Analysis of the relationship between liquidity and profitability

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Liquidity and profitability are some of the most studied concepts of financial management within the area, there is a vast literature in this field. The interaction between these two variables was seen by many economists as over time like Hirigoyen G. (1985), Eljelly A. (2004) and Assaf Neto, A. (2003).

Background and main questions

One of the main issues regarding the management of an enterprise is the compromise to be made between low profitability and high liquidity that the current assets are offering. According to the economist Assaf Neto, liquid assets are usually less profitable than fixed assets. Moreover he says that investing in working capital does not generate sales or production.

However, Hirigoyen (1985) argues that on mid-term and long-term the relationship between liquidity and profitability could be positive, meaning that a low liquidity would lead to lower profitability due to a greater need for loans and a low profitability would not generate sufficient cash flow to finance the expansion of its needs for working capital, purchase new fixed assets, outstanding loans, etc. And it ends up compromising liquidity, thus forming a vicious circle.

In 2004 Eljelly published an article on this subject, considering that capital management becomes even more important during periods of crisis, “management is important in good times and take a much greater importance during troubled time” Also, according to him, an effective management of a company’s level of liquidity is particularly important for business profitability and welfare.

Firstly I will analyze if there is a short-term negative relationship between liquidity and profitability, and then observe if on the medium term this correlation is positive.

Therefore the first two questions to be responded will be:

1) Is there a negative relationship between liquidity and profitability on the short run?

2) Is there a positive relationship between liquidity and profitability on the medium to long term?
Also, the period studied includes year 2008, when the global financial crisis erupted. After the collapse of hedge funds and U.S. investment bank Lehman Brothers, at that time the market has experienced a credit crisis that leads to lower production, sales and availability of funds for corporations. (New York Times, 2009)

Following this scenario a new hypothesis can highlighted:

3) Did the companies with a better liquidity ratio have a better performance during the financial crises of 2008?

**Justification and Purposes of the study**

The work is justified because all the researched concepts are widely known and accepted, i.e. there is a wide literature inside the financial management area regarding the concepts of liquidity and profitability.

My research differs from these previous studies in the aspects that it uses more recent data, also including a crises period in the analyses. Also my sample consists of much larger companies, since I took the data from the main airline carriers of the world.

Thus the problem the study deals with is to empirically test the theoretical hypothesis regarding the relationship between liquidity and profitability. First it will be tested the tradeoff in the short term, then the positive interdependence on the medium to long term, and finally the relationship during the crises year.

**Literature review**

In this section I will provide a critical analysis of the most relevant theories, from the clasical to the modern approaches, also presenting the theoretical concepts of the studied field, the definition of the main variables, as the main theories and researches relating the relationship between liquidity and profitability.

Profitability can be defined as the main form of measuring the economic success of a firm in terms of the capital invested in it. This economic success is determined by the extent of the net accounting profit.

According to Shim and Siegel (2000, pp.46-47) accounting liquidity is the company’s capacity to liquidate maturing short-term debt (within one year). Maintaining adequate liquidity is much more than a corporate goal is a condition without which it could not be reached the continuity of a business. Solvency and liquidity are two concepts that are closely related and reflect upon the actions of company’s working capital policy. A low liquidity level may lead to increasing financial costs and result in the incapacity to pay its obligations.
According to the research conducted by Chandra in 2001, normally a high liquidity is seen as a sign of financial strength. However, some authors like Assaf Neto believe that a high liquidity can be as undesirable as a low one. This would be a consequence of the fact that current assets are usually less profitable than fixed ones. Money invested in assets generates less revenue than fixed assets, thus representing an opportunity cost.

According to Assaf Neto (2003, p.22), the greater the amount of funds invested in current assets, the lower the profitability, and by the same time the less risky is the working capital strategy. In this situation, the returns are lower in the case of a greater financial slack, in comparison to a less liquid working capital structure. Conversely, a smaller amount of net working capital, while sacrificing the safety margin of the company, by raising its insolvency’s risk, positively contributes to the achievement of larger return rates, since it restricts the volume of funds tied up in assets of lower profitability. This risk-return ratio behaves in a way that no change in liquidity occurs without the consequence of an opposite move in profitability.

However, Hirigoyen (1985) argues that mid-term and long-term relationship between liquidity and profitability could be positive, meaning that low liquidity would lead to lower profitability due to a greater need for loans and low profitability would not generate sufficient cash flow, thus forming a vicious circle.

A company with low liquidity and high profitability will have to increase it’s lending, resulting to increased financial costs. This would certainly lead to increasing interest rates, given that resources cheap are depleting rapidly. In addition, enlarging the level of the debt, company’s credit risk increases, causing increasing interest rates charged by their financiers. Under these conditions, the company must plan to obtain from suppliers more time, resulting in the acquisition of more expensive materials. Also, the enterprise will not be able to enjoy discounts offered by anticipating financial payments instead bear interest and late payment penalties for various bills, taxes and others. After all this process liquidity problems might get bigger.

Moreover, a firm that has low profitability and high liquidity does not generate sufficient resources to finance expansion of its working capital needs, acquiring new assets, overdue loans, etc. And finally the liquidity turns out to become lower.

Thus Hirigoyen, profitability and solvency are a necessary condition for the existence of a healthy company and both of them are the subject to the strategy adopted in the medium and long term.

**Empirical Review**

In 1997 Smith and Begemann studied if the maximization of the firm's returns could threaten its liquidity, and the pursuit of liquidity had a tendency to dilute returns. They analyzed the relation between working capital measures and return on investment (ROI) for a sample of industrial firms listed on the Johannesburg Stock Exchange (JSE). The statistical test results showed that a traditional working capital leverage ratio, current
liabilities divided by funds flow, displayed the greatest associations with return on investment. Traditional liquidity ratios as current and quick ratios registered insignificant associations.

In 2005 Pimentel analyzed a sample of retailing companies in the Brazilian market for the period of 2000 to 2003. The results obtained where that the larger the current ratios, the smaller the ROE, therefore it was demonstrated a negative correlation among liquidity and profitability on the short run. His study supports the main literature on the relationship between liquidity and profitability.

For the medium run they analyzed Hirigoyen Hypothesis that the companies with high liquidity but low profitability would have its current ratio reduced, and that companies with low liquidity and high profitability would have the returns reduced. They rejected this hypothesis based on two-dimensional analyses, which showed that 72% of their sample moved in disagreement with this theoretical prediction.

Raheman and Nasr (2007) studied the relationship between capital and earnings management for 94 companies listed on the Stock Exchange in Karachi, Pakistan. One of their findings was to obtain a significantly negative relationship between liquidity and profitability of analyzed companies.

In 2007 García-Teruel and Solano have studied the effects of working capital management on the profits made from use of assets (ROA) for companies. They analyzed 8872 companies and found out that shortening the cash conversion cycle had no significant effect on the profitability of companies.

**Sample selection and data collection**

I decided to use the airline sector for this study because the service offered by all the different companies is quite homogeneous and the data from a reasonable number of companies would easy to find.

The sample was selected picking up the largest airline companies over the world. In order to observe this criterion, the International Air Transport Association (IATA) data about the number of passengers carried by each company was the parameter for the selection. In consequence of the time limitation to finish my thesis I decided to pick a sample of only 48 companies, however this number is good enough for the statistical the statistic procedures.

Thus, looking for the number of passengers carried according to Air Transport World’s (ATW) Airline Report I picked up for my sample the largest airline carriers in the world. Also intend to include at least one company of each continent, and at least to have half of the companies from Europe, since in the other continents the larger airlines are concentrated in a few countries. Thus the sample includes airlines from all continents, being of 25 European companies, 12 North Americans, 3 from South America, 1 African, 4 Asians and 3 from Oceania. According to ATW report, together the companies of my
sample carried in 2007 1.26 billion passengers, what represents 57% of world’s total flying passengers at that year.

I understand that this was not a random sample selection, however the main objective of my research is not to generalize the results for other cases, but to observe how the relationship between liquidity and profitability occurs for the studied group, and then compare the result with the other researches.

In order to analyze the companies selected I downloaded the annual reports of 2006 and 2009 from the firm’s websites. With that in hands it was possible to obtain the financial data necessary for the study for the years of 2005 to 2008.

Data Analysis

- Statistical correlations

From the Current ratio and ROA series collected from the sample it will be possible to establish the correlation coefficient between these series. The following correlation coefficients will be used to test hypothesis 1, regarding the short term relationship of liquidity and profitability.

\[
\text{corr}(\text{CR2005}, \text{ROA2005}); \text{corr}(\text{CR2006}, \text{ROA2006}); \text{corr}(\text{CR2007}, \text{ROA2007}); \\
\text{corr}(\text{CR2008}, \text{ROA2008});
\]

- Two-dimensional analyzes

In order to observe the medium term relationship between the variables, a two-dimensional analyzes will be made.

The companies will be classified according to its liquidity and profitability, and according to these values they will be put in different quadrants. So the companies will receive a classification according to the place they occupy.

Rules:
- high liquidity (H) if CR>1
- low liquidity (L) if CR<1
- high profitability (h) if ROACompany > Average ROA
- low profitability (l) if ROACompany < Average ROA

A company with high liquidity and high profitability is classified as ‘Hh’ i.e. it goes to quadrant 1, another firm with low liquidity and high profitability is ‘Lh’ i.e. it goes to quadrant 3, and so on.

According to Pimentel et al (2005) the companies on the quadrant 1 are considered to be in good financial position. On the other side the companies located on
the quadrant 4 were considered to be in bad financial condition. The companies in quadrants 2 and 3 were considered in intermediate condition.

The company’s movements between 2005 and 2007 (2008 was not considered because of the crises, thus its results were supposed to be specific) will be observed in order to test hypothesis 2. If Hirigoyen’s theory is correct we should observe the following movements:

- Companies initially on quadrant 2 (HL), would migrate to quadrants 3 (IH) or 4 (Ll).
- Companies initially on quadrant 3 (Lh) would migrate to quadrants 2 (HI) or 4 (Ll).
- Companies initially on quadrant 1 (Hh) or 4 (Ll) would stay in the same place

These companies are already in extreme positions, i.e. the indicators are either good or bad, and thus it would be harder to them to change their position according to the hypothesis

- **Financial Crises analyses**

In order to test hypothesis 3, the companies will be divided in 2 groups, the ones with a high liquidity (following the same procedure for the two dimensional analyses), and the others with a low liquidity, and thus the average return rate of 2008 from both groups will be compared.

If Hypothesis 3 is correct, it is expected that companies with a higher liquidity present a significant better performance then the low liquid companies.

**Response to the main questions.**

After analyzing the data collected by the main questions presented on the introduction chapter, the study suggests the following answers to each one of them:

- **Is there a negative relationship between liquidity and profitability on the short run?**

No, it was observed for all the studied years a significant and positive correlation between the liquidity and the profitability variables. The results indicated that for the studied companies, on the short term the higher the liquidity level of the company, the higher its profitability. It contradicts the usual findings from the literature, indicating that for this sample of airline carriers the dilemma between liquidity and profitability on the short term do not exist.

**Results:**

\[ \text{corr(CR2005, ROA2005)} = 0.386 \]
\[ \text{corr(CR2006, ROA2006)} = 0.382 \]
corr(CR2007, ROA2007) = 0.512
corr(CR2007, ROA2007) = 0.523

- Is there a positive relationship between liquidity indicators and profitability indicators on the medium to long term?

Yes, it was observed that companies with a poor indicator of liquidity or profitability are usually not able to upkeep the other indicator in a high level; also the companies with both high or low liquidity and profitability were stable in the same position after a few years.

This answer comes from the two-dimensional analysis of the companies that tested Hirigoyen theory: a company with a poor indicator of liquidity or profitability would have the other indicator deteriorated on the medium term, indicating a positive relationship between liquidity and profitability on the medium term. 71% of the companies migrated into the two-dimensional classification according to the hypothesis prediction. However since the first questions received a negative answer, this positive answer for this second question looses part of its meaning, since it was not observed an inversion of the correlation direction, but the upkeep of a positive correlation on the short and medium term.

**Results:**
- 91.3% of the companies that held the same quadrant were from Hh or Ll
- From 10 Lh companies, 6 (60%) migrated according to the hypothesis
- All of the companies from Hl group migrated according to the hypothesis
- 66.6% of the Hh companies and 68.8% of Ll group held the same quadrant
- In total 71% of the analyzed companies moved according to the hypothesis and only 29% against it ipotezei.

- Did the companies with a better liquidity ratio have a better performance during the financial crises of 2008?

Yes, the average profitability of the high liquidity companies was much higher then the low liquidity ones, also the proportion of companies which faced losses during the crises was much higher among the less liquid companies. Even that the relationship between liquidity and profitability was already positive before the crises, it became even more significant during it.

**Results:**
The U test had a value of 131.5, while the average rank of group A (32.28) was significantly higher than of group B (20.61) for the sample size analysis, being able to reject the null hypothesis at a significance level less than 1% (0.6%). Also, the alternative hypothesis was accepted for the same meaning.
The study was exploratory in nature and its conclusions are restricted to the group of companies and the periods examined, that is, the 48 airline carriers between 2005 and 2008. However it has its relevance while increasing the comprehensive knowledge over the relationship between the studied financial indicators.

I hope that this study has given its contribution to the financial area knowledge by observing that for the international airline carriers there is not a dilemma between liquidity and profitability on the short term, maybe this is also true for other industrial segments or maybe it just a specificity of the airline sector. Also it has demonstrated that the management of working capital indeed achieves a higher importance over troubled times, the results shows that companies with a safer liquidity margin were much more able to achieve a better performance during the crises. Thus, the research emphasizes the importance of the active management of working capital, by showing objectively the benefits of it during the crises time.