Cash Management Routines: Evidence From Spain[1]

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Abstract

The purpose of this article is to provide an overview of corporate treasury management, understood as the application of cash management. The decision-making actions of treasury department heads are analysed and have been confirmed by empirical evidence. This article seeks to contribute to the ongoing debate in financial literature by analysing the extent to which the size of companies, the sectors in which they operate and the training of financial decision-makers influence treasury management. In this way, companies seek maximise results obtained by the treasury department and, therefore, maximise the value of the firm. The results confirm the idea that there is a culture of cash management and that whether or not new treasury management techniques are used depends more on the initiative of the treasury manager than on the size of the corporation, the sector to which it belongs or the training of the decision-maker.

Key Words: corporate finance, cash management, firm size, discriminant analysis, cluster analysis.
JEL Classification: G31, G32

1 - Introduction

In the 1980's significant changes took place in the financial departments of large companies, as purely administrative tasks were abandoned and new tasks were taken up concerned with treasury management and the management of other cash assets. This increasing autonomy of financial departments with regard to general management coincided with the liberalisation of the financial system and the appearance of new financial instruments, which until the mid-1980s gave companies little margin for action.

Changes over time in treasury management within financial departments have continued in recent years. Treasury management has developed from a technique for managing immediate liquidity in companies (establishing the minimum balance needed to avoid idle funds that do not generate returns, which means investing surplus funds and raising funds when deficits occur, see Pogue, Faucett and Bussard, 1970; Desalvo, 1972; Hunault, 1984; Brunell, Jessell and Mcarty, 1990), to a much broader concept integrated within cash management. This concept not only brings together a number of techniques and financial tools for the management of immediate liquidity: it also provides a model for managing available assets and for other treasury tasks in the context of strategic and organisational measures that affect both monetary flows and financial results in companies (Phillips, 1997; Heywood, 1999; Hines, Hurtt and Langsam, 2000; Van Del Wielen, Van Der Alphen and Bergen, 2002; Bort, 2004).

Researchers have paid little attention to knowledge and understanding of the cash management routines. Particularly, little theoretical justification has been focused of working capital management routines (Pike and Pass, 1987; Mitchell, Reid and Smith, 1998). Most empirical studies have failed to explore the utilisation of working capital management routines by different types of firm. The relationship between size and the adoption of particular working capital management routines is not clear. Multivariate statistical studies focusing upon the combination of factors associated with the take-up of working capital management routines are sparse (Howorth and Westhead, 2003).

The studies focused on cash management routines are scarce. Most studies describe the treasury management characteristics and the empirical studies are simply descriptive (Phillips, 1997). In this context, the purpose of this article is to provide an overview of corporate treasury management, understood as the application of the culture of cash management. Specifically, we analyse the extent to which the size of companies, the sectors in which

they operate and the training of financial decision-makers influence treasury management. To achieve this aim a preliminary analysis is made of the various responsibilities involved in treasury management, and the decision-making actions of department heads are then analysed.

An empirical analysis is performed on a database of 4699 Spanish firms in order to (i) group treasury management activities according to significant functions; (ii) analyse the relationship between the size of a corporation, the sector in which it operates and the training in cash management of its treasury manager; (iii) establish groups of companies that are sufficiently homogeneous in terms of cash management; and (iv) detect the variables best able to discriminate between the groups of companies thus established.

Our results confirm the idea that there is a culture of cash management and that whether or not new treasury management techniques are used depends more on the initiative of the treasury manager than on the size of the company, the sector to which it belongs or the training of the decision-maker.

The rest of the paper is organised as follows. First of all, the theory and empirical hypotheses are described. In Section 3 the sample and the questionnaire used are presented and the analysis procedure followed in carrying out the empirical study is explained. The main results of the investigation are explained in Section 4. Finally, Section 5 present the main conclusions.

2 - Theory and Empirical Hypothesis

2.1 Previous Research

According to studies sponsored by the Treasury Management Association (Phillips, 1997) and the Association for Financial Professionals (Ernst & Young, 2003), the responsibilities usually allocated to treasury departments can be grouped into the following work areas: domestic cash management, bank relationship management and risk management.

Domestic cash management

A knowledge of the corporation's negotiating capability and of the variables that make up that capability is essential to the attainment of the main goal of financial management, i.e. ensuring the liquidity of the company. The treasury manager must determine the treasury level needed at any given time

in order to balance payments in for sales against payments out for purchases, thus optimal cash holdings levels (Smith, 1986; Meunier, Barolet and Boulmer, 1989; Santandreu, 1994), taking into account the reasons for the transaction, precaution and speculation identified according to monetary theory, which make it almost impossible for the balance of available assets in the corporation to be zero (Keynes, 1936).

The theories that can help to explain which firm characteristics impinge on cash holdings decisions stem from the idea that cash provides low cost financing for firms. According to this view, raising external finance costs more in the presence of asymmetric information between firms and external investors (Myers and Majluf, 1984), costly agency problems such as underinvestment (Myers, 1977) and asset substitution (Jensen and Meckling, 1976), and transaction costs and other financial restrictions.

The recent investigation about the cash holdings of firms, which has been given more attention in the empirical literature, focuses on explaining the significant amounts of cash and equivalent assets held by firms and the determinants of corporate cash holding. For example, Kim, Mauer and Sherman (1998) and Opler, Pinkowitz, Stulz and Williamson (1999) analysed the determinants of cash holdings for a sample of US companies; Pinkowitz and Williamson (2001) examine the cash holdings of firms from the United States, Germany and Japan. More recently, Ozkan and Ozkan (2004) examine the corporate cash holdings for a sample of UK companies. Another important strand of the literature focuses on the relationship between cash holdings and corporate performance. For instance, Blanchard, Lopez de Silanes, Sheifer (1994); Harford (1999); Faulkender (2002); Mikkelson and Partch (2003); Dittmar, Mahrt-Smith and Servaes (2003); Guney, Ozkan and Ozkan (2003); and Ferreira and Vilela (2004).

Bank relationship management

A corporation's relationship with its bank is of great importance in treasury management, because most of its flows of liquid assets are channelled through bank accounts. The way in which its relationship with banks is managed will therefore directly influence the banking position of the firm, and with it its overall treasury position.

The number of variables that the company must negotiate with banks is extremely important. Price is the determining variable in the contracting of financial products, but qualitative variables such as speed and quality of service, personal treatment and problem-solving ability, among others, are now becoming more and more important in corporate banking policies.

In this regard, the article by Soenen (1989) was one of the first to show the importance of non-monetary variables in the choice of banks. Subsequent studies have confirmed this trend in identifying the criteria behind decisions on relationships between companies and banks (Kennington, Hill and Rakowska, 1996; Mols, Bukh and Blenker, 1997; Tse, Buckley and Westerman, 1998; Iturralde, Maseda and San José, 2005).

Risk management

One of the missions of the treasury manager with regard to risk-management is to analyse and determine the extent to which it is advisable to take a risk, following an appropriate study of coverage for that risk (Ross, 1991; Masson, Oros, Flagg and Mavrovities, 1995; Faus and Tapies, 1999).

Risk-management as a function of the treasury department goes beyond merely measuring, controlling and minimising risks. It consists of obtaining the best possible results in all operations that entail risks, provided that the risk levels established are maintained, without jeopardising the survival of the company.

The importance of this function is even greater when we consider treasury management at multinational corporate groups, and in recent years companies have increasingly tended to group both financial and non-financial risks under the responsibility of the treasury department, thus making risk management one of the most important functions of that department (Buckley, 1996; Alfonsi, 1999; Mulligan, 2001; Navalón and Santomá, 2002). Moreover, Moore (2003) concludes that 69% of companies believe that the most important function of the treasury department is risk management, mainly with regard to the joint management of all risks at the company.

Therefore, it seems that there is some controversy with regard to the cash management procedures and tools that are common to all types of companies and with regard to whether there is a grouping of functions around the treasury department that is maintained by different companies regardless of their size, area of action and sector of activity. In this context, our study focuses on providing evidence for the Spanish case.

2.2 Research Hypothesis

The activities carried out in the area of cash management provide the basis for our study since our aim is to group the tasks of the treasury department by major functions, and to highlight the main activities of cash management. This enables a number of activities to be identified that

characterise the companies that place most value on the work of the treasury department.

According to the framework previously described, the hypotheses of our study are follows:

Hypothesis 1. Treasury department activities are expected to be grouped around three main functions: domestic cash management, bank relationship management and risk management.

Hypothesis 2. The size of companies, the sector in which they operate and the level of training of their treasury managers in the evaluation of the different functions of cash management are expected to have little influence.

Hypothesis 3. Groups of companies that are sufficiently homogeneous from the viewpoint of cash management are expected to exist.

3 – Data and Research Method

3.1 Sample

The database used comprises 4,699 Spanish companies with more than 15 employees. Our selection ignores the so-called "micro-companies", i.e. those with less than 15 employees, because one of their identifying characteristics is precisely their lack of a major organisational structure, especially in financial matters.

1,500 questionnaires were sent to the selected companies, distributed by provinces in proportion to the target population. 217 companies responded to these questionnaires, a response rate of 14.5%. 14% of the companies that responded to the questionnaire were classified as small enterprises, 62% as medium-sized and 24% as large companies. The companies in our sample are allocated to four subsections: 17% worked in building, 49% in manufacturing, 21% in services and 13% in trade.

Regarding the training of the treasury manager or the treasury decision maker, we divide these companies into two groups depending on whether or not the decision maker has a university degree: 69% do have such degrees, while 31% do not.

3.2 The Questionnaire

The questionnaire comprises two blocks of questions: "Responsibilities of the Treasury Manager" and "General Information". The

first block seeks not only to identify the responsibilities of the treasury manager but also to assess the importance of those responsibilities for the head of department in the course of his activities. From the previous analysis carried out in Section 2, several responsibilities have been identified which can be grouped around the three basic functions of cash management: domestic cash management, bank relationship management and risk management.

Specifically, the cash management functions considered are the following:

Domestic cash management
Responsibility 1: short-term treasury forecasts, at least monthly
Responsibility 2: establishment of optimum treasury level
Responsibility 3: optimisation of liquidity
Responsibility 4: monitoring and optimisation of the circuit of payments for purchases
Responsibility 5: monitoring and optimisation of the circuit of collects for sales
Responsibility 6: monitoring of banking positions at the value date
Responsibility 7: day-to-day control of banking positions
Bank relationship management
Responsibility 8: maximisation of returns on treasury surpluses
Responsibility 9: minimisation of costs of short-term borrowing
Risk management
Responsibility 10: coverage of interest-rate risk
Responsibility 11: coverage of exchange-rate risk

The "General Information" block covers the data needed to identify the company: annual turnover, total assets on balance sheet, number of employees, sector in which the company operates and level of training of the treasury decision-maker, among other points.

The questionnaire comprises 11 specific questions on the points to be studied, which call for equally specific answers. The questions are presented using a Likert type scale that enables the qualitative opinions of companies to be expressed in quantitative terms so that empirical comparisons can be made. A number of additional questions are also asked to assess the training level of the treasury manager, the area of the activity and the size of the company.

The degree of agreement/disagreement expressed by the scores allocated in these questions is as follows: 1.- Never/of no importance, 2.-

Sometimes/of little importance, 3.- Several times/of some importance, 4.-
Many times/of considerable importance, and 5.- Usually/of great importance.

3.3 Methodology

Treasury department activities are grouped according to main
functions by using exploratory factorial analysis subsequently validated by
confirmatory factorial analysis.

The effect of company size, area of activity and treasury manager
training on cash management is studied by means of a Kruskal-Wallis
variance analysis. This analysis enables us to check for differences in the
behaviour of companies according to their size, the areas in which they
operate and the qualifications of their treasury managers.

The search for significant variables that enable companies to be
classified according to their cash management routines is structured as
follows:

■   First of all, an individual cluster analysis is carried out
to place companies into sufficiently homogeneous groups from the
viewpoint of the perception of their cash management routines.

■   This classification is then validated by means of
discriminant analysis by phases. Through discriminant functions the
use of validation samples enables the variables with the greatest
classifying capacity to be established, i.e. those most able to
discriminate between the groups of companies obtained.

4 – Results

4.1 Preliminary results

First, a descriptive analysis is carried out of the average scores
obtained for each of the responsibilities considered in the questionnaire.

Table 1 **Average score for responsibilities**

	Mean
Responsibility 1	4.46
Responsibility 2	3.91
Responsibility 3	3.87
Responsibility 4	3.93

Responsibility 5	4.02
Responsibility 6	3.82
Responsibility 7	4.04
Responsibility 8	3.75
Responsibility 9	4.01
Responsibility 10	2.70
Responsibility 11	2.42

"Short-term treasury forecasts, at least monthly" is the area of action of the treasury manager that obtains the highest score, with 4.46 out of a possible 5, the same result was obtained by Soenen (1989). "Day-to-day control of banking positions" obtain high score, as is the case with Phillips (1997), "monitoring and optimisation of the circuit of collects for sales" and "minimisation of cost of short-term borrowing" obtain the next highest scores from companies.

The lowest scores by far are obtained by the two risk coverage functions, "coverage of interest-rate risk" and "coverage of exchange-rate risk", making these the least valued functions. These results are different from those obtained by Buckley (1996), Alfonsi, (1999) and Mulligan (2001), though the cause may lie in the type of companies surveyed. The samples in their studies were exclusively multinational groups, in which exchange-rate and interest-rate risk are of great importance due to the transnational nature of their operations.

It is also striking how little importance companies place on "maximisation of returns on treasury surpluses", which obtains the third lowest score. Treasury management seems to be considered exclusively as a centre for services, rather than a centre for generating profits like the remaining departments of the company.

4.2 Grouping of Functions

Following this preliminary description of the average scores obtained by the functions considered, the next step is to try to group those functions, since some of them may be perceived by companies in a similar fashion, and this will give us a clearer idea of how companies monitor their cash management routines. The statistical method used for this purpose is principal component analysis.

Table 2 below shows the results for the determining factor in the correlation matrix and the application of the Kaiser-Mayer-Olkin sample

suitability measure and Bartlett's sphericity test to the sample described in Section 3.

Table 2 Determining factor of the correlation matrix, KMO and Bartlett's test

Determining factor in the		.001785
KMO simple suitability measure		.750
Bartlett's sphericity test	Chi-square	799.244
	p-value	.0000

All the figures are satisfactory, so the sample meets the requirements for factorial analysis. The next step is to carry out the principal component analysis. The results are shown in Tables 3 and 4.

As can be seen in Table 3, the first component accounts for 20.02% of the total variability in the sample, the second 18.83%, the third 16.76% and the fourth 14.22%. In other words the first four components explain 69.83% of the variability. Furthermore, these four components are the only ones with Eigen-values greater than 1.

Table 3 Principal component analysis. Final statistics with four components of rotated variables

Variable	Communality	Comp.	Eigen-value	% of Var.	% Accum.
Responsibility 1	.566	1	2.203	20,02	20.02
Responsibility 2	.649	2	2.071	18.83	38.85
Responsibility 3	.791	3	1,844	16.76	55.61
Responsibility 4	.907	4	1.564	14.22	69.83
Responsibility 5	.903				
Responsibility 6	.617				
Responsibility 7	.671				
Responsibility 8	.702				
Responsibility 9	.422				
Responsibility 10	.760				
Responsibility 11	.694				

Analysing the sensitivities in Table 4, four groups can be established from the responsibilities initially considered. The variables "optimisation of liquidity", "maximisation of returns from treasury surpluses", "establishment of optimum treasury level" and "short-term treasury forecasts, at least monthly" have high, positive values for the first component. Considering the significance of these variables, this component seems to be showing aspects concerned with the *control, planning and profitability of liquidity*.

Responsibilities 4 and 5 "monitoring and optimisation of the circuit of payments for purchases" and "monitoring optimisation of the circuit of collects for sales" can be grouped in the second factor, dealing with *operational management*.

The third component is defined by the variables "minimisation of the cost of short-term borrowing", "monitoring of banking positions at the value date" and "day-to-day control of banking positions", therefore its significance may lie in *banking management*, with the concept of financing. Nevertheless, in the initial approach, "monitoring of banking positions at the value date" and "day-to-day control of banking positions" they were to be found grouped in with domestic cash management. This indicates that for the firms replying to the questionnaire, these concepts are more related to banking management than to domestic cash management.

Table 4 **Rotated component matrix**

	1ª COMP.	2ª COMP.	3ª COMP.	4ª COMP
Responsibility 3	.837			
Responsibility 8	.772			
Responsibility 2	.741			
Responsibility 1	.406			
Responsibility 4		.925		
Responsibility 5		.921		
Responsibility 7			.805	
Responsibility 6			.718	
Responsibility 9			.580	
Responsibility 10				.854
Responsibility 11				.785

Saturation levels below 0.4 in absolute terms have been eliminated.

Finally, the fourth component can be interpreted in terms of *coverage of risk*. It groups together the functions "coverage of exchange-rate risk" and "coverage of interest-rate risk".

As a result, cash management functions can be classed in four groups: *control, planning and profitability of liquid assets*, *operational management*, *banking management* with the concept of financing and *coverage of risk*.

A confirmatory factorial analysis is then carried out[2] to estimate the ratio between the concepts to be measured and the items used to do so, and thus validate the measurement scale of the specific constructs of the analysis. In other words, this statistical technique is used in an attempt to confirm from a convergent viewpoint the existence of a single underlying concept of sufficient size to group together the variables of the scale considered overall[3]. To develop a valid, reliable scale capable of expressing the concept of cash management, the internal consistency of the model is checked by using reliability (Cronbach's alpha, composite reliability and extracted variance), convergent validity and discriminant validity of the factor.

The factors meet the reliability requirements, since the Cronbach alpha obtained for each factor is high, the composite reliability is close to or higher than 0.6 (Bagozzi and Yi, 1994) and the extracted variance reaches the recommended figure of 0.5 (Fornell and Larcker, 1981). Convergent validity is checked by the overall model fit measures. Table 5 shows that an appropriate fit is obtained. The chi-square probability level is greater than 0.05, the GFI, AGFI, NFI, IFI, TLI and CFI are close to or higher than 0.9, indicating a good model fit. The root mean square error of approximation (RMSEA) also indicates a good fit at 0.05 (Browne and Cudeck, 1993). Furthermore, the discriminant validity of the scale is ratified, determining that the results and the coefficients of causal analyses will not be modified by problems of collinearity, and all factors are distinct from one another.

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[2] The model was estimated using AMOS 5.0 for Windows, as opposed to operations with LISREL and EQS, due to its excellent transparency levels and user-friendliness.

[3] It must be pointed out that owing to the lack of multivariate normality of the data, the estimations for the fit of the model were carried out using the asymptotically distribution-free (AGL) technique. This technique is suitable for cases where there is no multivariate normality because it is insensitive to the normality of data (Hair, Anderson, Tatham and Black, 1998).

Table 5 **Model fit summary**
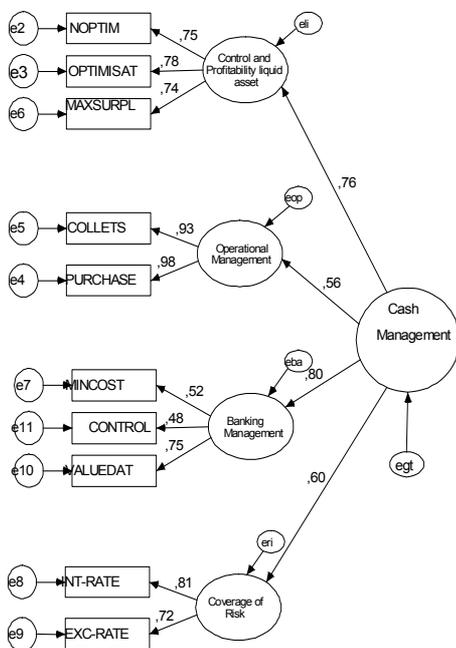
Model fit summary	Appropriate level
Absolute adjusted measured $\chi^2=$ 43.92, df=31, p=0.062 GFI=0.940 RMSEA=0.045 ECVI=0.451	P>0.05 GFI>0.9 RMSEA<0.05 Little value
Incremental adjusted measured AGFI=0.893 NFI=0.831 IFI=0.943 TLI=0.913 CFI=0.940	AGFI>0.9 NFI>0.9 IFI nearby 1 TLI>0.9 CFI nearby 1
Parsimony adjusted measured (valid for model comparisons) PNFI=0.572 PCFI=0.647 AIC=91.928	- - -

In short, confirmatory factorial analysis demonstrates the grouping of the variables obtained in the earlier exploratory factorial analysis. This enables us to determine that there is a reliable, valid overall concept of cash management that can explain the four cash management routines identified, i.e. *control and profitability of liquid assets*[4], *operational management*, *banking management* and *coverage of risk*.

4.3 Influence of company size, sector and training of decision-makers

This section analyses the influence that the size of a corporation, the sector in which it operates and the training of its treasury manager may have

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[4] The "short term treasury forecasts, at least monthly" variable is eliminated in the confirmatory model, since it fails to meet the minimum factorial load requirements.

on how it values the various functions of cash management. To achieve this goal, we perform a variance analysis. This analysis enables us to determine whether similar behaviour exists at different companies in assessing the importance of the different areas of action of treasury managers.

The results show a statistically significant link between company size and average company behaviour with regard to two cash management functions: "maximisation of returns on treasury surpluses" and "coverage of exchange rate risk". In the remaining areas of action of treasury managers no significant differences in assessment are found between the groups of companies considered[5].

Table 6 **Kruskal-Wallis variance analysis. Incidence of company size**

Factor: Size (small, medium, large)						
Dependent variable	1	2	3	4	5	6
χ^2 Statistic	2.865	0.122	1.531	0.464	1.056	5.182
p-value	*.239*	*.941*	*.465*	*.793*	*.590*	*.075*
Dependent variable	7	8	9	10	11	
χ^2 Statistic	2.104	7.450	1.451	2.064	18.022	
p-value	*.349*	*.024*	*.484*	*.356*	*.000*	

On the other hand, the results provided in Table 7 indicate that the sector to which a corporation belongs has a significant influence on several functions, including "coverage of exchange-rate risk" and "coverage of interest-rate risk".

Table 7. Kruskal-Wallis variance analysis. Tucked Sector to which companies belong

Factor: Sector (Building, Manufacturing, Trade, Services)						
Dependent variable	1	2	3	4	5	6
χ^2 Statistic	.891	.809	1.088	5.164	3.329	10.425
p-value	*.828*	*.847*	*.780*	*.160*	*.344*	*.075*
Dependent variable	7	8	9	10	11	
χ^2 Statistic	9.286	3.913	.082	10.751	10.220	
p-value	*.066*	*.21*	*.994*	*.013*	*.017*	

[5] Shortage of space precludes the inclusion here of the descriptive statistics and of all the statistical tables for the analyses performed, but they are available from the authors on request.

As can be seen in Table 8, "coverage of exchange-rate risk" is the only function in which there is a significant difference in the score depending on the training of the decision-maker. These results confirm the idea that there is a philosophy, a culture of cash management and that whether or not new treasury management techniques are used depends more on the initiative of the treasury manager than on the size of the company, the sector to which it belongs or the training of the decision-maker. As has been demonstrated, there are few variables for which the average score attributed by companies differs depending on their size, the sector to which they belong and the training of their decision-makers.

Table 8 **Kruskal-Wallis variance analysis. Training of decision-makers**

Factor: Training of treasury manager (university degree, no degree)						
Dependent variable	1	2	3	4	5	6
χ^2 Statistic	3.321	.495	.131	.000	.669	.000
p-value	*.068*	*.482*	*.717*	*.992*	*.413*	*.998*
Dependent variable	7	8	9	10	11	
χ^2 Statistic	.005	.192	1.196	.026	3.608	
p-value	*.942*	*.661*	*.274*	*.872*	*.057*	

For this reason, we perform a cluster analysis to divide companies into homogeneous groups, i.e. groups of companies with similar cash management routines, and then use discriminant analysis to detect the variables with the greatest classifying capacity in each group.

4.4 Grouping of Companies

In this section we divide companies into homogeneous groups. Using statistical methods this grouping can be achieved through cluster analysis. Cluster analysis is applied to the individuals in the sample using an agglomerative hierarchical method and the squared Euclidean distance.

The results of cluster analysis and the relevant descriptive statistics indicate that there are three basic categories of company: Group I, comprising 78 companies; Group II, comprising 63; and Group III, comprising 64.

Table 9 shows the average score for each responsibility in each of the three groups resulting from cluster analysis. The average scores for Group I are higher than for the other two groups, which means that the companies in

this group allocate the greatest importance to cash management. They are followed by the companies in Group II.

Table 9 **Characteristics of groups**

	Group I	Group II	Group III
Responsibility 1	4.81	4.30	4.19
Responsibility 2	4.51	3.89	3.23
Responsibility 3	4.45	3.79	3.14
Responsibility 4	4.50	3.73	3.42
Responsibility 5	4.60	3.84	3.45
Responsibility 6	4.68	3.48	3.03
Responsibility 7	4.83	3.56	3.50
Responsibility 8	4.44	3.56	2.98
Responsibility 9	4.68	3.78	3.42
Responsibility 10	3.08	2.84	2.06
Responsibility 11	2.88	2.89	1.42

If we analyse the groups in absolute terms, it emerges that "day-to-day control of banking positions", "short-term treasury forecasts, at least monthly", "monitoring of banking positions at value date" and "minimisation of the cost of short-term borrowing" are the areas of action of treasury managers which are most highly valued by Group I companies. A comparison of these data with the results of confirmatory factorial analysis shows that three of these four responsibilities are grouped under the factor we have called *banking management* with a financing concept.

"Short-term treasury forecasts, at least monthly" also scores highly among companies in Group II. Scoring less, but still more than the rest, are the functions "establishment of optimum treasury levels", "monitoring and optimisation of the circuit of collects for sales", "optimisation of liquidity", "minimisation of the cost of short-term borrowing" and "monitoring and optimisation of the circuit of payments for purchases". This means that this group of companies places most value on aspects concerned with *liquidity and operational management*.

The only function with a score that stands out for Group III companies is "short-term treasury forecasts, at least monthly". In all three groups the two coverage functions, grouped above in the *risk coverage* factor stand out for their low scores. The function "coverage of exchange-rate risk"

scores especially low among Group III companies. However, although the differences between groups are greater for some functions, variance analysis shows that the differences in scores allocated to functions by the different groups are significant for all functions, since the null hypothesis of equal means can be rejected for a 5% significance level in all cases.

4.5 Discriminant analysis: most significant functions

Once the companies have been grouped, we can now apply stage two of the process, which involves linking these groups with cash management functions. This will enable us to check whether the groups obtained are consistent, and to establish which variables are most useful for classifying companies into groups. It is therefore advisable to confirm the classification obtained by cluster analysis via confirmatory techniques such as discriminant analysis, using validation samples.

Given the results of the cluster analysis, in which three main groups are formed, we use discriminant analysis by phases for validation. Thus, phase one checks the accuracy of the separation between Group I and the other two, and phase two checks the distinction between Group III and the rest.

Phase 1: Group I and the rest

Starting with phase one, according to the results of the cluster analysis, if only two groups are distinguished those groups are precisely Group I and the rest. Group I comprises 78 individuals and the other group 127 individuals. Table 10 shows the results of a comparison using multivariate variance analysis (MANOVA). As can be seen, the statistic used is significant, therefore it can be asserted that the vector of means differs from one of the two subpopulations considered to the other.

Table 10 **Group I & the rest. Multivariate comparisons. Wilks' Lambda**

	Wilks' Lambda	**F**	**Hypothesis fd**	**Error fd**	**p-value**
Independent	.988	1,429.29	11	193	.000
Cash	.589	25.133	11	193	.000

However, we can confirm only that the influence of the variables in the dependent variable is significant. We cannot yet tell what level or levels of

those variables make the differences significant or to what extent. To do that we must look at univariate comparisons.

A univariate variance analysis (ANOVA) using Wilks' Lambda for the sample analysed shows that there are differences between the two groups that can be attributed to each of the independent variables considered: the significance of the F statistic is .000 for each of them.

Once the variables to which the difference between the groups can be attributed has been determined, our next step is to look at how important they are for distinguishing between groups. We do this through discriminant analysis. The dependent variable is the group to which companies belong and the independent variables are the 11 cash management responsibilities. First we divide the sample into two groups: the sample for analysis, used to construct the discriminant function, and the validation sample, used to validate the discriminant function. 187 observations (91.34%) are taken at random as the sample for analysis, and the remaining 18 make up the validation sample[6].

The null hypothesis that the centres of the groups are the same can be tested using Wilks' Lambda, because it measures the deviations of the discriminant scores within the groups against the total deviations with no distinction between groups. The p-value associated with this statistic is less than .000, therefore the null hypothesis can be rejected, i.e. the information provided by the function for classifying each case is statistically significant at below the 5% level.

Table 11 **Group I & the rest. Discriminant function. Wilks' Lambda**

Wilks'	Chi-square	fd	p-value
.382	175.379	6	.000

Using the exact F statistic to check whether the model is significant or not, we can also conclude that the model formed by all the variables considered in the discriminant function is significant, since the p-value associated with the variables is .000 in all cases.

Table 12 provides the discriminant loads or structural correlations for the variables in the discriminant function. As can be seen, the variables "monitoring of banking position at the value date" and "day-to-day control of banking positions" have the greatest discriminant load, i.e. these are the

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[6] 12 cases were excluded since they did not have at least one discriminant.

variables that best characterise the companies in Group I. Next we distinguish the responsibilities "maximisation of returns on treasury surpluses", "monitoring and optimisation of the circuit of collects for sales" and "minimisation of the cost of short-term borrowing". It can be seen that these are the functions for which the differences between the average scores for the three groups are greatest (Table 9) in the cluster analysis. The function "establishment of optimum treasury levels" is the final variable in the discriminant function.

Table 12 **Group I & the rest. Discriminant function. Structural matrix**

	Discriminant
Responsibility 6	.527
Responsibility 7	.492
Responsibility 8	.416
Responsibility 5	.397
Responsibility 9	.385
Responsibility 2	.373

The final indicator of the effectiveness of the discriminant function is the proportion of individuals correctly classified. In this case, 96.3% of individuals in the sample for analysis are classified correctly, and 88.9% of those in the validation sample. To check the goodness of these results they must be compared with the proportion of individuals that might be classified correctly on a random basis without the aid of the discriminant function. A priori, one might expect 63.1% of cases (118/187) in the sample for analysis to be correctly classified on a random basis, and 66.6% (12/18) in the validation sample. A look at the figures actually obtained shows that the improvement achieved with this analysis is considerable.

Therefore, Group I is clearly characterised and distinguished from the remaining individuals, and the most significant variables in that regard are "monitoring of banking position at the value date" and "day-to-day control of banking positions". The functions "minimisation of the cost of short-term borrowing", "maximisation of returns on treasury surpluses", "monitoring and optimisation of the circuit of collects for sales" and "establishment of optimum treasury levels" also have discriminant power.

Phase 2: Group III and the rest

In phase 2, once Group I has been distinguished, we now seek to establish the variables that can discriminate between Group III and the rest. For this purpose, groups I and II are considered as a single group comprising 141 individuals, while Group III is made up of 64 individuals.

Table 13 below shows the results of the MANOVA analysis. The figures for the statistic used are significant, so in this case also it can be asserted that the vector of means differs from one subpopulation to the other. The results of an ANOVA analysis using Wilks' Lambda on the sample for analysis show the differences between the means for the two groups to be significant for all variables, therefore they are all influential in distinguishing between the groups.

Table 13 **Group III & the rest. Multivariate comparisons. Wilks' Lambda**

	Wilks' Lambda	**F**	**Hypothesis fd**	**Error fd**	**p-value**
Independent	.021	834.349	11	193	.000
Cash	.535	15.242	11	193	.000

The sample for discriminant analysis is formed by once again taking 187 individuals at random and leaving the remaining 18 as a validation sample. The results of applying Wilks' Lambda statistic to test the null hypothesis that the centres of the groups are the same as displayed in Table 14. As can be seen, the p-value associated with the statistic is .000, therefore the null hypothesis can be rejected and the information provided by the function for classification of individuals is hence also statistically significant at below the 5% level.

Table 14 **Group III and the rest. Discriminant Function. Wilks' Lambda**

Wilks' Lambda	**Chi-square**	**fd**	**p-value**
.569	102.862	5	.000

Table 15 shows the discriminant loads in this case. From the means of the variables in the groups and from the results shown in the table, it can be

deduced that "coverage of exchange-rate risk" is the variable with the greatest discriminant load, and that its mean is very low for Group III and quite high for the other two groups. It seems clear that the individuals in Group III pay little attention to this function. According to these results, the companies in Group III also pay little attention to "maximisation of the returns on treasury surpluses", since the discriminant load of this function is also quite low in comparison with the other two groups. "Establishing of optimum treasury levels", "monitoring of banking position at value date" and "monitoring and optimisation of the circuit of collects for sales" are the other variables in the discriminant function.

Table 15 **Group III & the rest. Discriminant function. Structural matrix**

	Discriminant
Responsibility 11	.649
Responsibility 8	.545
Responsibility 2	.515
Responsibility 6	.496
Responsibility 5	.391

88.3% of the individuals in the sample for analysis and 83.3% of those in the validation sample are classified correctly by the function. The expectations for random classification are 70.6% (132/187) in the sample for analysis and 50% (9/18) in the validation sample, therefore the improvement obtained with this analysis is considerable. Group III is therefore also significantly distinguished from the remaining individuals, and the most significant variables in this are "coverage of exchange-rate risk" and "maximisation of returns from treasury surpluses". The functions "establishment of optimum treasury levels" and "monitoring of banking position at the value date" also play a significant role. The final variable included in the discriminant function is "monitoring and optimisation of the circuit of collects for sales", although its discriminant load is considerably lower.

5 - Conclusions

This study has focused on the analysis of cash management, providing evidence using Spanish companies with more than 15 employees. There are

several important features of our analysis which extend the literature on cash management routines.

Regardless of the type of company involved, the task to which the treasury manager devotes most attention is "short-term treasury forecasts, at least monthly". The company budget is thus a key element in the management of available liquid assets, even for those companies that see the treasury department exclusively as a payment and collect centre, as routines that must be carried out for the survival of the company.

Responsibilities linked to risk coverage, i.e. coverage of interest rate risk and exchange rate risk, score lowest. Low interest rates and the single currency in use in the euro zone may explain the low level of concern for functions which may entail major costs for companies, especially in periods of economic instability. Coverage of exchange rate risk is the responsibility for which the score differs most according to company size, sector and the training of treasury managers. Logically, such coverage is greater in the larger companies and among more highly qualified treasury managers.

In the remaining areas of action of treasury managers, there are no significant differences in the scores awarded by companies in most cases. This seems to indicate that cash management is a culture that forms part of the strategy of companies and depends more on managers themselves than on the characteristics of companies.

The cluster analysis performed enables firms to be divided into three main groups according to the quality of their cash management, with a view to detecting the variables characterising each group.

Thus, first of all the separation between Group I (companies that place greatest importance on cash management) and the other two groups is confirmed. Secondly, the difference between Group III (the worst placed companies in regard to cash management) and the rest is analysed.

Banking control, identified by the responsabilities "monitoring of banking position at value date" and "day-to-day control of banking positions" enables a distinction to be drawn between those firms that place most importance on cash management and the rest. The variables that discriminate between Group III and the other two groups are "coverage of exchange rate risk" and "maximisation of returns on treasury surpluses". In other words, the companies in this group devote little effort to covering exchange rate risk and to managing peaks in liquidity. This demonstrates how little importance they allocate to treasury departments, which they see exclusively as cost centres rather than as an element for generating profit which can help to achieve their company's overall goal of increasing its value.

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