Financial management of publicly funded research activities: an explorative study

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Abstract: This research deals with the analysis of financial management, with a specific focus on cash flows, within in-house publicly controlled companies operating in high-technology sectors and characterised by the relevant participation in research projects financed by the European Structural Funds. To this end, three research questions are formulated relating to the liquidity cycle of such organisations. They focus respectively on the risk and return trade-off, on the variability of their cash flows and on the relation between the liquidity and the yields of the financial tools owned. A public–private consortium was the subject of analysis to answer the research questions. Specifically, the Miller–Orr model is applied to the consortium’s cash flows to provide managerial recommendations for the future and a course of action.

Keywords: financial management; in-house publicly controlled companies; publicly funded research.

1 Introduction

It is increasingly important for both private and public organisations to optimise their investment decisions to ensure an additional internal form of financing. This aspect is even more important in a market scenario characterised by strong global competition (Dezi and Del Giudice, 2014; Fellnhofer, 2015; Foster and Magdoff, 2009; Kolay, 1991; Mizen, 2008; Nelson, 1977; Shapiro, 2008).

Companies need to ensure the reactivation of resources to maintain a proper commitment to new investments (Arnold, 2008). Such an aspect becomes strategic, especially for those organisations working in high-technology sectors that require
substantial capital for the pursuit of the economic–financial equilibrium (Pyles, 2014; Shapiro, 2008; Zied and Triki, 2013). It is interesting to explore the theme of cash management in companies that make extensive use of external financing funds, thanks to their participation in research projects financed by the European Structural Funds (Dolfe and Koritz, 1999; Puga, 2002; Rodriguez-Pose and Fratesi, 2004; Tondl, 2001; Vanhoudt et al., 2000), and that are publicly controlled inhouse and therefore subject to the prevailing ethical constraints with regard to the nature of the investments that can be performed (Romano et al., 2014; Schillaci et al., 2012). For such reasons, an empirical investigation was conducted to identify the most significant aspects of the cash management of public–private consortia.

In particular, the first research question focuses on the risk–return relation that characterises investments made by companies with such a hybrid legal status; the second analyses the high degree of variability in the cash flows generated by the participation in projects financed by the European Structural Funds; finally, the third question refers to the trade-off between the degree of liquidity and the yield of the financial instruments held by such companies. The analysis was conducted in an in-house publicly controlled company with the characteristics listed above. It is an organisation operating in a high-technology sector, belonging to the research, development and training field, which has developed a system of relations with universities, research centres and firms, sharing with them the mission of enhancing the competitiveness of the region through research, innovation and technology transfer activities.

The present research also deals with the implementation of the stochastic model of Miller–Orr, linked to the management of liquidity reserves. In this model the firm can allow the net cash flows to fluctuate between the upper control limit and the lower control limit, making purchases and sales of marketable securities only when one of these limits is reached. The assumption made is that the net cash flows are normally distributed with a zero mean value and a standard deviation. This model provides two control limits – the upper control limit and the lower control limit – as well as a return point. When the firm’s cash limit fluctuates randomly and reaches the upper limit, the firm buys sufficient marketable securities to return to a normal level of net cash flows, that is, the return point. Similarly, when the firm’s cash flow falls to the lower limit, it sells sufficient marketable securities to bring the cash balance back to the normal level, namely the return point.

2 Theoretical background and research questions

Liquidity analysis is relevant to providing a concise evaluation of the solvency of an organisation in the short term (Huff et al., 1999; Maness and Zietlow, 2005). In particular, by valuating the amount of transactions that can be assimilated to cash, an assessment of the organisation’s ability to fulfil its commitments can be developed.

Cash management means ensuring the balance of cash inflows and outflows in the short term (Dolfe and Koritz, 1999; Maness and Zietlow, 2005). The question concerns how the organisation promptly and economically faces its needs linked to the current financial cycle. Other shaping issues are the minimisation of unused cash and the optimisation of bank management (Howells and Bain, 2005). With reference to the latter, it is important to point out the difference in yields, recognised in the financial market, between passive and active rates (Dolfe and Koritz, 1999). In many cases, excessive
allocation of resources on the asset side, such as bank current accounts, does not represent the best possible solution as a representative of the potential loss of returns. To optimise the management of working capital, it would be more appropriate to use such resources to repay relatively more expensive funding sources, such as venture capital (Boisjoly, 2009; Howells and Bain, 2005; Rossi, 2014a; Tennent, 2012).

Cash management plays a critical role in running a business, being inextricably linked to the valuation of expected and unexpected cash outflows and to financial planning. It is important to ensure solvency, especially in the short term of the organisation, without reaching critical levels of financial risk (Cherubini and Della Lunga, 2001; Huff et al., 1999; Maness and Zietlow, 2005; Rossi et al., 2017).

Research suggests two important reasons to hold cash: transaction costs and precautionary measures (John, 1993; Jose et al., 1996; Kim et al., 1998; Pittaluga, 2007). In the first case, it can be said that companies keep part of their portfolios in liquid form to cope with current transactions. Some classic models of finance derive the optimal demand for cash from transaction costs arising from the conversion of non-liquid financial assets into cash. The two main models recognised are the deterministic model of Baumol (1952) and Tobin (1956) and the stochastic model of Miller and Orr (1966).

The choices related to the mix of assets to be allocated to cash and to long-term investments are functions of the valuation of the future cash flow trend and of the risk appetite of the organisation (Mariani, 2007). Also relevant are the individual subjective value attributed to holding liquidity and thus the lower profitability. This is a subjective judgement on the yield and the financial duration of the investment. This assessment can be exemplified with reference to the lower return obtained from the amounts of cash deposited in banks than from government bonds (Garcia-Teruel and Martinez-Solano, 2007; Howells and Bain, 2005; Shin and Soenen, 1998).

To track an additional motivation to dedicate resources to cash, it is necessary to move away from the characteristics of the perfect market of the Modigliani–Miller theory (Modigliani and Miller, 1967). Financial markets are characterised by the presence of transaction costs (Williamson, 1985) and asymmetric information (Rosen and Gayer, 2010). Moreover, choices concerning liquidity are influenced by the adopted structure of corporate governance of the organisation (Rossi, 2014b). This refers to the misalignment of objectives between controlling shareholders and minority shareholders or between shareholders and managers. Cash is probably one of the easiest instruments to acquire private benefits against minorities or against those affected by problems arising from incomplete information (Coluccia et al., 2017; Macey, 2010). These conditions are typically found in the agency theory (Izzo, 2009).

The above-described issues are particularly relevant within contexts characterised by specific corporate governance structures that limit the investment choices (Bhasin and Shaikh, 2013; Bresciani et al., 2017). In Italy, in-house publicly controlled companies are subject to constraints of a prevailing ethical nature in relation to the type of investments that can be performed (IRES Piemonte, IRPET, SRM, Europolis Lombardia and IPRES, 2012). Such constraints do not have a proper institutional nature, being mostly ethical limits that do not allow investments in certain instruments, although a legal framework can be found in the Act of Local Authorities (TUEL), approved by Decree no. 267 from 18 August 2000 and by the Code of Ethics for Local Authorities, the so-called ‘Charter of Pisa’ (Caringella et al., 2007).
The Code of Ethics for Local Authorities is a good example of the existing constraints for publicly controlled companies regarding the nature of the investments that can be performed. Already adopted by many Italian public organisations, it can be considered as an ethical code with the aim of promoting transparency and legality in public administrations, and it is adaptable to all public (or private/public) organisations. It tries to reduce the possibility, already experienced in some cases, of public organisations undertaking excessively risky investments and speculative instruments like derivatives (Fellnhofer, 2015; Maci, 2009; Nadotti, 2009; Rafuse, 1996).

In 2009 the Audit Court reported the use of derivative financial instruments by local authorities and appealed for the adoption of a precautionary principle that would evoke transparency, greater qualification of the operators involved and clear information in the contractual phase (Atelli, 2008), with the aim of halting highly risky and speculative operations and ensuring a low level of risk for publicly controlled organisations. Therefore, ethical and legal constraints influence the decisions on investments in financial securities for in-house publicly controlled companies.

From those considerations the first research question arises:

**Research question 1:** Does public control in the governance of in-house providing companies lead the management to prefer low-risk or risk-free financial instruments?

This aspect is considered here in conjunction with the restrictions imposed on companies participating in research projects financed by the European Structural Funds. The European Structural Funds are characterised by the necessary co-financing of recipient institutions and have a significant impact on the choices of cash management (Piantoni, 2008).

The regulatory provisions relating to R&D in Italy are partly due to financial aid for firms to influence their development positively. It is a set of measures to restore or promote business initiatives. Such financial aid is managed by different entities, which are responsible for the direction and guidance of various forms of facilitation for businesses (Midelfart-Knarvik and Overman, 2002; Quah, 1996; Rodriguez-Pose, 1998). The different organisational and managerial responsibilities are distributed among institutions at the EU level, such as the European Parliament, the EU Council and the European Commission, among national authorities, which are strictly dependent on a programmatic architecture set by the EU among organisations at the regional or local level (Velo, 2007).

Regarding the regional level, in the Italian context, various regions have been considered as part of the Convergence Objective to accelerate the economic development of less advanced regions and to create favourable conditions for growth and employment. Italy, in fact, is experiencing a gradual weakening of its position in world markets, leading to the loss of its competitiveness. As part of an increasingly integrated international economy, it is necessary for Italy to adopt a policy specifically aimed at strengthening its national innovative system to set the country on a path towards qualified economic development. In this sense, in the pursuit of convergence, regions with innovation, production and business weakness would benefit from such financial aid to improve the quality of investment in physical and human capital and to promote the development of innovation and technology (Murray et al., 2016; Rossi, 2015a).

Today R&D activities are distributed among a multiplicity of decision-making and cost centres (Rotilio et al., 2006). On one side the current incentive system has many advantages compared with the past systems, linked to the multiplicity of ideas and
innovations of intervention tools; on the other, it encourages the fragmentation of investments, with duplication and overlapping activities.

For organisations benefiting from such financial aid, one of the main effects is the presence of a cash flow that is not constant over time and amounts, raising questions about liquidity management. Grants deriving from the participation in R&D projects are subject to time gaps between the cash outflow phase necessary to develop activities for the project itself and the subsequent cash inflow phase of financial aid (Pittella and Serenari, 2007). If such activities constitute the core business of the organisation, the high variability present in the cash flows will exert a significant impact on the cash balances (Santoro, 2012). Starting from this assumption, the second research question emerges.

Research question 2: Are companies that participate in research projects financed by the European Structural Funds characterised by high variability in cash flows?

Therefore, the second research question aims to test the existence of a direct relationship between the incidence of the financial aid received and the magnitude of the cash flow oscillations within the benefiting companies.

The propensity for dilution of the amounts deriving from financial aid over time thus has a significant influence on cash management decisions. The liquidity reserve will be used for investment securities, allowing a greater concentration of cash inflows in the short term (Cuzzola and Petrulli, 2005; Maness and Zietlow, 2005). Ultimately, in such companies, the trade-off between the degree of liquidity in the short term and the efficiency of investments favours greater liquidity at the expense of the relative yields.

Hence, the third research question is as follows:

Research question 3: Public control in the governance of in-house providing companies affects investment in securities, leading the management to prefer greater liquidity at the expense of the relative yields.

3 The object of the research

The subject of the research analysis is an in-house publicly controlled company, suitable for answering their search questions. It is characterised by participation in research projects funded by the European Structural Funds and has a public organisation as its controlling shareholder (Azzariti, 2007). Other shareholders are research centres and companies operating in different sectors. Its activity is focused on the design, implementation and management of an organised system in a territory, and it works to safeguard the land and the environment; to facilitate and establish operational interactions among research centres and companies, promoting the expansion of both the supply and the demand for innovative research; to strengthen and create structures and research services focused on innovation; and to ensure a continuous process of technology transfer, the promotion of entrepreneurship, experimentation, development and industrial application of innovations and the acquisition of new management and marketing techniques.

Over the years the company has developed and animated an efficient network of relations among firms, research centres, universities, associations and agencies, enhancing the visibility of national and regional competitiveness in the international market through the establishment of relations with numerous EU and non-EU countries.
4 Research analysis

To answer the first research question, a historical analysis of the company’s major investments in financial instruments over a period of ten years was conducted. The aim was to take into consideration the company’s current assets, with special reference to its short-term financial assets. The data arising from such a review, which included the analysis of investment returns, allowed us to reflect on the nature of the portfolios held by the company to answer the first research question. The analysis highlighted the propensity of the company to execute investments in the short and long term oriented towards the creation and maintenance of bond portfolios with a low-risk profile and an average return of 3%. Considering the risk–yield relation of the investment choices, and because of the relevant regulatory framework, an analysis was conducted of the investments in repurchase agreements used by the company.

Therefore, as far as the first question is concerned, it was found that, in an in-house publicly controlled company, with a core business based on European research projects, investments in financial instruments produce low yields in relation to the risks incurred.

To answer the second question, concerning the high variability in the cash flows of the company (Lettini, 2009), the degree of variability in the cash flow was calculated through the variance calculation of the cash flow on a monthly basis with reference to a specific year. Thus, the twelve monthly observations of the cash flows represent the population within which to calculate the variability with respect to the central tendency (Guarini and Tassinari, 1996). The logic behind the choice of the variance calculation for the cash flows lies in identifying whether the firm under study, during the considered period, shows significant changes in the values of the cash flow, which inevitably affect its investment choices and overall cash management policy.

The following is a statistical formula to calculate the variance ($\sigma^2$) (Keller, 2005):

$$\sigma^2 = \frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n},$$

where $(x_i - \bar{x})$ is the difference between the $i$th statistical unit and the arithmetic mean of the considered data.

With regard to the trend of the cash flow, which constitutes the starting point for the calculation of the variance, valuation on a monthly basis was performed. The cash flow of operating activities was estimated using the direct method by subtracting the changes in the net operating working capital ($\Delta$CCNO) from the difference between the cash inflow and the cash outflow (Bergh and Fairbank, 2002; Boisjoly, 2009; Dallocchio and Salvi, 2011).

The cash inflows and outflows used in the calculation relate just to the management of the research projects, considered as the operating activities of the organisation. On the contrary, other activities, such as fiscal and financial activities, were not considered. The changes in working capital items concern the differential between the positive and the negative accounting items of commercial management (Bergh and Fairbank, 2002; Boisjoly, 2009; Chiu et al., 2006; Masmoudi and Boujellbène, 2015; Montrone, 2005). Moreover, in estimating the monthly cash flows, human resource costs were not considered. This is justified by the fact that, in the specific year taken into consideration, employees represented a small percentage of the human resources collaborating in the specific project activities.
Table 1 provides a summary of the cash flows and their variation starting from the company’s data.

**Table 1**  
Monthly cash flows and their variation

<table>
<thead>
<tr>
<th>Months</th>
<th>Cash flows</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>€–59,930.61</td>
</tr>
<tr>
<td>February</td>
<td>€47,025.95</td>
</tr>
<tr>
<td>March</td>
<td>€–2,613.36</td>
</tr>
<tr>
<td>April</td>
<td>€85,598.41</td>
</tr>
<tr>
<td>May</td>
<td>€–40,927.96</td>
</tr>
<tr>
<td>June</td>
<td>€519,923.10</td>
</tr>
<tr>
<td>July</td>
<td>€–476,352.84</td>
</tr>
<tr>
<td>August</td>
<td>€66,390.82</td>
</tr>
<tr>
<td>September</td>
<td>€87,659.34</td>
</tr>
<tr>
<td>October</td>
<td>€–132,140.20</td>
</tr>
<tr>
<td>November</td>
<td>€1,038,254.29</td>
</tr>
<tr>
<td>December</td>
<td>€–796,523.54</td>
</tr>
<tr>
<td>Variation</td>
<td>(1,87049)</td>
</tr>
</tbody>
</table>

This confirms the second research question regarding whether companies developing a core business focused on research projects funded by the European Structural Funds generate high variability of their cash flow because of the time gap between cash inflows and cash outflows, respectively representing the financial aid of the project and the costs incurred.

As part of the analysis of the liquidity reserve investment choices, the yields, at the base of the first question, are not the only parameter to be considered. With regard to the third question, although the analysed relation between the risk and the return generated by financial instruments is the main focus of the analysis, the importance of yields in relation to the guaranteed level of liquidity cannot be ignored. The aim is to ensure a high degree of liquidity of the financial instruments used together with good short-term profitability. This aspect is relevant especially in relation to the choices of the company over the period studied. The relationship between liquidity and investment yields is a significant problem that considerably affects investments, especially in the context of participation in projects financed by EU Structural Funds.

A trend of such funds has been the propensity to dilute the amounts that beneficiaries should obtain over time, a circumstance that affects cash management choices. Such a situation, although not part of the two previous research hypotheses, has an impact on them.

Therefore, in the in-house publicly controlled company to which we are referring, the management was driven to use instruments with a great concentration of cash inflows as a source of immediate liquidity. Following the analysis of investments, those guaranteeing a greater degree of liquidity in relation to returns were favoured because of the public control and the stringent European regulations concerning funds for R&D projects.
5 Results and implications

From the above considerations about the nature of the analysed company, as a result of the evidence found from the analysis of the research hypotheses, the need to implement models of cash management within such organisations emerges.

In this context, the stochastic model of Miller–Orr for the management of liquidity reserves in contexts with the characteristics described in the three research questions can be applied.

In the Miller and Orr model of cash management, the companies let their cash balance move within two limits – the upper limit and the lower limit. They buy or sell marketable securities only if the cash balance is equal to either of these. When the cash balance of a company touches the upper limit, it purchases a certain number of securities that help it to return to the desired level. If the cash balance of the company reaches the lower level, then the company trades its securities and gathers enough cash to fix the problem.

It is normally assumed in such cases that the average value of the distribution of net cash flows is zero. It is also understood that the distribution of net cash flows has a standard deviation. The Miller and Orr model of cash management also assumes that the distribution of cash flows is normal.

Therefore, the working model involves the identification of a range of fluctuations of the cash values that are able to take into consideration fluctuations of unpredictable amounts of cash and to provide rules of conduct when the upper limit and the lower limit are reached. At the centre of the model, calculation is the forecasting of realised cash flows through the ‘direct method’, which is explicitly based on financial data of the cash inflows and outflows (Dallocchio and Salvi, 2011).

Although a company can easily design its financial budget to maintain stable internal net cash flows at a minimum level, it cannot neglect to consider unplanned or unpredictable fluctuations, which are more sensitive the shorter is the considered time frame (Almeida et al., 2004; Prandi, 2010; Rossi, 2015b). For this purpose, to manage cash flows that are not easily predictable or for which the cost of obtaining information is high, the model developed by Miller and Orr can be used profitably.

Therefore, in a context in which it is not possible to predict the trend of future cash flows, the net cash flows can fluctuate between an upper and a lower limit (Calori et al., 2000). In this way, the two limits, which constitute an admissible range of cash values, indicate the need for interventions of the opposite sign when a limit is achieved. In particular, when the net cash flows are greater than or equal to the upper limit, actions are needed to use excess liquidity, for example through the closure of existing loans or the purchase of short-term securities. Conversely, in the case that the net cash flows reach the lower limit, and therefore the enterprise lacks liquidity, it could be generated, for example, from the disposal of short-term securities.

The calculation of the spread depends mainly on three factors:

- the variability of the observed cash flows
- the transaction costs related to the opening or closing of deposits and/or securities
- the interest rate applied to investments.
The daily variability of cash flows can be obtained by calculating the variance of the fluctuations in cash flows over an established period. In this way, the different cash flows represent the population for which we want to calculate the degree of dispersion and the variability with respect to the central tendency (Guarini and Tassinari, 1996; Abbate, 2013). The logic behind the choice of the variance calculation for the cash flows lies in identifying whether the firm under study, in the period concerned, shows significant changes in the cash flow values, which inevitably affect the amplitude of the acceptable spread.

The variance calculation of cash flows was studied during the evaluation of the second question. However, as regards the elements necessary for the application of the described model, a short description of the other components is given below. Transaction costs related to the opening or closing of deposits and/or investment operations that are part of the working capital can be traced in the bank charges applied to the company. Finally, the interest rate is formed by the rate of return on invested short-term securities and by the interest rate of cash deposits.

In the case that it is assumed that the temporary cash of the firm is invested in the purchase of short-term securities, the amplitude of the spread will increase with the variability of cash flows and with the transaction costs and will decrease with the increase in the rate of return on invested short-term securities, according to the formula of Miller–Orr:

$$\text{Spread} = 3 \left[ \frac{\text{transaction cost} \times \text{variance of cash flows}}{\text{interest rate}} \right].$$

This formula is based on the assumption that the time pattern of the net cash flow is not characterised by any systematic trend, which in any case can be forecasted more easily, often being linked to evolutions of seasonal cycle sales or purchases, and could lead to periodic financing or investing activities with the intent to cancel out the distorting effects caused by such trends.

In addition to the identification of the elements needed for the determination of the spread, it is necessary to define the lower limit, summing the spread calculated with the previous formula and the so-called return point, that is, the level of cash to return to when it reaches one of the two limits. The determination of the lower limit is discretionary. The management indicates the minimum level of cash that it is desirable to hold. The return point is positioned at one-third of the determined spread, starting from the lower limit, through the following formula:

$$\text{Return point} = \text{Lower limit} + \left( \frac{1}{3} \times \text{spread} \right).$$

The application of the Miller–Orr model to the in-house publicly controlled company is quite peculiar regarding the study of cash inflows and outflows and the time lag elapsing between them. The model was applied by considering a rate of return of 3% and an average transaction cost of €30.82. The variance in the cash flows finally amounts to (1.87049). Therefore, the spread of fluctuation of the net cash flow is €157,288.66.

The aforementioned spread should be added up to a lower limit identified by the management by considering the high variability of the observations. This is indicative of the need to maintain relatively high levels of liquid reserves. In detail, the lower limit was set to €250,000 and the resulting upper limit to €407,288.66. The net cash flows to
minimise the transaction costs and opportunity costs, generated by the non-use of resources, fluctuate in this range.

The analysis shows that every time the company presents net cash flows near or below the lower limit, it will be necessary to turn to external financing or to divest assets to face a potential cash deficit. Vice versa, in the case of net cash flows near or above the upper limit, the company should proceed with a financial budget, investing in securities or repaying the sources of debt, to use the potential liquidity excess.

As far as the return point is concerned, it indicates the level of liquidity to be held whenever it is acting with a financial budget. According to the model, it is found with the aim of minimising the sum of the transactions cost and opportunity costs. In the present case, the point is at about €302,000. Figure 1 summarises such results.

**Figure 1** Monthly cash flow in a ‘spread’ according to the Miller–Orr model (see online version for colours)

The results suggest that, given the high variability of cash flows observed in a specific year, the in-house publicly controlled company under observation should manage its cash flows to minimise its costs due to the use of external sources of financing and missed yields; a balanced flow lies between the limits indicated above.

Maintaining an adequate level of liquidity is relevant given the large time lag between cash-out and cash-in for projects, it being necessary to optimise the cash management and minimise the probability of excessive short-term debt.

Second, more prudent cash flow management could help to ensure the creation of internal funding sources, which are relatively less expensive. In this way, the best strategic objectives could be pursued in line with the stated mission.

### 6 Conclusions

The development of a modern cash management function potentially affects the operations and finances of companies. The survey focused specifically on the importance of liquidity management and the optimisation of cash management choices in companies operating in high-technology sectors, which are publicly controlled and have a core business based on participation in projects funded by the European Structural Funds. The
implications and management of the cash management function depend on the wider relationship between the company and the public institution that controls it.

For this purpose, a survey based on three research questions was conducted to identify the most significant aspects of the liquidity cycle in such companies. They focused respectively on the risk and return trade-off, on the variability of the cash flows and on the relation between liquidity and yields of the financial tools owned.

A public–private consortium was the subject of the analysis. The survey confirmed that, in an in-house publicly controlled company with a core business based on European research projects, investments in financial instruments select low yields in relation to the risks incurred.

Moreover, the degree of variability in the cash flow of such a company was calculated, confirming that developing a core business focused on research projects funded by the European structural funds generates high variability of the cash flow because of the time gap between cash inflows and cash outflows, respectively representing the financial aid of the project and the costs incurred.

Finally, in the in-house publicly controlled company studied, the management was driven to use instruments with a great concentration of cash inflows as a source of immediate liquidity. Following the analysis of investments, those guaranteeing a greater degree of liquidity in relation to returns were favoured because of the public control and the stringent European regulations concerning funds for R&D projects.

At the end of the analysis, the Miller–Orr model for cash flow management was applied to the specific organisation taken into consideration to provide managerial recommendations for the future.

However, this research is not without limitations. Firstly, it can be considered as the first exploration in the field of the cash management of in-house controlled companies. Moreover, it is based on a single case study; thus, the results cannot easily be generalised to all the companies with the features that we considered.

Prospectively, future research could provide insights into the cash management activities and characteristics of in-house publicly controlled companies, developing an empirical exploration with significant statistical samples to reach more generalisable and reliable results.

It would also be interesting in the future to validate empirically the significant differences between the cash management of in-house publicly controlled companies and that of other companies with different forms of corporate governance.

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