

CASH FLOW MANAGEMENT MODEL OF PAYMENT INSTITUTION ON THE BASIS OF SYSTEM APPROACH

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– System approach

Abstract:

This article deals with the problems of cash flow (CF) management in payment institution (PI). It shows current position of PIs, their business partners and competitors in the dynamic changing situation on international markets. Main point of view is on client's behaviours, market events, their predictability and effect on CF. Improvement in this area means reduce costs and timely settlement on banking transactions. The model of CF management works with the real business data set and therefore data had to be anonymized.

Introduction

World economic crisis, which start in 2008, becomes thread and opportunity concurrently for many firms. This also applies to companies in financial sector in small country like Czech Republic (CR). In years 2009 – 2013 significantly grown PIs for example [1, 2, 10]. These institutions [12] use efforts of importers and exporters to save costs on exchange commission. The CR is strongly open economic, where many producers or traders must deal with exchange, primary on currency pair Euro – Czech crown (CZK) [4]. There are few common ways to save are [5]: Making less high volume transaction with lower margin; Create balanced foreign currencies CF [6]; Use financial derivatives like forwards to ensure exchange rate [7]; Monitoring offers from more financial institution. Last one means opportunity for PIs that are more operative than huge bank houses [9]. Therefore these institutions quickly increased in recent years. The market situation is now more competitive and favourable for client and lead to lower

margins and improving services for the clients. On the other side exchange institutions have to reduce costs by development and optimization of human sources, try to reduce costs on banking transactions and CF management.

1. Problem formulation

A system approach is necessary for improvement of CF [3, 8]. There are so many factors that a use of classic methods like statistical analysis, regression or linear programming are very problematic. Primary inputs with strong influence to CF are: Development of market i_1 ; Effect of exchange rate changes on the volume of transactions i_2 ; Client structure and trends of business transactions on individual accounts (Market background) i_3 ; Behaviour and needs of 'special' clients i_4 ; Influence of date – annual and week cycles, effect of Christmas, Eastern and holidays i_5 . Problems are not only different and variable weights of inputs but also their predictability. Some of them are known very good (i_1 and i_5), some are really good predictable (i_3) but last of them (i_2 and i_4) are very hard predictable. It is a reason why institution primary use CF management experts and statistical and other methods have a role of expert support. From the view of PI it is possible to distinguish four types of markets: new, growing, developed and descending (see Tab. 1). Linguistic values are used because it depends on the size of PI. The table shows primary behaviour of background. It means that negative impact of predictability or special clients on CF can be observed in some banks or currencies, not through whole market. Next reason is that developed market shows sometimes signs of unpredictability.

TAB. 1: Market differences

Market	Nr. of transaction	Volume of market	Predictability of background	Effect of special clients
new	few	small	unpredictable	huge
growing	plenty	middle - high	bad	big
developed	plenty	middle - high	good	middle
descending	medium	middle	good	small

Source: Authors

One of that reasons is currency market events. Correlation analysis showed great impact among volatility of currency and volume of transactions, margin or profit. Correlation coefficients are in the Tab. 2. Difference between buyers and sellers is different needs of

market participants. Sellers are already importers (traders) which do not want to keep goods in warehouse. So they change currency in week's cycles. Buyers are on opposite site (exporters – manufacturers). They can keep foreign currencies and wait for the best moment for exchange and are more typical month cycles of exchange.

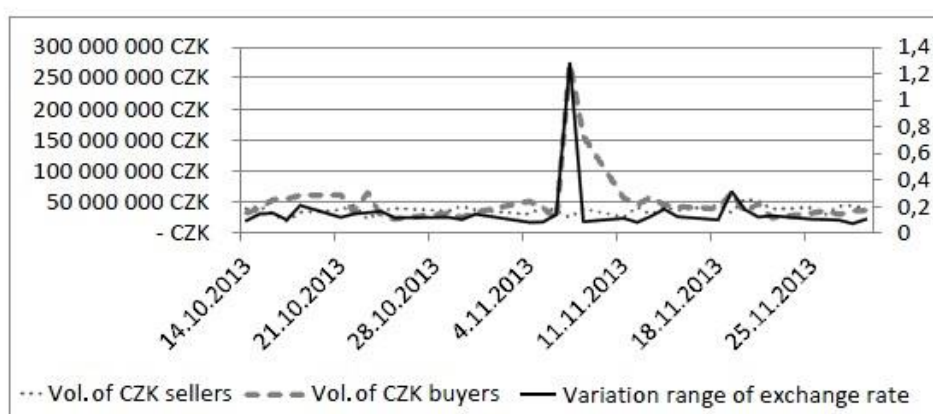
TAB. 2: Correlation between daily change of rate on Euro and selected business parameters

Clients	Volume	Profit	Nr. of transactions
CZK sellers	-0.32797	-0.33327	-0.20618
CZK buyers	0.893825	0.929612	0.763844

Source: Authors

The Fig. 1 shows reaction of buyers and sellers on Czech National Bank (CNB) intervention in Nov. 7, 2013. Left scale is difference between higher and lower position variation range of CZK in one day. This event was not expected by markets despite signs from CNB. It meant a significant increase in turnover and profits for payment institution which offset the higher costs on CF. Since then analysts attach reports from CNB more importance. On the contrary, speculative attacks are still totally unpredictable. Fortunately, their influence is in halers (penny) rather than in tens of halers.

FIG. 1: Volume of sellers and buyers of CZK in November 2013

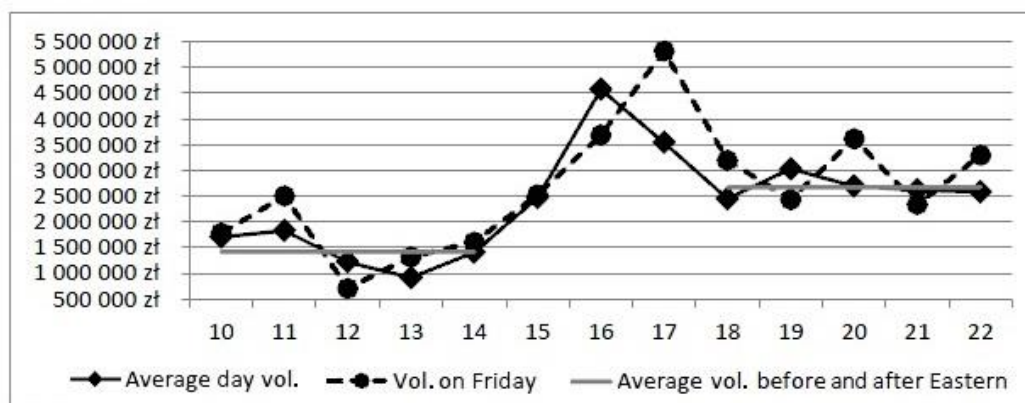


Source: Authors, processed based on business data of PI and data from CNB

On the other side there are events which can be simple predicted by look into calendar: Christmas, Eastern, holidays etc. These events mean special behaviour of clients in

period around these feasts and for example Christmas and Easter are also points that mark the end of one period and the beginning of a new period of the annual cycle. For example, Polish Easter is celebrated more than in other countries it is possible to trace them during a large increase in currency exchange. It is shown in Fig. 2.

FIG. 2: Requirements for sales of PLN around Eastern 2014



Source: Authors

Another risk for CF are called 'special' clients (currency exchange, international traders), i.e. clients with large turnovers and already specific requirements as speed of settlement, lower margin, monitoring the movements of exchange rate. When this client starts to trade, he can change the situation on accounts in bank, where he make the trade. We can see results in several banks and accounts in Tab. 3. In the PL bank 1 several special clients strengthened the trend of PLN surplus and shortage of foreign currency. In the PL bank 2 change these clients the character of bank from typical bank for exporter to typical bank of importers.

TAB. 3: Special clients and its influence on CF in banks

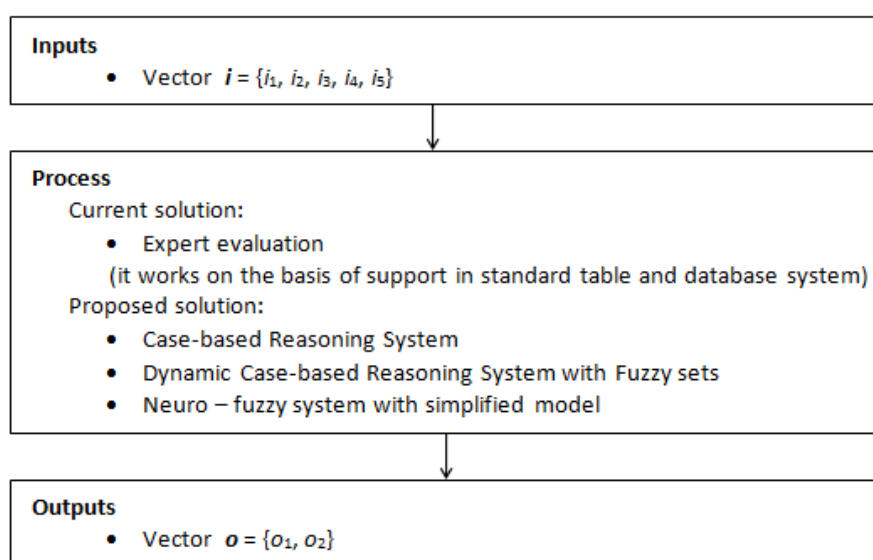
Bank	Currency	Result	Result without special clients	Ratio of Transaction	Nr. of observations
PL bank 1	EUR	- 35 348 998	- 7 128 838	54.29%	150
PL bank 1	PLN	293 045 855	136 480 481	65.95%	150
PL bank 1	USD	- 45 254 177	- 4 563 647	86.77%	150
PL bank 2	PLN	78 876 595	- 101 286 654	57.15%	150

Source: Authors

2. Model design

Scientific articles are primarily devoted to CF management under uncertainty on international markets [6 - 8]. On the side of PI there is a problem with the time. Transfer of money from one bank to another takes one day. For faster processing the PIs must pay urgent surcharge and even this solution has its cut of time. It is necessary to estimate the client's need day before and this estimate next day edit along the evolution of the situation. Therefore PI needs system solution. When the system approach is use for CF management, it is possible to identify vector of inputs $i = \{i_1, i_2, \dots, i_5\}$, some algorithms (methods) in process and output vector $o = \{o_1, o_2\}$ where o_1 is absolute cost for CF management and o_2 represents relative cost, it means o_1/profit . Some of them can be statistically described, other depend on the estimates of experts. The quality level of model is thus dependent on the processing uncertainty statements of the experts. This concerns both the description of the individual input and degree of interaction and multiplication between the different inputs. Therefore is suitable to use the hybrid approach it means fuzzy and neuro-fuzzy approach.

FIG. 3: Model of CF management



Source: Authors

3. Discussion

An uncertainty of information and inaccuracy of leading indicators (expert opinion - evaluation and statement of CNB) are a prerequisite for the use of fuzzy sets as

measuring of some inputs. Other can be measure by statistical methods. The influence of data is determined based on previous experience. All these approaches can be used in Case-based reasoning. Due to the ongoing acquisition of special clients must be continuous updating of the data base with new dataset. It will also be necessary to provide additional information in situation of non-standard or not included cases in the data base. On the other side there is possible to use neural-fuzzy approach [11]. There is a problem with the complication of model which poor intelligibility for humans and more calculations for machines. Even worse is finding errors when the model of dynamic system begins to exhibit high error rate. Therefore it would be necessary to simplify the model. The aim is to optimize the cost with compare to profit, it means to find minimum value of o_2 . Evaluation of this function is relatively easy so there is no need for specific approach.

On the basis of comparison the earlier approaches to CF management, it is possible to trace two major differences. The first is the rapid acceleration of payment during the last two decades. From the days become hours or minutes. This has resulted in increased demands on the speed of decision. Any support that is not capable of responding to the situation in real time loses its value-added. In addition, after the crisis years of 2009 - 2013 increased regulation of the financial sector, this carries more responsibilities. The second difference lies in the fact that most of the professional work of CF management is not based on the perspective of financial institutions but manufacturing or logistics companies.

Conclusion

The aim of the paper was the analysis of information's from dynamic changing markets and possibilities of creating model. This model should be satisfied the conditions of the systems approach. Due to the uncertainty and imprecision are offered use of hybrid systems with soft computing.

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