International Cash Management in the 21st century: Theory and Practice

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Abstract

This paper outlines the theoretical models of international cash management and assesses their implications for corporate practice. Corporate practice is then reviewed through the analysis of survey research and case studies. It emerges that whilst the implications of theoretical models are captured in essence by corporate practice, there is scant evidence of companies using sophisticated models in international cash management. The practice of international cash management is largely driven by developments in communications and computer technology, relaxation of regulatory and tax impediments, the internationalisation of banking and the development of new banking products. International treasurers may therefore be able to find appropriate cash management solutions to meet their business needs with the co-operation of banks and technology providers. Further academic research should evaluate the extent to which corporate practice is consistent with extant multi-currency balance and network optimisation models and also explain why particular approaches to international cash management persist in companies.

Keywords: International cash management, multi-currency balances, network optimisation models, international funds transfer, international cash pooling, multilateral netting.

1. Introduction

Recent developments in computer communications technology, especially the internet, globalisation of banking, reduction in regulatory barriers in the major economies, and the marketing of innovative products by global and niche banks appear to have made an impact on the practice of international cash management. This paper reviews developments in the theory and practice of international cash management. From the theoretical angle, we outline models for the determination of optimal cash balances in a multinational setting as well as models of optimal multilateral netting and international funds transfer and their implications for short-term borrowing, investment and hedging decisions. We then analyse changes in the practice of international cash management through the review of survey research and case studies. To this end, we highlight how developments in telecommunications and computer technology, the globalisation of banking, product development, reduction in regulatory barriers and the introduction of the single European currency have changed and continue to change regional and global cash management. The paper ends with suggestions for future research.

2. International Cash Management Models

2.1 Models of optimal cash balances in a multinational setting

The holding of foreign currency balances by multinational organisations is an integral part of international cash management which includes the determination of optimal cross-border transfers, short-term investments, inter-company lending and short-term borrowing (Srinivasan et al., 1990). Shapiro (1976) analysed the transaction demand for cash in a

multinational setting by extending the optimal cash balance model of Baumol (1952) to cover multiple currencies. He showed the need to hold balances in foreign currencies to eliminate the need to borrow in such currencies and avoid transaction costs as well exchange rate risks associated with cross-border cash transfers. Essayyad and Jordan (1993) developed an economic order quantity model to determine how much of a particular foreign currency a multinational should hold given the opportunity cost, transaction cost and the volatility of the exchange rates vis-à-vis the home currency. Their model indicates that the optimal balance maximises the difference between total transaction and opportunity costs of ordering foreign currency before currency appreciation and the total costs of not ordering and incurring currency appreciation cost on the next order quantity. They found that if the actual balance is less than the optimal balance, then a saving could be realised by placing a special order quantity before the appreciation of the foreign currency. The practical application of this model depends largely on the forecast of currency appreciation and depreciation. Such forecasts are prone to error, if international parity relations do not hold.

Gautier et al. (2002) also model how much foreign currency multinationals should hold, how much should be exchanged into home currency and the changes in the level of holdings of foreign and home currencies in the light of associated costs, benefits and risks. The paper uses qualitative sensitivity analysis developed by Gautier and Granot (1996) to investigate how changes in currency holdings, expected returns, exchange rates and rate volatility affect the costs of various strategies, to help managers understand the interdependencies in the sources of and need for different currencies. They show that holdings of different currencies respond to exogenous changes in cash flows from operations. However, they point out that a small change in the amount required to be held in a single currency can lead to changes in the levels of other currencies that are several times that of the exogenous change. This amplification effect increases when foreign exchange transaction costs are small.

Levy (1981), empirically investigated how firms should have invested their international cash balances given rates of return in their home countries and exchange rate risks. Using historical information, he found evidence for holding multi-currency balances but the optimal holdings differed from country to country. In a similar vein, Swanson and How (1986) showed that within a mean-variance framework, it would have been optimal for US firms to have held short-term cash balances in the US dollar, pound sterling and deutschemarks over the 1981-82 period.

VanderLinden and Gramlich (2005) investigated the challenge of short-term investment of yen surpluses in the Japanese money market, which had been characterised by near-zero interest rates for more than a decade. Using data from July 1997 through May 2002, they found that for 61 percent of monthly observations, the forward dollar/yen exchange rate overestimated the future spot rate. This reinforced prior evidence that a forward bias existed in the dollar/yen exchange rate because the forward yen premium differed from the interest rate differential between the dollar and the yen. This offered scope for the exploitation of uncovered interest arbitrage. They investigated a number of cash investment strategies to exploit this arbitrage under a scenario where associated investment risks were also kept under control. They found that using zero-cost or collared options to invest in dollars which was converted later into yen produced higher returns with reduced risk relative to other strategies that involved the use of either hedged or unhedged Eurodollar options. However, since US nominal interest rates fell after May 2002, such an investment strategy was no longer profitable. A collared short-term investment

strategy of investing excess yen in the British pound could be profitable, if the forward bias was demonstrated to exist between the yen and sterling in light of the fact that the UK had higher nominal interest rates.

Madura (1985) modelled international short-term borrowing within a framework that took account of interest rates and exchange rate risks. He found that borrowing an equally weighted portfolio of relevant currencies that excludes any currency with a higher interest rate than the domestic currency outperforms borrowing a portfolio based on the mean-variance framework.

The preceding models are consistent with the practice of multinational organisations holding foreign currency balances to meet operating, investment and exchange rate risk management purposes. Currency balances in excess of transaction demand should be typically used for inter-company lending or invested in currencies that would yield higher returns for a given level of exchange rate risk.

2.2 Models of netting and international funds movement

Other models of international cash management focus on obtaining optimal solutions to multilateral netting and international funds movement. Generally these decisions have been modelled as generalised network problems[1] or as mathematical programming problems either of the linear or goal programming type[2] (see Philippatos and Christofi, 1984 for a review of these models). Shapiro (1978) showed that the flow of funds between subsidiaries can be modelled as a transportation problem if the transfer costs are assumed to be linear. Where they are not, a mixed integer programming method can be used. The optimal netting for such a problem may produce transfers that could differ from what could be obtained from a pencil and paper approach because it takes account of the relative costs of transferring funds between countries. He also pointed out that a multilateral netting system also provides information that can assist in shifting funds in response to interest differentials, expectations of exchange rate movements and tax differentials. He echoed the fact that in a multilateral netting system, the exchange rate at which the transactions occur is fixed by the MNC usually within the week that netting takes place and the amounts netted are usually converted into a single currency. If billing periods between affiliates differ significantly, netting can induce effective changes in credit terms that can cause delays in the flow of funds between affiliates. One solution is to conduct netting more frequently.

Anvari (1986) developed a multi-period cross-border cash transfer-scheduling model that uses forecasts to produce the most cost-effective multilateral netting system. The use of forecasts in funds transfers helps in the identification of foreign exchange risks involved in such transfers and how they could be hedged. His model therefore included netting with foreign exchange hedging and associated costs in addition to funds transfer costs. Unlike the Shapiro model, transactions are not done in one currency. The centre that manages the process can identify currency exposures and incorporate the hedging costs in determining the optimal transfer patterns. The model can also incorporate leading and lagging practices, third party transfers, and other flows such as dividends, royalties and capital investments.

A generalised network optimisation model that allows the deduction of costs from funds available and identifies how netting will impact short-term investment and borrowing in affiliates was developed by Srinivasan and Kim (1986). They showed that whilst a

pure netting system can generate no fund flows between subsidiaries, if short-term investments and borrowing needs are taken into account, there will be transfers between affiliates because additional short-term borrowing costs may outweigh the savings from transfer costs. Hinz (1989) extended the Srinivasan and Kim model to take account of foreign exchange spread costs, and their impact on short-term borrowing costs and returns from short-term investments.

Adkins (1991) proposed a network model of international cash management based on currency flows in a company over time in contrast to previous models that focused on cash flows through an affiliate. In his model, cash flows can originate in the collection of receivables and other transfers in the same currency, the retirement of investments, and borrowing and currency conversions. Outflows cover payables and other transfers in the same currency, the retirement of borrowings and initiation of investments and transfers into foreign currencies. The model is designed to yield an optimal feasible configuration of currency conversions, borrowing and investment opportunities in the absence of covered interest arbitrage. His generalised network model can accommodate netting, matching and third party flows. It is currency and time oriented and therefore avoids the problems, which arise in models based on a single currency. The model also accounts for foreign exchange costs of bid-ask spreads. Future foreign exchange conversions are carried out with forward contracts. Investigating the implications of the model with derivatives other than forwards can offer the opportunity to assess how such models can accommodate the growing currency derivative markets.

Whilst the above models provide insights into the issues associated with cross-border transfers, most of them are deterministic by design and do not therefore deal with the uncertainties that arise in cash management. Furthermore, most of the models are complex in design and have data requirements that are not easy to meet. For instance, Anvari (1986) points out that even though such models can be incorporated into a computerised data transmission and processing system, the task of preparing input data and maintaining records of past decisions requires an elaborate information system which companies may not be keen to develop. However, the emergence of shared service centres since 1985 in which treasury, accounting and other operations are centralised and supported by common Enterprise Reporting Systems could help to integrate cash management systems with other organisational processes (Tam and Lim, 2003).

To set the stage for the review of corporate practice, we explore how globalisation of banking and the development of products by banks have been instrumental in widening the scope and practice of international cash management.

3. Globalisation of banking and international cash management

3.1 Globalisation of banking

Goldberg and Saunders (1981) and Brealey and Kaplanis (1996) among others, show that some banking organisations follow a strategy of setting up offices in countries where their home nation customers have foreign affiliates. In a study of the choice of banks for cash management in 20 European countries, Berger et al. (2003) found that 65.5% of respondents chose host nation banks for cash management purposes more often than they chose home nation banks (17.7%) or third nation banks (16.9%). This is attributed to the fact that host nation banks may best know the local market, culture, language and regulatory condi-

tions and have superior information about local non-financial suppliers and customers. They also found that foreign affiliates prefer banks that span multiple nations but more often than not they choose regional banks 52.8% of the time in preference to global banks (35.1%) or host nation banks 12.0%. Firms were likely to choose a global bank when operating in the former socialist nations of Eastern Europe. This paper suggests that while global banks have a role, regional and local banks are perhaps more important in the provision of international cash management services to multinational businesses. This could be due the practice of most companies managing their cash on a regional rather than a global basis.

Mols et al. (1997) surveyed 1129 corporate customers in 20 European countries and found that service quality was the most important criterion for choice of domestic cash management banks, followed by pricing and relationship. Technology had a very low ranking indicating that no bank has been able to develop a significant technology-based advantage. Templeton and Clark (2001) noted that European banks have developed European-wide cash management systems to take advantage of technological advances and regulatory changes accompanying the introduction of the single currency.

3.2 Cash management services provided by banks

The provision of cash management services by banks in developed countries has moved at different rates in different countries from balance reporting through transaction reporting, netting of debit and credit balances, target balancing, electronic funds transfer, cash flow projection and information advisory service to internet based trading platforms. Such product development has been largely driven by technological advances and customer demand[3] (Haaroff, 1983). Communications technology in cash management has also moved from dial-up phones through to work stations that are web-based. The Internet has changed a lot of business models and offers some promise in the way companies interact with their clients. Companies are using electronic means to achieve straight through processing[4]. Banks are making the effort to deliver every application that is delivered through the desktop also through the internet, whether it is information or transaction based. Lenzer (2003) reported a wide range of netting systems that are either desktop or internet-based used in European cash management. The challenges to the implementation of netting and pooling systems seem to lie in regulatory restrictions, taxation issues, and differences in banking practices as well as insolvency problems[5]. The involvement of global and specialist banks in cash management means that strategies and innovative methods are being developed to overcome such obstacles.

Payment systems are also gradually, uniformly and unmistakably moving from cash and paper giro[6] towards a greater use of electronic payments in fourteen developed countries (Humphrey, Pulley and Vesala, 1996). Ricci and Morisson (1996) reiterate that in international payments, wire transfers that rely on national bank netting systems for making international payments and SWIFT[7] - a communications system for connecting banks across the globe - are the two computerised systems developed to process international payments. The challenge of how a national electronic payment system such as Euro CHAPS in the UK interacts with another such as RTGS^{PLUS} in Germany must be adequately addressed before real-time cross-border electronic payments can be achieved. In the European Union, multiple cross-border payments systems for the euro have been developed. European central banks are linked through the Trans-European Automated Real-Time Gross Exchange Transfer (TARGET)[8] system to facilitate cross-border real-time

payments. TARGET enables banks that are members of one national Real-Time Gross Settlement (RTGS) payment system such as Euro CHAPS in the UK to make payments to banks in other national RTGS systems in real time and final basis. Cross-border payments in this system are final because they are fully funded or collateralised with deposits at the central bank. The Euro Banking Association has developed another system that allows member banks to clear euro payments without going through the national payment systems. This is not a final payment system but depends on whether or not a participating bank is below its agreed maximum amount it can pay under the system, whether or not the bank in reality has cash in excess of its limit.

In the light of the above, it can be argued that developments in international cash management would, among others, depend on the growth of regional and global banks, product development by international cash management banks, technological advances and central bank co-operation to enhance real-time cross border electronic payments.

4.The practice of international cash management

Empirical research in international cash management tends to be surveys of corporate practice. Srinivasan and Kim (1986) surveyed the netting practices of multinational companies and found that electronic funds transfer networks like SWIFT had reduced the direct cost savings of netting, leaving foreign exchange cost savings as the major benefit of netting. Soenen (1986) investigated the responsibilities and practices of international cash management by UK-based companies. He found that responsibility for cash management tended to lie with senior financial executives even though hardly any respondent companies had formal cash and foreign exchange management policies. Centralisation at headquarters was the most common approach used in international cash management. As expected, cash and foreign exchange forecasts were prepared and updated by most companies even though 80% of respondents indicated that they were not familiar with optimal cash balancing models. A small proportion (17%), however, indicated that they were exploring the possibility of constructing optimisation models for cash and foreign exchange management. Even though there was increasing awareness of cash management services offered by banks, only 18% of respondents used such services for balance reporting, funds transfer and consultancy and those who used it were satisfied with respect to efficiency, accuracy of information and the extent of the service network. Respondents tend to hedge transaction exposure with forward contracts, international money market transactions and leading and lagging. However most respondents were of the view that foreign exchange exposure should be minimised, first through such actions as the specification of currencies for export and import transactions in order to eliminate currency risks.

Soenen and Aggarwal (1988) surveyed banking practices in the area of cash management in the UK, Netherlands and Belgium. They found that the most frequently used cash management services were balance reporting, funds transfer and cash and foreign exchange consultancy. Other frequently used services included value dating, cash flow analysis, cash pooling, clearing and netting letters of credit, interest compensation and foreign exchange transactions. Banks of local or US origin in almost equal proportions offered such services. Banks were used as the major intermediaries for short-term investment of excess cash to provide a hedge against a liquidity squeeze. Investment instruments included overnight deposits, bank deposits and marketable securities. Overdraft facilities and short-term bank credit were the most frequently used credit facilities to deal with short-term cash shortages.

The study of international working capital practices of Fortune 200 firms by Ricci and Morrison (1996) showed that more than 80% of respondents use wire transfers, 50% pool their international cash balances often and almost half net payments multilaterally and transfer funds electronically. Netting was justified because annual average savings in foreign exchange transactions costs and bank transfer charges are about 1.5% per dollar netted (Shapiro, 1992) whilst the payback for a netting system was typically six months after implementation (Bogusz, 1993). Regarding foreign exchange activities, the vast majority of respondents use only spot and forward markets often, with infrequent use of currency options and swaps, whilst the majority of respondents never used leading and lagging or futures contracts. A similar study using the same questionnaire distributed to the top 200 UK companies by Ricci and Vito (2000) reports that 68% of respondents use wire transfers, 52 % notionally pooled their balances, 61% transferred funds electronically but only 23% net payments multilaterally. In relation to foreign exchange activities, spot and forward rates were used by over 70% of respondents, followed by swaps at 28% and the other methods at less than 15% each.

Tse et al. (1998a) analysed the data for the Netherlands of a pan-European cash management survey that started in 1994. They found that whilst some activities such as funding, balance reporting, liquidity, investments and exposure management tended to be centralised, accounts payable and receivable were usually decentralised. Instruments used to make and receive international payments tended to be dominated by cheques, post office giros, electronic funds transfer and letters of credit. Multilateral netting systems were used by more than fifty percent of companies with worldwide sales in excess of £2 billion, otherwise ad-hoc bilateral arrangements tended to be the norm. In a follow-up paper, Tse et al. (1998b) noted that liquidity management tended to be carried out at the local and subsidiary levels while short to medium-term liquidity needs tended to be managed regionally using internally developed cash flow forecasting systems. Over 70% of respondents invested surplus funds manually, whilst transfer of funds between accounts in different currencies was done by about 37% of respondents usually using currency swaps. Netting was used by almost half of respondents with 80% of such companies relying on their own in-house system and only 10% using a bank netting system. Bank services such as pooling were widely used within the country but cross-border single/ multiple currency pooling and concentration services tended to hardly used.

Adams (1997) pointed out that companies operating in the central European countries of Poland, Hungary and Czech Republic were beginning to enjoy improved banking services relating to clearing, reduced float, electronic banking and some form of cash concentration including rudimentary pooling within countries. Netting appeared to be the most difficult method to achieve even though it was possible in the Czech Republic. As these countries become integrated into the European union and the single currency, their systems and regulations would improve to help achieve pan-European cash management solutions.

Several authors in Birks (1998) discuss aspects of global cash management in Europe, based on a survey of 1130 cash managers and treasurers in 19 European countries in 1996. The articles describe cash management practices in Europe, outline what buyers of cash management services look for from their banks, and indicate future developments in cash management and electronic banking practices.

Marshall (2000) surveyed multinational companies in the UK, USA and the Asia-Pacific region[9] and found the widespread use of netting among all respondents with the exception of Hong-Kong where matching appeared to be the preferred internal method of hedging. The provision of cash management solutions in the Asia Pacific region by banks with full service branches varied widely (Large, 2002). Only two global banks offered multilateral netting. Other services were widely available even though there were restrictions in some jurisdictions on some aspects of cash management. The findings for a Latin American survey were similar to those of the Asia Pacific region: banks strategies varied considerably in much the same way, as there was variation in coverage of liquidity management services.

There appears to be some inclination on the part of companies to outsource aspects of their international cash management functions. A JP Morgan Fleming survey (2003) suggests that out of a sample of 347 treasurers from the UK, Europe, US and Asia, about one third outsource sweeping, pooling, cash investment, netting and foreign exchange execution services. The survey also reports the rapid growth in the use of the internet for electronic banking (89%), trading (64%) and market information (91%) among respondent companies.

From the analysis of annual reports of 112 British and 200 French companies, Capstaff and Marshall (2005) show that more than half of the sample firms use cash management techniques of netting, matching and pricing policies to hedge foreign exchange exposures. Empirical analysis confirmed that users of cash management hedging methods have higher levels of financial distress and are less liquid which is consistent with the argument of Smith and Stulz (1985) that hedging is used to increase firm value by helping to reduce financial distress.

Several case studies help to illuminate aspects of the practice of international cash management. Srinivasan *et al.* (1990) explain how a US-based multinational used regional cash centres in Europe, Latin America, Asia-Pacific and Others (covering eastern Europe, Middle East and Africa) to invest locally in short-term money market instruments, the commercial paper of the parent company and pay off inter-company loans. In addition, a re-invoicing centre was established to net inter-subsidiary fund flows and manage transaction exposure in over 30 currencies. All cross-border sales transactions fed into an online information system that provided corporate management with the firm's exposure by currency.

Sandford (1994) described how Primark, a US company, created a multi-currency pooling system to help service debt taken to finance the acquisition of Datastream. For pooling purposes each subsidiary had a currency account in London (operated by a US bank) into which surplus cash balances in excess of operating requirements would be notionally pooled. Receipts into the parent company's account at the pooling centre were royalties from subsidiaries or transfers, which were treated as inter-company loans. All account balances in the pool (which were in local subsidiary currencies) were notionally converted into US dollars to determine the aggregate net balance on a daily basis. All overdrawn accounts were totalled and compared with an aggregate overdraft limit agreed with the concentration bank. If the notional dollar pooling showed a positive balance, then currencies with a net positive balance earned local LIBOR less a spread. Net overdrawn currencies paid local LIBOR plus a spread. Large amounts of currencies with a longer-term investment horizon were invested outside the pool in money market instruments and term

deposits. Multi-currency pooling allowed the parent to overdraw its US dollar account to the extent that excess US dollar equivalents were available in all currency accounts in the pool. Dollars for repayment of the US$80 million 6-year bank debt were guaranteed by a currency swap agreement which exchanged, at quarterly intervals, deutschemarks, French francs, Swiss francs, and Japanese yen for dollars.

A balance reporting system using SWIFT fed local concentration balances to the pooling centre which added the multi-currency pool accounts to produce the global daily cash position. Six months cash forecasts rolled over on a weekly basis were prepared by the subsidiaries. The treasurer estimated that initially, the pooling arrangement enabled the early payment of bank debt of about $424,500 per annum. The opportunity cost of using pooled funds to pay debt rather than for short-term investment amounted to $132,000 per annum resulting in an expected annual saving of $292,500. The programme reduced interest cost to the group to the tune of about $3 million per year (Queree, 1995).

A longitudinal study of how Motorola adapted an internal information system infrastructure initiated in 1976 for data sharing among its subsidiaries to support a multilateral netting system is analysed by Holland et al. (1994). In this system, the different Motorola businesses pay the net amount due from them to the netting centre in their local currencies and the centre also pays them in their local currencies. The system has been extended to pay suppliers of Motorola companies. Motorola supplies payment data from subsidiaries and third party suppliers in EDIFACT to Citibank, which then translates such messages into SWIFT to generate cheque and wire payment instructions. This multilateral netting system reduced payments to the tune of $2.38 billion in 1991. Additionally, foreign exchange transactions worth $3 billion in 1991 were avoided with netting, which equated to an annual saving of $6.5 million.

Tsamenyi and Skliarova (2005) study a Russian multinational and report that the company uses a re-invoicing centre, netting, leading and lagging and cash flow forecasting in its international cash management in ways similar to those used in Western Europe. The differences in practices they report tend to be a function of the environment within which the company operates, especially the non-convertibility of the rouble and problems with the banking system.

Westerman and Von Eije (2005) describe how that the introduction of the Euro, deregulation and liberalisation enabled Philips to implement Euro cash pooling with the creation of an in-house bank. The firm also operates a payment factory to process cross-border and third party payments in domestic currency through the use of non-resident accounts at the netting and pooling centre. However, idle non-Euro balances are not pooled, as the company does not find such activity to be cost efficient. Nevertheless, the establishment of the payment factory and an in-house bank has led to substantial cost savings.

The findings of the above surveys and case studies indicate an increasing use of cash pooling and multilateral netting arrangements by multinationals. Foreign exchange hedging appears to be the natural outcome of pooling and netting arrangements. Evidence on the use of optimal cash balance and network optimisation models is very limited in much the same way as it is unclear about the extent to which foreign exchange forecasts are used. Future research should examine the extent to which optimisation models and foreign exchange forecasts are used. Additionally, the use of international cash management to

hedge exchange risks through the use of forwards, money market transactions, currency swaps and other derivatives should also be explored in future research.

5. Conclusion

The theoretical developments in international cash management have tended to focus on the determination of optimal currency balances, multilateral netting and cash pooling to help use non-transaction balances for short-term investments and inter-company borrowing in order to reduce borrowing cost, currency conversion costs, and optimise short-term investment income. In the practice of international cash management, companies focus on finding ways to overcome regulatory, taxation, insolvency and banking related impediments to netting and currency pooling in the operation of international cash management systems and do not appear to worry about optimal multi-currency balances or network optimisation models. Developments in computer and telecommunications technology have been helping global and niche banks to develop international cash management solutions for both large and medium size multinationals. It is expected that more companies would use international cash management systems as regulatory barriers are overcome, global cash management banks extend their operations to more countries, the world-wide web is extensively used as a platform for delivering cash management services and the cost of such services reduces over time. Further academic research should evaluate the extent to which corporate practice is consistent with extant multi-currency balance and network optimisation models and also explain why particular methods of international cash management persists in companies.

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Endnotes

1. Generalised network models investigate how N subsidiaries manage liquid assets over T years with a view to determining how funds and other asset flows should be transferred between subsidiaries to minimise transfer costs subject to the supply and demand for funds constraints and overall flow conservation constraints.

2. Linear programming models seek to minimise the costs of transfer of funds between subsidiaries as well as currency conversion and borrowing costs and maximise investment income subject to cash flow, minimum balance and other constraints. To be effective, they must allow for timing of actual cash flows, forecast cash budgets, short-term investments and borrowings and foreign exchange risks, among others. Most models are unable to capture all these dimensions. Goal programming models provide a framework for dealing with conflicting objectives such as maximisation of returns on near cash investments and minimisation of exchange rate risks subject to a number of constraints.

3. On 1 September 1982 Midland Bank became the first UK clearing bank to launch a cash management service (Haaroff, 1983).

4. This refers to the idea of capturing all processes relating to transactions (such as invoicing and receipt of payments) through the exchange of electronic files and avoiding the need to input data into different information systems that manage different aspects of such transactions. This requires the use of organisational information systems that are able communicate with each other.

5. Lenzer (2003) noted that interest couldn't be earned on current account in France, stamp duty is charged on overdraft facilities in Denmark, Portugal and Austria and there are insolvency-related problems in Spain and Portugal.

6. Paper giro covers standing order or pre-authorised bill payments. Other payment methods covered in the study are electronic giros which include direct debits, direct deposit of payroll and corporate cash management debits in addition to debit and credit cards.

7. SWIFT (Society for Worldwide Interbank Financial Telecommunications) is an electronic method for communicating information about payments across borders.

8. TARGET links the 15 gross national settlement systems such as Euro CHAPS in the UK, in Germany and in France with the European Central Bank payment mechanism to provide a uniform platform for processing cross-border euro payments.

9. The sample for this region covered companies in Australia, Hong Kong, Japan, Korea and Singapore.

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