THE INFLUENCE OF CASH FLOW ON THE RESEARCH AND DEVELOPMENT INVESTING DECISION

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Abstract

This paper attempts to explore the possible links between the cash flow and the research and development indicators of top innovative companies in the world. A sample of 65 companies from the Thomson Reuters Eikon platform, classified as 2013 top innovative companies, is examined for the years 2004-2013. The analysis is made taking into account 3 criteria: companies grouped by industry, by size and by region. A plus of the paper is that it also analyzes the periods before, in and after the financial crisis that started in 2007 and brings some interesting results.

Keywords: cash flow, research and development, financial crisis, sales.

1. Introduction

Cash flow is considered one of the most important indicators in the performance analysis of a company, both from a financial perspective and from a decisional perspective. From a strategic perspective, the cash flow statement is one of the most used reports for the strategic evaluation of resources. Because the cash flow statement is composed from elements both from the balance sheet and the income statement, it gives us an overall view about the company's resources. This report contains three elements: operating (payments and receivables due to the current activity), investing (payments for the equipments/technology and receivables from the sales of equipments) and financing (receivables from credit, and

dividend payment), which can be taken as chronological references in order to measure how effective were the management strategies used for the business.

Research and development, on the other hand, is the principle factor of innovation and it is critical for production and the economic growth. The R&D expenditures are an impetus for the companies' growth and a source of competitive advantage. Some authors question what are the methods through which the businesses financing influences development. One of these methods is the financing of research and development, a factor that influences innovation and growth in the modern economies. R&D is interesting for study not only for the multitude of knowledge that it generates but also through how this knowledge can be shared by companies, projects and used to obtain something innovative.

2. Literature review

2.1. Research and development in relation with cash flow

Hall et all (1998) show that both R&D and the tangible investments are powerfully dependent by cash flow and the level of sales in the United States, whereas in France and Japan the results are mixt. In United States, for example, investors are more pro-active and they want to invest in riskier businesses, even for a longer term, due to the constant and careful monitoring of the market, due to less financial constraints and due to banks that are powerfully connected with the investments. The authors study industries like: chemical, pharmaceutics, machinery, electronic components and scientific instruments. The authors have an important point of view in relation with the investment decisions and the type of corporate governance that the firms have in the three countries. The biggest difference is between Japan and United States. If in Japan, the ownership is delegated, the shares' management is supervised by banks, which are also involved in the monitoring and restructuring of companies. In the United States, on the other hand, the ownership is dispersed and the monitoring and restructuring is done in the public area; more exactly, most of the financial information is known to the public, therefore the potential investors can search the company and obtain an overall view over the company's performance. In France, we have a balance between the two systems, but more close to Japan.

Brown et all (2009) show that United States finance their R&D through cash flow and the issue of shares. They study the young firms which concentrate on high level technologies, for which there are much more financial constraints than for large companies. If these young and small firms finish rapidly their sources of investments, either internal or external, they will have big shocks in terms of R&D, meaning that R&D will either increase or decrease rapidly, which could lead to financial problems for the firms. The authors study companies from the pharmaceutical industry, IT, electronic components, medical instruments and software.

One good example in favour of the influence of cash flow on R&D is the fact that when the tax policies changed in United States, where taxes influence companies and their cash flow, R&D had some changes in its' levels.

Zhuang (2013) has similar arguments to Brown et all (2009) but his findings make better the distinction between large and small companies and the factors that influence R&D for them. Therefore, in his research, the small and young companies, which use innovative technologies, are financing their research and development expenditures through the issue of shares, which they sell internally or externally. Due to the fact that these firms are for a short period of time on the market, they have a big impact from the negative impact from cash flow, which cannot be eliminated and therefore cannot see cash flow as a source of innovation. On the contrary, larger firms use financing and credits. For the small firms, a plus of cash flow is just in a small part directed to research and development, the biggest part is being used in order to pay the credits they made. Therefore these companies direct money not to investment but to economies, which they can use in emergency situations.

2.2. R&D and cash flow in the financial crisis

Mannasoo si Merikull (2011) study R&D ciclicity, which makes the link between short term fluctuations and long term growth. Which means that even the temporary fluctuations have implications over the development perspective of a country, through the incentives given to the investors and creators of R&D. Therefore, in the moment where an economy reaches a high level of development it is more profitable to invest in production capacities, which are short term, than in long term investments, like R&D is. On the other hand, in case we have a productivity shock, companies will be willing to pay more for

development, as the opportunity cost of production gets lower. Therefore, there is a ciclicity between R&D and short term investments, influenced by what happens on the market. The autors show that R&D was low in the period before the financial crisis, due to the high demand of the market and the companies did not focus so much on the long term development strategies, due to the opportunity costs on the short term. Also, in the prime time of crisis, R&D got lower, but not because of the production capacity, which was dropping, but due to the correlation with the economy shock.

Also, in the prime time of the financial crisis, R&D got lower not only due to the fact that it was financed by cash flow, which gets lower in the periods with economic decrease, but also due to the fact that the companies have difficulties in obtaining external financial sources which would have sustained investments and R&D. Therefore, companies tend to cut off risky investments, R&D being one of them.

3. Empirical test

The research was done on 65 companies selected from " 2013 Top 100 Global Innovators", report published by Thomson Reuters. The companies were studied from three perspectives: the industry in which the business is conducted, the size of the company and the geographical region from which they come.

We have identified 12 industries, 4 types of companies regarding size and 3 regions. The analyzed period was 2004-2013 because we wanted to study a recent period, in order to see the innovators' behavior in the relationship of our two main indicators and because we also wanted to see if the financial crisis that started end of 2007-beginning of 2008 had an impact on the indicators.

The variables that we used in the research were R&D, cash flow and sales, all collected from the income statements and cash flow statements of the companies, taken from the Thomson Reuters Eikon platform. Because the variables were not comparable we transformed all the variables and our model was the following:

$$\ln R\&D_{it} = \propto_0 + \propto_1 lnFCF_{it} + \propto_2 lnSales_{it} + \varepsilon_{it}$$

We made regressions based on this model, on all the cases mentioned above and we used the weighted least squares method.

The results are as presented in the following lines.

From *the industry perspective* of the firms we found that the most relevant industries, considering the number of companies that were in them, were the semiconductors and electrical components industry, hardware, consumer products and telecommunications.

For the companies that produce semiconductors and electrical components, cash flow is a powerful determinant of R&D. In the case of consumer products and telecommunications, cash flow is a predictor of R&D, but it is not the most powerful. Whereas for hardware producing companies R&D is not affected at all by cash flow.

The next groups of industries were chemical, automotive, electrical products, industrial and machinery. Chemical industry was the only one where R&D was very influenced by R&D, followed by the electrical products, industrial and machinery, where cash flow is a stable predictor. The automotive industry brings no correlation between cash flow and R&D.

The last group of industries is represented by the companies that produce software, transportation equipment and the ones that are involved with petroleum. The software companies are not influenced at all by cash flow in their research and development decisions, whereas the transportation and petroleum are highly, respectively lower influenced by cash flow. For the last two industries, we cannot conclude that the results are very representative on an industry level, due to the fact that they were composed only from two companies.

In what concerns *the size of the firms*, the small ones are not influenced by cash flow. A first argument would be that they might have difficulties in maintaining a positive cash flow, and their financial performance depends on the cash flow conversion cycle (for example the period of time until which the companies cash in their money from the clients or until they pay their debts to the suppliers). According to Eben and Johnson (2013), companies that have a small conversion cycle have a better financial performance and can think of investments, which would create a better relationship between R&D and cash flow. Whereas, for companies with high conversion cycle, the options are either to borrow money or to find investors that will finance their business.

Also, although it is not the case for our companies, they can be small also because they appeared recently on the market. Therefore, it is harder for them to obtain financing, due to the fact that the investors don't find them reliable, which will lead to a negative cash flow or a volatile cash flow.

For the medium and large companies, cash flow is a powerful determinant of R&D, and the results show us that a positive cash flow will shift in the same direction also the R&D. In what concerns the giant companies, they are not influenced by cash flow, which is in accordance with the literature review. Harhoff (1997) shows that there are effects of the cash flow on the investment activities, but these investment activities are not comprised also of R&D.

From the *region point of view*, the American companies are the ones influenced the most by cash flow, followed by the companies from Asia, where the influence is lower and the ones from Europe where the influence is not present. The results are similar to the ones obtained by Hall et al. (1998) and Brown et al. (2009) and they can be explained trough the type of economies, Anglo-American on one hand and continental and Japanese on the other hand. America is financing its R&D from volatile sources like cash flow and shares issue (so they try to attract external capital) and they react faster to the market's movements and have higher capital costs, which links R&D to cash flow.

In what concerns the *analyzed time interval,* at a total companies level, we found that there is no correlation between cash flow and R&D in the pre and post financial crisis time and only a small correlation between the two of them in the prime time of crisis. In what concerns the indicators' level, the cash flow had a small decrease in the prime time of crisis, whereas the level of R&D was relatively constant.

Graph 1. R&D evolution by type of company

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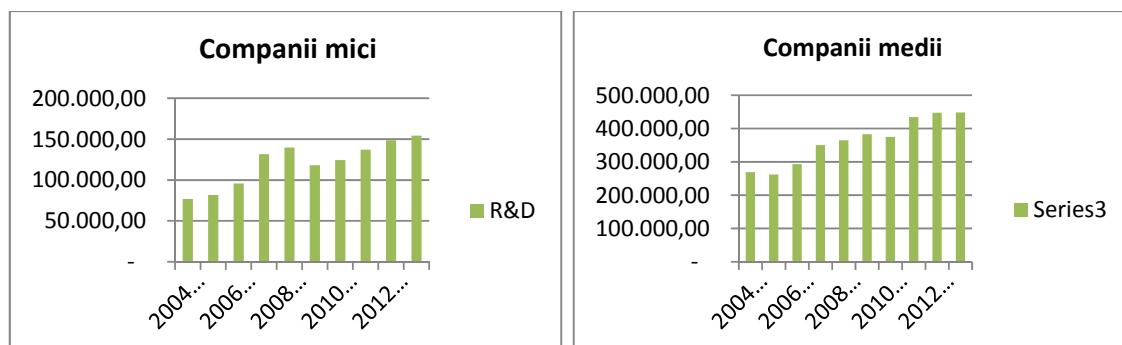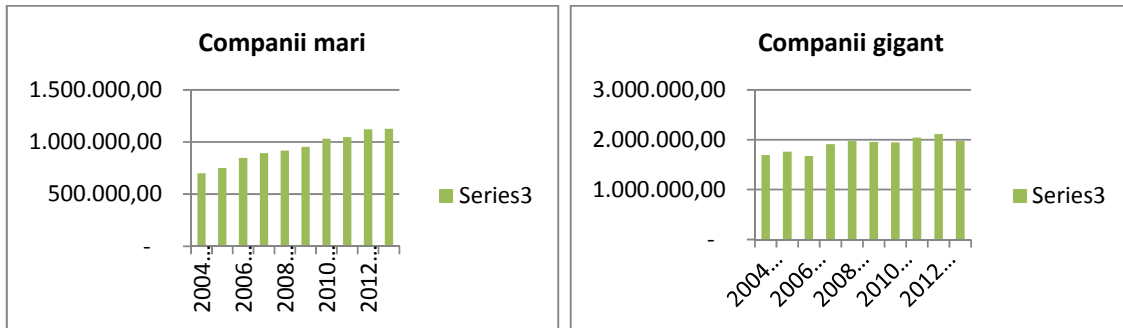
One reason for this could be interpreted as Correa and Iootty (2011) did, when they said that the companies which increased R&D in the financial crisis interval were the ones oriented to export, whereas the companies that reduced R&D were the big ones, that had loans. And if the number of the two of them would balance, we would obtain a balanced R&D. In our case, we cannot confirm the theory, and we can observe that R&D was predominantly constant and with an ascending trend, indifferent of the companies size.

Graph 2. Cash flow and R&D comparative evolution in the analyzed time frame
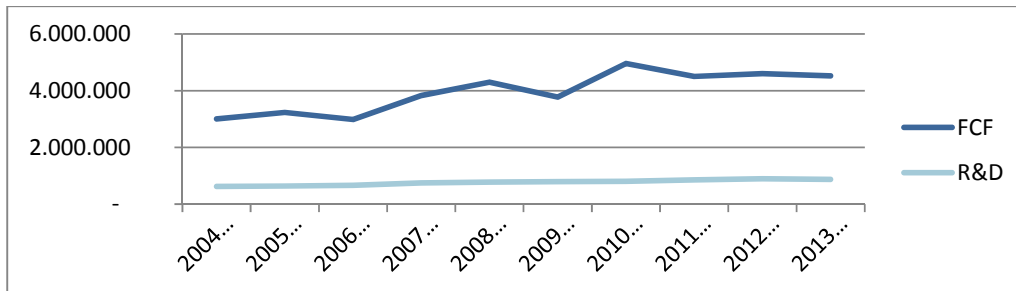
4. Conclusions

Although this study has its limits, we have obtained some relevant and interesting results which showed us in what cases we can consider cash flow as a predictor of the research and development decision.

What we found out was that the influence that cash flow has on R&D depends very much on the industry in which the company has its 'activity, the size of the company and the region from where it comes. Also, a positive economic environment will positively influence the company's decision on what to do with its' cash.

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