.A. (10 years of data), Sutostrade Centropadane S.p.A. (10 years of data), Società di Progetto Autostrada Asti researchers Cuneo S.p.A. (9 years of data) and Tangenziale di Napoli S.p.A. (10 years of data). Overall, we have analyzed 109 years of data with no missing data in the database.

The most recent year is 2014, in which the 12 firms reached an amount of 1.618 billion euro in sales, 8.059 billion euro in investments, 102 million euro in taxes paid and 5,000 workers employed. Average sales were 911.244 euro per km of highway per year. This study develops the analysis as follows: We reclassify the annual accounts of 12 highway firms included in the sample, applying descriptive statistics to balance sheets, income statements and cash flow statements; we test whether there are statistically significant correlations between economic margins (variables EBITA, EBIT and Π) and financial margins (CF, OCF, UFCF and FCFE) and (c) we test whether there are statistically significant differences between economic margins (EBITA, EBIT and Π) and financial margins (CF, OCF, UFCF and FCFE).

Table 1: Balance sheet data of the sample firms (109 years of data) with reclassification of balance sheets with financial forms, using the approach from Eq. 1

Value	Mean (€)	Mean (% TA)	Median (€)	Median (% TA)	SD	Skewness	Curtosis
A	12,477,674	2.35	-	0.00	41,264,994	3.074	7.591
Bfaint	51,179,475	9.65	722,183	0.19	183,719,283	4.315	17.388
Bfatan	291,826,906	55.00	222,168,563	59.84	305,008,267	1.484	1.280
Bfafin	73,559,390	13.86	12,990,897	3.50	171,474,943	2.743	6.278
FA	416,565,772	78.52	283,462,563	76.35	340,293,389	0.747	-0.698
Cwcar<12m	12,230,552	2.31	3,830,820	1.03	20,482,401	2.044	2.738
Cwcar>12m	40,211	0.01	-	0.00	305,516	9.831	99.858
Cwco<12m	27,956,588	5.27	23,221,432	6.25	30,843,996	4.357	26.541
Cwco>12m	6,204,358	1.17	1,057,225	0.28	11,245,418	2.335	4.819
Cwci	3,448,706	0.65	992,317	0.27	11,735,831	9.090	89.426
Cwcql	13,406,214	2.53	-	0.00	33,806,849	2.887	7.845
Cl	37,390,113	7.05	9,154,034	2.47	55,260,781	1.874	2.819
D	835,229	0.16	481,495	0.13	1,051,918	1.807	2.519
TA	530,555,417	100.00	371,259,800	100.00	385,669,320	0.609	-0.790
Aesc	90,462,560	17.05	55,472,175	14.94	76,508,708	0.831	0.386
Aer	85,608,894	16.14	27,213,258	7.33	120,936,927	1.655	1.835
AEP	3,123,243	0.59	-	0.00	9,630,410	1.284	3.244
AP	15,131,726	2.85	9,781,643	2.63	19,111,514	1.355	1.961
ET	194,326,423	36.63	163,245,582	43.97	162,602,102	0.868	-0.080
B	60,637,542	11.43	26,583,287	7.16	132,916,578	3.045	8.122
C	7,191,448	1.36	7,702,770	2.07	5,493,415	0.481	-0.339
Df<12m	44,151,504	8.32	492,512	0.13	93,371,126	3.097	9.431
Df>12m	104,049,605	19.61	785,152	0.21	233,075,532	2.888	7.448
Dwcap<12m	21,829,250	4.11	15,832,019	4.26	21,019,756	1.905	5.168
Dwcap>12m	1,503,701	0.28	-	0.00	5,115,231	5.553	35.493
Dwco<12m	76,317,781	14.38	27,033,704	7.28	198,758,172	4.379	18.635
Dwco>12m	20,001,857	3.77	462,075	0.12	41,382,595	2.632	6.554
E	546,306	0.10	223,325	0.06	745,680	2.077	4.203
TS	530,555,417	100.00%	371,259,800	100.00%	385,669,320	0.609	-0.790

Annual account data analysis: The analysis of the 12 sample firms first considers annual account data (Table 1) which confirm the high level of capital intensity required for highway activities (the median value of TA:S is 4.425); sector firms are capital intensive, particularly considering fixed assets (the median value of FA:S is 3.378). The sample data have positive skewness for balance sheet values with mean values higher than median. The Kolmogorov researchers Smirnov D statistic on normality of distribution shows that all balance sheet values do not follow a normal distribution. Capital absorption is relevant in fixed assets (the median value of FA is 78.52% of TA) and this confirms that highway firms need to have relevant investments in fixed assets, particularly for Bfa^{tan} (59.84% of TA).

FA investments have an effect on increasing the source of capital needed to finance long-term investments to be covered with ET or $Df^{>12m}$. To cover their financial needs, the firms in the sample use equity (ET) as the first source of capital, given the fact that the median value of ET is 43.97%. Sample firms rarely finance investments with financial debts; in fact, median values are $Df^{>12m}$ = 0.21% of TA and $Df^{<12m}$ = 0.13% of TA. The values of financial debt are particularly asymmetric (3.097 for $Df^{<12m}$ and 2.888 for $Df^{>12m}$) and, in fact, the mean values are $Df^{>12m}$ = 19.61% of TA and $Df^{<12m}$ = 8.32% of TA. Moreover, it is worth noting that stable sources of funding (ET + $Df^{>12m}$) are 44.18% of TA while FA is 78.52% of TA and stable sources of finance are not able for median values to cover financial needs to finance FA investments.

A part of FA investments is then financed with short-term loans, expressing a typical matter of financial risk. In fact, the sample firms frequently cover FA investments via short-term commercial debts. Highway firms have no delay in collecting their accounts receivable ($Cwc^{ar<12m}$+$Cwc^{ar>12m}$) from consumers but they frequently experience large delays in payment from their suppliers because of their bargaining strength. The average cycle ($Cwc^{ar<12m}$+$Cwc^{ar>12m}$), expressed by AR_DAYS could be calculated as ($Cwc^{ar<12m}$+$Cwc^{ar>12m}$)×365 : S. AR_DAYS has a median length of 16.665 days (the mean is 41.897 days). Accounts payable ($Dwc^{ap<12m}$+$Dwc^{ap>12m}$) are also an important source of capital (the mean value is 4.39% and the median value is 4.26% of TA). AP_DAYS which can be calculated as ($Dwc^{ap<12m}$+$Dwc^{ap>12m}$)×365: (Mc+Sc) has a median length of 255.509 days (the mean is 329.047 days).

Particularly, the highway firms analyzed herein have important other accounts payable ($Dwc^{o<12m}$+$Dwc^{o>12m}$) as sources of capital (the mean value is 18.15% of TA and the median value is 7.40% of TA) because of the great delay in payment of other accounts payable (OAP_DAYS) which can be calculated as ($Cwc^{ap<12m}$+ $Cwc^{ap>12m}$)×365: S (an approximation, given that S does not have a direct impact on the size of other accounts payable). OAP_DAYS has a median length of 119.624

Table 2: Balance sheet data of the sample firms (109 years of data) with a reclassification of balance sheets in functional form, using the approach from Eq. 4

Value	Mean (€)	Mean (% TA)	Median (€)	Median (% TA)	SD	Skewness	Curtosis
FA	416,565,772	142.79	283,462,563	138.72	340,293,389	0.747	-0.68
NWC	-124,834,567	-42.79	-60,706,593	-29.71	208,699,796	-2.394	6.223
NIC	291,731,205	100.00	204,342,770	100.00	293,654,599	1.651	1.953
ET	194,326,423	66.61	163,245,582	79.89	162,602,102	0.868	-0.08
NFP	97,404,782	33.39	17,166,767	8.40	305,957,373	1.97	3.672
TNS	291,731,205	100.00	204,342,770	100.00	293,654,599	1.651	1.953

Table 3: Income statement data of the sample firms (109 years of data) with reclassification of income statements using a value-added approach from Eq. 5

Value	Mean (€)	Mean (% S)	Median (€)	Median (% S)	SD	Skewness	Curtosis
S	106,900,971	100.00	83,895,946	100.00	89,222,369	1.108	0.812
DCwcj	-843,268	-0.79	4,449	0.01	11,261,726	-10.318	107.347
Cp	1,374,730	1.29	294,194	0.35	2,323,603	2.849	9.237
Os	4,935,238	4.62	2,919,696	3.48	11,942,565	8.916	87.291
Mc	-2,162,280	-2.02	-1,727,123	-2.06	1,775,860	-1.396	2.204
Sc	-23,720,138	-22.19	-20,889,250	-24.90	17,266,633	-0.827	0.774
Rc	-798,673	-0.75	-543,823	-0.65	959,998	-3.288	13.586
Lc	-21,542,149	-20.15	-19,119,411	-22.79	16,193,233	-0.972	0.892
Oc	-9,777,737	-9.15	-6,149,486	-7.33	11,688,782	-1.893	3.501
EBITDA	54,366,695	50.86	46,665,998	55.62	49,749,164	1.244	1.218
Dc	-7,085,754	-6.63	-711,458	-0.85	20,117,335	-2.92	7.243
Ac	-19,173,972	-17.94	-13,726,417	-16.36	16,579,924	-0.619	-0.797
EBIT	28,106,969	26.29	23,214,467	27.67	23,084,492	0.95	0.85
1SF	-4,557,587	-4.26	-478,139	-0.57	18,049,959	-1.636	3.151
SR	-274,028	-0.26	-	0.00	1,124,834	-6.106	39.986
SX	939,661	0.88	15,859	0.02	2,929,584	4.351	28.004
PbT	24,215,015	22.65	16,927,448	20.18	28,516,648	1.374	1.89
T	-9,083,289	-8.50	-6,462,765	-7.70	9,679,758	-1.393	2.052
P	15,131,726	14.15	9,781,643	11.66	19,111,514	1.355	1.961

Our processing of directly collected data

days (the mean is 328.871 days). The high capital generation due to the length of AP_DAYS and OAP_DAYS confirms the bargaining power of highway firms with regard to their suppliers. It is worth noting that the sample firms because of their types of activity are often without inventory values.

In Table 2, we express Net Invested Capital (NIC) as the sum of FA and NWC. Data show that FA is 138.72% (the mean is 142.79%) of NIC while NWC is-29.71% of NIC (the mean is-42.79%). These data are particularly interesting because they confirm that highway firms finance their FA investments via NWC which provides a source of cash. This is defined as an aggressive strategy of working capital management (Grablowsky, 1984; Weinraub and Visscher, 1998) and, even if useful to generate financial resources for the investment cycle, NWC <0 is inversely correlated with financial default, expressing a particularly risky strategy of short-term financial funding (Hill *et al*., 2010). Out of 109 cases in the sample, NWC = 0 in 13 and NWC <0 in 96, expressing a high level of capital generation to finance FA investments via the NWC cycle. ET is 79.89% of NIC (the mean is 66.61%) while NFP is 33.39% of NIC (the mean is 8.40%). The ratio between NFP and ET (net financial position equity ratio: NFP_E_R) is 0.105 (the mean is 0.501), expressing a low level of financial indebtedness, thus confirming the relevance of equity (and NWC cycle) in financing highway firms.

Further information on the typical characteristics of firms in the sector results from an analysis of economic data in Table 3. The median value of S amounts to 83,895,946 euro and the major production factors are services (20,889,250 euro, 24.90% of S) and labor (19,119,411 euro, 22.79% of S). EBITDA has a median value of 46,665,998 euro (55.62% of S) and a mean of 54,366,695 euro. Ac+Dc absorbs a median value of 17.21% of S and EBIT then has a median value of 23,214,467 euro (27.67% of S) and a mean of 28,106,969 euro. The median values of EBITDA and EBIT are lower than the mean values as expressed by a comparison with median values, having EBITDA = 0 in 105 cases out of 109 and EBIT = 0 in 104 cases. Financial management (SF) absorbs a median value only 0.57% of S (i.e., 65.60% of EBIT and 27.20% of EBITDA) in mean values and the data highlights that SF = 0 in 39 cases out of 109, contributing to profit generation while SF < 0 in 70 cases, in all of which EBITDA >SF in absolute value, thus expressing EBITDA's ability to cover SF charges when negative. The same goes for EBIT.

Π has a median value of 9,781,643 euro (11.66% of S) and a mean of 15,131,726 euro and Π = 0 in 94 cases out of 109. It is worth noting that 10 cases of negative Π are concentrated in one firm and 4 cases of negative Π are concentrated in a single other firm, thus confirming firms' capacity to generate income via highway management in

Table 4: Cash flow statements of the sample firms (97 years of data) using an indirect approach from Eq. 6

Value	Mean (€)	Mean (% FCFE)	Median (€)	Median (% FCFE)	SD	Skewness	Curtosis
Õ	15,532,460	-295.45	9,910,936	261.95	19,666,843	1.339	1.824
+(Dc+Ac)	27,545,488	-523.95	16,200,718	428.20	29,833,241	1.641	2.315
+SF	4,951,773	-94.19	998,881	26.40	18,461,506	1.581	2.957
CF	48,029,721	-913.59	37,795,080	998.96	43,287,684	1.138	0.796
±DNWC	6,968,291	-132.55	232,217	6.14	114,279,825	4.597	49.446
OCF	54,998,012	-1046.13	40,764,747	1077.45	121,442,068	4.074	37.82
±DFA	-55,303,502	1051.94	-25,074,105	-662.73	106,258,055	-6.103	48.319
UFCF	-305,490	5.81	5,749,111	151.95	53,743,394	-3.09	19.463
-SF	-4,951,773	94.19	-998,881	-26.40	18,461,506	-1.581	2.957
FCFE	-5,257,263	100.00	3,783,455	100.00	58,035,207	-3.055	17.241

Our processing of directly collected data

a large majority of cases. An analysis of income statements also shows that the data have a high level of positive and negative skewness and kurtosis for the majority of values. Therefore, the Kolmogorov researchers Smirnov D statistic on normality of distribution shows that the values of these income statements do not follow a normal distribution.

The analysis of cash flow statements (Table 4) calculated from 97 years of data (12 first years as base years for every firm, considered in the calculation) highlights some typical management characteristics of firms in the highway sector: Income margin profit (Π) generates a relevant source of cash (9,910,936 euro as a median value that is, 261.95% of FCFE); CF because of the relevance of Dc+Ac is particularly high and amounts to 37,795,080 euro as a median value that is, 998.96% of FCFE; the dynamic of NWC investment is stable and does not absorb a significant amount of liquidity generated by operations (CF); OCF is then 40,764,747 euro as a median value that is, 1,077.45% of FCFE; the dynamic of FA investments absorbs the most part of OCF as expressed by UFCF values, making a median value of 5,749,111 euro that is, 151.95% of FCFE. SF absorbs a median value of 998,881 euro (26.40% of FCFE).

Given these results, the analysis shows that CF = 0 in 95 cases out of 97, OCF = 0 in 88 cases out of 97, UFCF = 0 in 62 cases out of 97 and FCFE = 0 in 58 cases out of 97. In the 97 considered cases, EBITDA = 0 in 95 cases, EBIT = 0 in 94 cases and Π = 0 in 84 cases. The analysis shows in several cases that the sample firms are not able to meet their financial commitments and pay the costs of their debt.

The median value of FCFE <0 represents the inability of firms in the sample, on average to proceed to a distribution of profits if detected and eventually repay the NFP with the need to acquire additional debt (or improve equity capital) to financially support the business management cycle. The analysis shows that the sample firms are not able to distribute dividends in 58, even considering their high levels of economic margins (as a ratio of S).

Given the high level of investment required to access the sector and given the necessity to finance via maintenance the required level of highway services even through the adoption of technology, this analysis of the differences between income and financial margins highlights necessary considerations about the financial requirements for highway maintenance and to ensure the required payout ratio, given the high level of equity provided by shareholders to firms in the sample. This analysis could allow for corrections to prevent financial crises, considering the aggressive NWC policies of the firms analyzed.

Regarding these topics, we should consider that EBITDA and EBIT as economic margins are frequently applied to assess the sustainability of a business cycle and to approximate cash flow, particularly regarding debt financing for ICRs (Moir and Sudarsanam, 2007) and several researchers have highlighted that ICRs calculated using an economic (income) approach could be significantly different from ICRs calculated using a financial approach (Bonazzi and Iotti, 2014; Iotti and Bonazzi, 2015c). Moreover, it is necessary to express that only in a steady-state situation, in which there is no change in the extension granted and received by customers and suppliers and without turnover variation (expressed as $\Delta S = 0$) is there equality, even with lag time, between income and financial margins in the NWC cycle as in the case of $\Delta NW = 0$. Particularly in the case of highway firms, FA investments are relevant and concessionaires have to maintain the efficiency of highways with ordinary and extraordinary investments in route maintenance, thus absorbing capital and investing in the FA cycles.

Economic and financial margins analysis On these themes, the research has aimed to verify whether margins calculated using an economic approach (EBITDA, EBIT and profit) correlate with and differ significantly from margins calculated using a financial approach (CF, OCF, UFCF and FCFE). The Kolmogorov researchers Smirnov D statistic on normality of distribution shows that all

Table 5: Correlation between income and financial margins using a nonparametric approach (Spearman's r)

Values	Mean	EBITDA	EBIT	PROFIT	CF	OCF	UFCF	FCFE
EBITDA	Corr. r Spearman	1	.940**	0.636**	.985**	.679**	.233*	0.191
	Sig. (2-tailed)		0	0	0	0	0.021	0.061
	N	97	97	97	97	97	97	97
EBIT	Corr. r Spearman	.940**	1	0.605**	.928**	.627**	.226*	0.157
	Sig. (2-tailed)	0	.	0	0	0	0.026	0.124
	N	97	97	97	97	97	97	97
PROFIT	Corr. r Spearman	.636**	.605**	1	.563**	.396**	0.146	.355**
	Sig. (2-tailed)	0	0	0.	0	0	0.154	0
	N	97	97	97	97	97	97	97
CF	Corr. r Spearman	.985**	.928**	0.563**	1	.683**	.217*	0.136
	Sig. (2-tailed)	0	0	0	.	0	0.033	0.185
	N	97	97	97	97	97	97	97
OCF	Corr. r Spearman	.679**	.627**	.396**	.683**	1	.484**	.417**
	Sig. (2-tailed)	0	0	0	0	.	0	0
	N	97	97	97	97	97	97	97
UFCF	Corr. r Spearman	.233*	.226*	0.146	.217*	.484**	1	.888**
	Sig. (2-tailed)	0.021	0.026	0.154	0.033	0	.	0
	N	97	97	97	97	97	97	97
FCFE	Corr. r Spearman	0.191	0.157	.355**	0.136	.417**	.888**	1
	Sig. (2-tailed)	0.061	0.124	0	0.185	0	0	-
	N	97	97	97	97	97	97	97

**Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2-tailed)

Table 6: Comparison of economic and financial margins using a nonparametric approach for paired samples (T Wilcoxon)

Couple	T-Wilcoxon for paired sample stand. stat	Observ.	Sig. (2-tailed)
Couple 1 EBITDA-CF	-7,623a	97	0.000**
Couple 2 EBITDA-OCF	-1,858a	97	0.063
Couple 3 EBITDA-UFCF	-7,630a	97	0.000**
Couple 4 EBITDA-FCFE	-7,875a	97	0.000**
Couple 5 EBIT-CF	-7,846b	97	0.000**
Couple 6 EBIT-OCF	-4,759b	97	0.000**
Couple 7 EBIT-UFCF	-5,957a	97	0.000**
Couple 8 EBIT-FCFE	-6,198a	97	0.000**
Couple 9 P-CF	-8,468b	97	0.000**
Couple 10 P-OCF	-6,583b	97	0.000**
Couple 11 P-UCFE	-2,819a	97	0.005**
Couple 12 P-FCFE	-3,726a	97	0.000**

**The relation is significant at the 0.01 level (2-tailed). *The relation is significant at the 0.05 level (2-tailed). A expresses positive rank sign. B expresses negative rank sign

distributions considered margins, both economic and financial do not follow a normal distribution so it has been necessary to apply a nonparametric approach such as the Spearman's rho (ρ) test to test correlations between margins. The correlation calculated with the nonparametric approach (Table 5) shows several significant correlations between margins with high significance (1.00%). EBITDA and EBIT are particularly correlated with other income margins and with CF and OCF while they are slightly correlated with UFCF and not correlated with FCFE. Π is predictive of financial margins, resulting in correlation with FCFE but not with UFCF. Even financial margins are correlated with one another, though CF is slightly correlated with UFCF and is not correlated with FCFE.

The comparison between income (EBITDA, EBIT and Π) and financial (CF, OCF, UFCF and FCFE) margins aims to evaluate the significance of differences between mean values (Table 6). This analysis determines whether different margins can be applied as substitutes for one another and even give information to managers and banks to apply correct margins to assess the sustainability of firms' cycles. The KolmogorovresearchersSmirnov D statistic on normality of distribution shows that all income and financial margins do not follow a normal distribution, so it has been necessary to apply a nonparametric approach, such as the Wilcoxon T statistic (Wilcoxon matched-pairs signed-rank test). The analysis is articulated, considering 12 comparisons and a comparison of pairs using a nonparametric approach highlights that it is possible to reject the null hypothesis of equality between means by applying a two-sided test with significance at 1% in 11 cases out of 12. Only paired-sample comparisons of EBITDA and OCF using Wilcoxon T statistics do not reject the null hypothesis of equality of means.

An analysis of the economic margins shows that for the sample firms, income margins (EBITDA, EBIT and Π) differ from financial margins (CF, OCF, UFCF and FCFE) and it is not possible to evaluate firms' management cycles or financial sustainability by applying income margins instead of financial margins with the only

exception of EBITDAresearchersOCF approximations (as exposed by analysis of paired samples). On this topic, the data show that EBITDA >CF in 88 cases out of 97, EBITDA >OCF in 56 cases out of 97, EBITDA >UFCF in 87 cases out of 97 and EBITDA >FCFE in 89 cases out of 97. Additionally, EBIT >CF in 8 cases out of 97, EBIT >OCF in 23 cases out of 97, EBIT >UFCF in 78 cases out of 97 and EBIT >FCFE in 78 cases out of 97. Π >CF in 2 cases out of 97, Π >OCF in 13 cases out of 97, Π >UFCF in 58 cases out of 97 and Π >FCFE in 62 cases out of 97.

CONCLUSION

The analysis conducted in Italy has allowed us to qualify firms operating in the highway sector as capital-intensive firms. Particularly, investments in FA are, in absolute value, higher than S and are financed primarily with ET and with NWC. This assumes that sources of finance are often negative. The sample data show that, in any case, the income margins of companies are positive with high levels of profitability in percentage of S. The main difficulties for firms are related to the financial cycle. In fact, the financial margins (OFC, UFCF and FCFE in particular) of sample firms are worse than their economic margins (EBITDA, EBIT and Π) with various cases of negative financial margins.

On this topic, the research has been useful in concluding that income margins are statistically different and higher than financial margins, a result gathered from applying T Wilcoxon statistics for paired samples. In particular, financial margins (especially UFCF and FCFE), although related are statistically different from the economic margins represented by EBITDA, EBIT and Π. The generation of FCFE is a critical element of highway firms, given the result of FCFE = 0 in 58 cases out of 97 in the analysis, compared with Π = 0 in 84 cases out of 97. Given the differences that exist between economic and financial margins (and, frequently, given greater values for income margins compared with income margins), it is essential that highway firms apply cash flow statement analyses to quantify properly their generation of cash flows.

The phase shift between the economic and financial cycles in the highway sector shows that the absorption of financial resources, particularly due to the cycle of investments in FA, means that financial margins cannot be properly approximated by applying economic margins in many cases, particularly if the aim is to estimate cash flow generation. The analysis has thus shown that firms in the sector, although able to generate a high return in relation to sales may suffer from a lack of liquidity and an analysis relating to this must be carried out using financial margins as income margins, even when related, differ significantly from financial margins.

Despite its useful conclusions, this research has some limitations. Firstly, the sample analyzed is related to a small number of firms (12) on a time series of 10 years with a total of 109 observations (97 for financial margins). It could be useful to extend the analysis to a larger sample; the analysis could even be repeated over the next few years also considering the effects of current changes in European rules about public concessions in the highway sector.

The research could be further developed through an analysis of cash flow to equity and profit generations and through an application of multiple regression models to the sample firms or even by an extension of the research to the whole highway sector. On this topic, it could be useful to analyze other European and non-European countries with the aim of comparing the profitability of highway firms with other types of firms. Conclusions could be useful in publicly comparing the profitability of highway firms, the values of their public services and state budget advantages brought about by highway concessions.

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