THE RELATIONSHIPS OF CASH FLOWS: EVIDENCE FROM LATVIAN COMPANIES

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Abstract. *The paper deals with the subject of relationships among the different cash flows, as well as earnings, of a company. The aim of the paper is to establish the direction and strength of mutual relationships between different cash flow measures, as well as with earnings, and to provide recommendations for the prediction of future cash flows and earnings. The methods of the research include content analysis, the calculation of relative indicators, average and median measures, as well as regression and correlation analysis. There is an empirical study of the data of 52 Latvian companies, which has resulted in testing the hypotheses put forward and substantiated in the paper. A typical Latvian enterprise relies on the operating cash flow to create the investing cash flow and does not need to rely on the external sources of financing. The author concludes that investment does pay, and, based on the assessment of results of the developed model, the investing cash flow should be used in cash flow prediction, while it should not be used in earnings prediction. The increase in financing cash flow causes a company investments to increase.*

Key words: *operating cash flow, investing cash flow, earnings, financing cash flow*

1. Introduction

There is a lack of research on the mutual relationships of cash flow measures. This applies to both worldwide as well as Latvian scientific publications. There are no papers on the predicting ability of investing cash flows in relation to operating cash flow and earnings. Also, the financing cash flow as a driver of company investments and the operating cash flow as a driver of company's financial activities have not been analysed in any scientific publications. Therefore, one can conclude that the subject of the paper is topical.

The aim of the study was to establish the direction and strength of relationships among different cash flow measures as well as with earnings, and to provide recommendations for the prediction of future cash flows and earnings.

The tasks of the research were as follows:

1. To analyse the concept of corporate cash flow.
2. To investigate the investing cash flow as a driver of cash flow and earnings.
3. To analyse financing cash flow as a driver of a company's investments.
4. To investigate the operating cash flow as a driver of a company's financial activities.
5. To provide recommendations for the prediction of future cash flows and earnings.

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The hypotheses of the study were the following:

1. The investing cash flow is a significant predictor of operating cash flow one year ahead (high and negative investing cash flow improves operating cash flow in the future).
2. There should be a direct effect of financing cash flow as a driver of company investments.
3. A high operating cash flow is associated with the negative financing cash flow.

The study covers the period from 1995 to 2013.

The data for the research were gathered from annual reports of Latvian companies.

The methodology of the research includes content analysis, the calculation of relative indicators, average and median measures, as well as regression and correlation analysis. The author analyses data of 52 Latvian companies. For testing the hypotheses, linear regression models were put forward, in which the investing cash flow was an independent variable and the operating cash flow and earnings one year ahead were the dependent variables (Models 1 and 2). The Model 3 has the financing cash flow as an independent variable, while investing cash flow is a dependent variable. The Model 4 features the operating cash flow as an independent variable, while financing cash flow is a dependent variable. In the models, in order to avoid multicollinearity, all variables are relative (divided by sales). The problem with unrepresentative outliers was solved by removing the observations that derogated by more than three standard deviations from the average. The introduction of a one-year lag in the models has reduced the number of observations in Models 1 and 2. In each model, the author calculated the intercept a, the slope (regression coefficient) b, the correlation coefficient r, as the well as determination coefficient r^2.

The remainder of the paper consists of the theoretical analysis of the concept and prediction of corporate cash flow: Chapter 2 follows the Introduction, Chapter 3 offers the description of data, Chapter 4 presents the analysis of empirical data, and the paper is concluded with Chapter 5 – Conclusions.

2. The Concept of Corporate Cash Flow and Cash Flow Prediction

Cash is the ultimate measure in business. Acquisitions, expansions, buyouts, insolvencies, and bankruptcies all revolve around and depend on the flows of cash.

A company's cash flow should be divided into three parts – the operating cash flow, the investing cash flow, and the financing cash flow.

When founding an enterprise, owners and, possibly, creditors provide funds in the form of statute capital and debt, resulting in a positive cash flow from financing activities. These financing cash inflows are then converted into investing cash outflows, since they are invested in long-term assets.

Company assets are used to generate a positive operating cash flow (to make cash inflows larger than cash outflows). The operating cash flow, then, can be divided into two parts. First of all, a company must pay principal and interest payments to its creditors, as well as dividends to its shareholders. It manifests itself in the cash flow statement as a negative cash flow from financing activities. The rest of the operating cash flow, depending on the amount, can be invested in capital maintenance or in increasing the size of the company assets.

A corporation must find, or create, investment projects with a positive net present value (NPV) in which it is appropriate to invest cash, thereby generating cash flow from investing activities.

Cash flow ratios should be divided into three categories: solvency ratios (including the financing cash flow to sales ratio FNPNA); ability to finance growth ratios (including the investing cash flow to sales ratio INPNA); cash-generating efficiency ratios (including the cash flows to sales ratio NPNA).

There have been publications on the ability of earnings to predict future operating cash flows (Lorek, Willinger, 2009; Kim, Kross, 2005; Bowen et al., 1986), as well as on the comparative ability of operating cash flows and earnings to predict operating cash flows in the future (Greenberg et al., 1986; Finger, 1994). Murdoch and Krause (1989) have come to the conclusion that the net income outperforms the cash flow in a significant manner. McBeth (1993) states that the predictive ability depends on the time period. The conclusions by Dechow et al. (1998) have implied that the current earnings are better predictors of the future cash flow than are the current cash flows. Quirin et al. (1999) found that the best predictor of cash flow from operating activities was the past cash flow from operating activities. Likewise, the results of Krishnan and Largay (2000) suggest that the past cash flow data are more useful than the past earnings in predicting the future cash flows.

According to Jordan and Waldron (2001), the best predictor of future operating cash flows seems to be not a pure measure of either accrual earnings or cash flows, but rather a hybrid measure containing elements of both. In the paper that is the most cited publication in this field of research, Barth et al. (2001) find that accruals have a substantially higher predictive ability for future cash flows than several lags of aggregate earnings. DeFond and Hung (2003) have found that cash flows have an incremental power in explaining stock returns and future cash flows. Al-Attar and Hussain (2004) have come to the following conclusion: the model containing only current cash flows has a significantly superior explanatory power than the model containing only current earnings as an independent variable. The study by Nikkinen and Sahlström (2004) has covered the widest population of countries in papers on the subject of cash flow prediction known to the author. They have discovered that the model created by Barth et al. (2001) performs

consistently across most countries. According to Cheng and Roy (2011), the Evolutionary Fuzzy Support Vector Machine Inference Model for Time Series Data (EFSIMT), an artificial intelligence hybrid system focusing on the management of time series data characteristics which fuses fuzzy logic, weighted support vector machines and a fast messy genetic algorithm, represents a promising alternative approach to predicting cash flow. Simulations performed on historical cash flow data demonstrate the EFSIMT to be an effective tool for predicting cash flow.

McInnis and Collins (2011) predict and find that accrual quality improves firms' propensity to meet or beat earnings benchmark declines following the provision of cash flow forecasts.

Overall, one can conclude that there are no papers on the predicting ability of investing cash flows in relation to operating cash flow and earnings. Also, the financing cash flow as a driver of a company's investments and the operating cash flow as a driver of a company's financial activities have not been analysed in any scientific publication.

3. Description of data

The present study covers data of 52 Latvian companies. The total number of observations is 507, covering the period from 1995 to 2013. The main source of annual reports for the study is the homepage of the OMX Riga Stock Exchange. (There are several companies that are not listed on the Riga Stock Exchange, and their financial reports were acquired on their internet home pages).

The study includes data on company sales, net earnings, the operating cash flow, the investing cash flow, and the financing cash flow.

In order to make data from different companies comparable, the absolute numbers of earnings and cash flows were divided by company sales. Thus, relative (and comparable) indicators were achieved.

The mean indicators of earnings and cash flows are reflected in Table 1.

TABLE 1. **Average and median indicators of items in the study, 1995–2013, n = 507**

	π/NA	NPNA	INPNA	FNPNA
Average	0.005	0.072	–0.120	0.057
Median	0.030	0.091	–0.057	–0.008

The π/NA is the net profit margin, NPNA is the cash flows to sales ratio (calculated by dividing operating cash flow by sales), INPNA is the investing cash flow to sales ratio, and FNPNA is the financing cash flow to sales ratio.

Since there are some extreme observations, the use of the median is more appropriate than the usage of the average (arithmetical mean) in determining the most typical levels

of each ratio. The median is the number in the middle of a set of given numbers. The median shows that a typical Latvian company has a net profit margin of 0.03, which means that a typical enterprise has earned 3 centimes out of the 1 lats of revenues. The median NPNA is 0.091, which shows that a typical Latvian company had gained 9.1 centimes of the operating cash flow from 1 lats of sales.

The π/NA and NPNA are positive. This reflects positively on a company's earnings and cash flows. The company is earning profits, not suffering losses; its operating cash flow is positive, which means that a typical company is gaining cash (not losing) from its operating activities.

The typical INPNA is negative, which means that a company is putting away money into new investment projects. A typical Latvian enterprise has invested 5.7 centimes from each lats of revenues. This can be regarded positively, since these investments will, hopefully, return in the form of a positive operating cash flow. The NPNA is greater than INPNA, which indicates that a typical Latvian company relies on the operating cash flow to create the investing cash flow and does not need to rely on the external sources of financing.

The FNPNA is –0.008. This negative ratio indicates that a typical Latvian enterprise is repaying the financing it has acquired in the previous periods (and not gaining a new financing from external sources). A typical Latvian company is paying 0.8 centimes to external financiers out of every lats of sales. This also indicates that the majority of companies in the study are in the maturity phase of their development.

4. Empirical Data Analysis

4.1. Investing cash flow as a driver of cash flow and earnings

One would expect a that high and negative investing cash flow improves the operating cash flow and earnings in the future.

In order to evaluate the role of the investing cash flow in predicting the future operating cash flow and earnings, two linear regression models were put forward. In the models, all variables were deflated by sales.

The Model 1 has the investing cash flow to sales INPNA in year 0 as the independent variable, while the cash flows to sales ratio NPNA in year 1 is the dependent variable:

$$NPNA_1 = a + b * INPNA_{0.} \quad (1)$$

The Model 2, again, has the investing cash flow to sales INPNA in year 0 as the independent variable, however the dependent variable is the net profit margin in year 1:

$$\pi/NA_1 = a + b * INPNA_{0.} \quad (2)$$

The introduction of a one-year lag in the models has reduced the number of observations from 507 to 454, which is by 53 less than the total number of observations (52 companies plus 1 case of a 1-year break in the sequence of observations).

The main indicators of the Model 1 are shown in Table 2. The intercept *a* shows how large is the dependent variable if the independent variable is 0. The slope *b* indicates the volume of change of the dependent variable if the independent variable increases by 1 unit. The correlation coefficient *r* describes the closeness of the relationship between two variables. The correlation coefficient of 0 indicates no relationship, while the *r* of –1 or 1 implies a perfect relationship. The determination coefficient r^2 shows the proportion of the variance of the dependent variable which is determined by the regression equation.

TABLE 2. **Indicators of Model 1, 1995–2013, n = 454**

a	0.053
b	–0.227
r	–0.205
r^2	0.042

TABLE 3. **Indicators of Model 1, without outliers, 1995–2013, n = 444**

a	0.082
b	–0.263
r	–0.303
r^2	0.092

One must note that there are some extreme observations (outliers) that have a significant impact on the indicators of both models. To exclude outliers, the author of the paper identified the observations that were more than 3 standard deviations away from the average. These outliers were removed from the data set. In the case of Model 1, there were 10 outliers.

Table 3 reflects the fact that the exclusion of outliers has improved the significance of Model 1 (the r^2 has grown from 0.042 to 0.092). This means that 9.2% of the operating cash flow is influenced by the investing cash flow one year before.

The intercept *a* is 0.082, which means that if the independent variable $INPNA_0$ is 0 (there is no investing cash flow), the dependent variable $NPNA_1$ is 8.2%. The slope (regression coefficient) *b* is –0.263, which suggests that if the independent variable $INPNA_0$ increases by 1 unit, the $NPNA_1$ decreases by 0.263 units, and vice versa, if the investing cash flow ratio decreases (there are more capital expenditures) by one unit, the operating cash flow ratio increases by 26.3 percentage points. This means that the investing cash flow has a significant impact on the operating cash flow 1 year later. The *r* (correlation coefficient) is –0.303, suggesting that the relationship is inverse, and the strength of the relationship is somewhat below the average.

The indicators also mean that the operating cash flow is positive if the investing cash flows to sales ratio is 0.312 or below (this means all cases when the INPNA is negative). If the investing cash flow to sales ratio increases over 31.2 %, the operating cash flow will turn negative one year later.

The main indicators of Model 2 are shown in Table 4.

TABLE 4. **Indicators of Model 2, 1995–2013, n = 454**

a	0.015
b	0.021
r	0.013
r^2	0.000

In a similar way to Model 1, the author of the paper excluded outliers from the data set. In the case of Model 2, there were 9 outliers.

Table 5 shows that the exclusion of outliers has improved the significance of Model 2 (the r^2 has grown from 0 to 0.028).

TABLE 5. **Indicators of Model 2, without outliers, 1995–2013, n = 445**

a	0.014
b	–0.168
r	–0.168
r^2	0.028

Still, this means that only 2.8% of net profit is influenced by the investing cash flow one year before.

The intercept *a* is 0.014, which means that if the independent variable $INPNA_0$ is 0 (there is no investing cash flow), the dependent variable π/NA_1 (net profit margin) is 1.4%. The slope (regression coefficient) *b* is –0.168, which suggests that if the independent variable $INPNA_0$ increases by 1 unit, the π/NA_1 decreases by 0.168 units, and vice versa, if the investing cash flow ratio decreases (there are more capital expenditures) by one unit, the net profit margin ratio increases by 16.8 percentage points. The *r* (correlation coefficient) is –0.168, suggesting that the relationship is inverse and somewhat weak.

The indicators also mean that earnings are positive if the investing cash flows to sales ratio is 0.083 or below (this means all cases when INPNA is negative). If the investing cash flow to sales ratio increases over 8.3%, the earnings will turn to losses one year later.

Overall, one must conclude that there is a relatively strong correlation between the investing cash flow and the operating cash flow one year ahead. This means that the investment does pay, and the investing cash flow should be used in cash flow prediction. Therefore, the Hypothesis 1 is confirmed (not rejected). Perhaps an additional challenge for the future research would be to find such a relationship with the operating cash flow two or more years ahead. On the other hand, the correlation between the investing cash flow and the earnings one year ahead is weak, and the investing cash flow should not be used in earnings prediction.

4.2. The financing cash flow as a driver of company investments

This section of the empirical data covers the relationship between the financing cash flow and the investing cash flow. There should be a direct effect, because the financing cash flow (alongside the operating cash flow) is necessary to provide for company investments.

In order to evaluate the role of the financing cash flow in providing for the investing cash flow, a linear regression model was put forward. The Model 3 has the financing cash flow to sales FNPNA as the independent variable, while the investing cash flow to sales ratio INPNA is the dependent variable:

$$INPNA = a + b * FNPNA. \quad (3)$$

In this case, no lag was introduced in the model; so, the number of observations is not reduced. Here, the total number of observations is 507.

The main indicators of Model 3 are shown in Table 6.

To exclude outliers, the author of the paper identified observations that were more than 3 standard deviations away from the average. These outliers were removed from the data set. In the case of Model 3, just like of Model 1, there were 10 outliers.

Table 7 reflects the fact that the exclusion of outliers has improved the significance of Model 3 (the r^2 has grown from 0.103 to 0.237). This means that 23.7 % of the investing cash flow is influenced by the financing cash flow.

TABLE 6. **Indicators of Model 3, 1995–2013, n = 507**

a	–0.106
b	–0.254
r	–0.321
r^2	0.103

TABLE 7. **Indicators of Model 3, without outliers, 1995–2013, n = 497**

a	–0.102
b	–0.596
r	–0.486
r^2	0.237

The intercept *a* of Model 3 is –0.102, which means that if financing cash flow is 0 (there is no financing cash flow), the investing cash flow to sales ratio is negative (–10.2%). The regression coefficient (slope) of the model is –0.596, which reflects the fact that if the financing cash flow increases by 1 unit, the investing cash flow decreases by 0.596 units, and vice versa. Thus, an increase in the financing cash flow causes the company investments to increase. The correlation coefficient is –0.486, suggesting that the relationship between the variables is inverse and slightly below the average.

The results also indicate that the investing cash flow is positive (the company is selling its long-term assets) if the financing cash flow to sales ratio falls below –0.171 (the company is repaying the financing drawn in before to the shareholders and creditors). The investing cash flow is negative (a company is buying new long-term assets) if the financing cash flow to sales ratio exceeds –0.171. This also means that if the financing cash flow is positive (the company is drawing in a new financing from creditors and shareholders), the company is investing money in new long-term assets.

To sum up, there is a moderately strong relationship between the financing and the investing cash flows. Therefore, the Hypothesis 2 is not rejected. The company makes more investments if it is drawing in an additional external finance, and the typical company is selling its long-term assets when it is repaying the financing drawn-in of the previous years to shareholders or creditors.

4.3. Operating cash flow as a driver of a company's financial activities

This section of the chapter covers the relationship between the operating cash flow and the financing cash flow. One would expect that a high operating cash flow is associated with a negative financing cash flow (the repayment to creditors and shareholders of the financing received before).

In order to evaluate the role of the operating cash flow in providing for the financing cash flow, a linear regression model was put forward. The Model 4 has the cash flows to sales ratio NPNA as the independent variable, while the financing cash flow to sales ratio FNPNA is the dependent variable:

$$FNPNA = a + b * NPNA. \quad (4)$$

In this case, like in the previous one, no lag was introduced in the model; so, the number of observations is not reduced. The total number of observations is 507.

The main indicators of Model 4 are shown in Table 8.

TABLE 8. **Indicators of Model 4, 1995–2013, n = 507**

a	0.104
b	–0.667
r	–0.693
r^2	0.480

To exclude outliers, the author of the paper identified the observations that were more than 3 standard deviations from the average. These outliers were removed from the data set. In the case of Model 4, there were 9 outliers.

The r^2 of Model 4 is 0.028, which means that 2.8 % of the financing cash flow is influenced by the operating cash flow.

TABLE 9. **Indicators of Model 4, without outliers, 1995–2013, n = 498**

a	0.016
b	–0.180
r	–0.166
r^2	0.028

The intercept *a* of Model 4 is 0.016, which means that if the net operating cash flow is 0, the financing cash flow to sales ratio is positive – 1.6% (the company is drawing in a new external capital from shareholders and creditors). The slope *b* (regression coefficient) of Model 4 is –0.18, reflecting the fact that if the operating cash flow increases by 1 unit, the financing cash flow will decrease by 0.18 units, and vice versa.

The indicators also mean that the financing cash flow is positive if the cash flows to sales ratio is 0.089 or below; if the operating cash flow to sales ratio increases over 8.9%, the financing cash flow will turn negative (the company would be paying back to shareholders and creditors the financing received before).

The correlation coefficient *r* is –0.166, meaning that the relationship between the operating cash flow and the financing cash flow is inverse and quite weak. Therefore, the Hypothesis 3 can be partially rejected due to the weak nature of the relationship. However, the relationship is inverse as predicted in the Hypothesis.

5. Conclusions

1. Financing cash inflows are converted into investing cash outflows, since they are invested in long-term assets. Company assets are used to generate a positive operating cash flow.
2. The present study covers data from 52 Latvian companies. The total number of observations is 507, ranging within the period from 1995 to 2013. A typical Latvian company had gained 9.1 centimes of operating cash flow from 1 lats of sales. A typical Latvian enterprise relies on the operating cash flow to create the investing cash flow and does not need to rely on external sources of financing. The majority of the companies in the study are in the maturity phase of their development.

3. Of the operating cash flow, 9.2% is influenced by the investing cash flow one year before. The investing cash flow has a significant impact on the operating cash flow one year later. If the investing cash flow ratio decreases (there are more capital expenditures) by one unit, the operating cash flow ratio increases by 26.3 percentage points. Investment does pay, and the investing cash flow should be used in cash flow prediction. An additional challenge for future research would be to find such a relationship with operating cash flow two or more years ahead.
4. Only 2.8% of net profits is influenced by the investing cash flow of the previous year. If the independent variable investing cash flow to sales in the year 0 increases by 1 unit, the net profit margin in year 1 decreases by 0.168 units. The investing cash flow should not be used in earnings prediction.
5. 23.7% of the investing cash flow is influenced by the financing cash flow. There is a moderately strong relationship between the financing and the investing cash flows. If the financing cash flow increases by 1 unit, the investing cash flow decreases by 0.596 units. Thus, an increase in the financing cash flow causes the company investments to increase.
6. Just 2.8% of the financing cash flow is influenced by the operating cash flow. If the operating cash flow increases by 1 unit, the financing cash flow will decrease by 0.18 units. The financing cash flow is positive if the cash flows to sales ratio is 0.089 or below; if the operating cash flow to sales ratio increases over 8.9%, the financing cash flow will turn negative.

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