Does insourcing of processes pay off?

Grzegorz Grela and Mariusz Hofman
Institute of Management and Quality Sciences, Maria Curie-Sklodowska Univeristy, Lublin, Poland

Received 25 June 2020
Revised 30 October 2020
16 December 2020
Accepted 19 January 2021

Abstract

Purpose – This study aims to examine whether insourcing of processes pays off and verifies key hypotheses regarding the financial ratios of organisations.

Design/methodology/approach – This paper randomly selects and then surveys 1996 organisations, of which 9.5% (190) stated that they used insourcing, 1.9% (37) made a decision to implement insourcing in the near future and 88.6% did not use insourcing. Then, for available firm data (100 insourcing firms and 100 firms without it), the financial statements of the surveyed companies were obtained to compare the most important financial ratios. The financial situation was compared at four-time points. The mean and median values of individual indicators were compared with the significance of relevant statistical tests.

Findings – A U-shaped curve of financial results in the time of enterprises that implemented insourcing and reverse U-shaped curve for enterprises that did not have insourcing are seen. Thus, the insourcing of processes pays off in the long run.

Research limitations/implications – Limitations exist in the generalisation of the results obtained, due to the limited number of samples qualified for analyses (limited reliable financial data).

Practical implications – The research highlights the importance of effective insourcing projects in the long term.

Originality/value – This study is the first to quantify the financial performance of companies that have used insourcing in comparison with a reference group. This paper defines insourcing and contributes to the growing number of studies on insourcing by bringing attention to the financial outcomes in the long run.

Keywords Quantitative, Financial performance, Business improvement, Benefits and financial results, Insourcing, Financial effects of insourcing

Paper type Research paper

1. Introduction

Insourcing is defined as a project whose aim is to include processes that have been carried out so far outside the borders of the organisation. Insourcing as an economic phenomenon has been the subject of research for many years (Hirschheim and Lacity, 2000; Schniederjans and Zuckweiler, 2004; Caputo and Palumbo, 2005; Brege *et al.*, 2010; Singhania and Gupta, 2014; Chaudhury *et al.*, 2015; Tate and Bals, 2017; Ozturk, 2018; Silva *et al.*, 2019; Damanpour *et al.*, 2020; Nujen *et al.*, 2019). Most often, these studies are based on case studies or theoretical models without

JEL classification – D22, D23, C58

This article is a result of the project funded by the National Science Centre of Poland (grant no. 2014/13/D/HS4/01921).

Journal of Global Operations and Strategic Sourcing
Vol. 14 No. 3, 2021
pp. 477-501
Emerald Publishing Limited
2398-5364
DOI 10.1108/JGOSS-06-2020-0029

empirical verification of the financial consequences of insourcing on a larger group of companies. The results show that one of the main motives for implementing insourcing is cost reduction (Drauz, 2014; Stentoft *et al.*, 2015; Hartman *et al.*, 2017a; Hartman *et al.*, 2017b; Foerstl *et al.* (2016); Moschuris, 2015). Entrepreneurs see insourcing as an opportunity to take over the margin of their existing suppliers, to improve the quality of products or services purchased externally and to improve the quality of management of insourced processes. In view of the turbulence caused by the SARS-CoV-2 virus, minimizing the risk of interruption or delay in the supply chain and managing the risk of a rapid increase in supply prices has become crucial. These aspects may also have an impact on insourcing decisions (Reza-Gharehbagh *et al.*, 2020; Li-Ying and Nell, 2020).

Apart from the benefits, insourcing of processes also entails a certain risk (Puranam *et al.*, 2013) related to increasing fixed costs resulting from starting the process within the organisation and the risk related to the functioning of the process itself (such as time and cost of delivery of raw materials necessary to enter the process, employment and maintenance of appropriate employees, purchase of technology necessary for the functioning of the process and involvement of the management). The costs associated with launching the process have a negative impact on financial performance even before the process is launched and financial benefits appear with some delay depending on the nature of the insourced process. Therefore, the decision to use insourcing is not simple and should be preceded by deep analysis.

This research aims to verify the financial benefits of insourcing by comparing the financial performance of two groups of companies – one comprising companies that implemented insourcing and the other (reference group) comprising companies of a similar industry structure and size, where insourcing was not implemented. The financial performance evaluation was carried out by analysing the values of the most popular financial indicators such as net return on sales (ROS), return on assets (ROS), return on equity (ROE), current ratio, ratios describing the cost structure, asset productivity ratio, labour productivity ratio and operating cash flows.

2. Theoretical background of process insourcing

As Foerstl *et al.* (2016) point out, the terminology associated with sourcing is not clearly established, which may cause some confusion when comparing the results of research on insourcing. Altmann (2006) defines insourcing as an act of moving some of the firm's externally sourced activities and decision responsibilities to internal providers. Hirschheim and Lacity (2000) consider insourcing to be the practice of evaluating the outsourcing option but also confirming the continued use of internal resources to achieve the same objectives of outsourcing. Beaumont and Sohal (2004) have adopted the following definition of insourcing: applying outsourcing's discipline to internal suppliers, often having them compete with external suppliers. According to Damanpour *et al.* (2020), insourcing is a managerial decision to abandon outsourcing and bring the production of the products or services back in-house. For S. Chakrabarty, insourcing means that the service provider is a client entity (Chakrabarty, 2006), which equates it with the concept of in-house production. In this sense, it is not necessary to transfer activity from outside the company to inside it and the process could be carried out inside from the beginning. Muhic and Johansson (2014) defined insourcing as the opposite of outsourcing, that is, the activity is governed and performed by internal resources. The adoption of the opposite meaning to outsourcing requires the transfer of activity from outside the company to its borders. Articles on sourcing distinguish two main approaches to defining insourcing. In the first case, insourcing is about reversing the effects of outsourcing (Gray *et al.*, 2013; Cabral *et al.*, 2014; Foerstl *et al.*, 2016). In our opinion, the reversing decision should be referred to more

precisely as "backsourcing" (Hirschheim and Lacity, 2000; McLaughlin and Peppard, 2006; Nicholas-Donald and Osei-Bryson, 2017; Thakur-Wernz, 2019; Damanpour *et al.*, 2020). In the second approach (adopted in this article), insourcing refers to the inclusion of processes performed outside the organisation without the requirement of their prior implementation in the organisation (Altmann, 2006; Muhic and Johansson, 2014). This means that insourcing occurs not only in the situation where reversal of outsourcing takes place but also in the situation when the process has never been carried out in the organisation, but its product is purchased on the market.

Transaction cost theory is amongst the recognised theories that can be used to describe insourcing. According to transaction cost theory, each transaction in the market involves specific costs. Williamson makes two behavioural assumptions to analyse transaction costs:

(1) people as parties to the transaction are driven by limited rationality and

(2) at least some people are driven by opportunism when making contracts.

He presents the market and the company (hierarchy) as two alternative ways of obtaining goods. As a decisive criterion for choosing one of the two forms mentioned above, it advocates assessing the specificity of the assets necessary to produce a given good, as well as the frequency and volume of the purchase of the good. The greater the degree of specificity of the assets, the greater the probability that the analysed well will be acquired within the company's boundaries (Williamson, 1979; Williamson, 1981). In practice, estimating transaction costs a priori is an extremely difficult task, as not all the factors and the degree of their negative consequences, affecting cooperation with an external supplier, are known. Therefore, we can observe situations in which, despite the decision to obtain certain components from external suppliers, entrepreneurs, on the basis of later experience, make insourcing decisions with partial or total resignation from external supplies. In the case of maintaining partial external supplies while starting up the manufacturing processes on their own, they are dealing with making and buying decisions, the justification of which from a business point of view has been proven on the basis of an estimate of the minimum own demand and costs related to starting up the manufacturing processes in the house (Grela, 2020).

According to the estimates of Furubotn and Richter (2005), transaction costs in modern market economies comprise as much as 50 to 60% of the net national product. Furthermore, these authors divide transaction costs into three categories. Market transaction costs – those associated with obtaining information on the conditions of supply and negotiation costs; Managerial transaction costs – those arising within the organisation. They primarily include costs related to the performance of managerial contracts, as well as agency costs and Political transaction costs – those related to the provision of public goods and political decision-making (Furubotn and Richter, 2005). Ghoshal and Moran (1996) presented a critique of the transaction cost theory. Their main objections concerned Williamson's assumptions. They disagreed with the prevailing opportunism amongst business partners. They argued that the recommendations of this theory may not only be wrong but also dangerous for managers because of the assumptions and logic on which they are based. In their opinion, organisations are not only substitutes for transactions in the event of market collapse but also have the unique advantage of managing certain types of business activities with a logic that is very different from that of the market (Ghoshal and Moran, 1996).

The area of application of transactional cost theory in the context of sourcing decisions is relatively well described in the literature (Lacity and Willcocks, 1995; Murray and Kotabe, 1999; Watjatrakul, 2005; Schneider *et al.*, 2013). Earlier studies by other authors (mentioned in the introduction) confirm that the most common motive for insourcing is cost reduction,

hence the assumption that insourcing should also be reflected in the financial indicators of companies that use it.

On the basis of the survey conducted with representatives of the organisations, it was found that only 4.9% of the organisations responded that the willingness to reduce costs had no influence at all on the decision on insourcing (in questions concerning costs they marked 0 on a scale of 0–5, where 0 meant no influence and 5 meant very high influence). For more than 95% of those surveyed, cost reduction was not an indifferent issue when making insourcing decisions, while for about 50% of those surveyed on the adopted five-stage scale, the issue of assessing the impact of cost reduction was assessed at 4 or 5. A relatively strong cost reduction motive in the surveyed group when making insourcing decisions is likely to have positive financial effects at the level of financial indicators.

3. Theoretical issues of financial performance assessment

The literature dealing with the issue of assessing the financial performance of a company is very broad and examines problems in many aspects. The first studies focused on the essence of the financial ratios by which it was possible to assess the financial situation of the company (Capon *et al.*, 1990; Opler and Titman, 1994; Taffler, 1983). In those papers, an appropriate method of calculation based on the data obtained from the financial statements of the companies was indicated. It also pointed to the usefulness of certain sets of indicators to properly assess the financial situation of companies and anticipate their bankruptcy. Horrigan (1965) concludes that the separation and later development of the currently used set of financial ratios is an effect of changes in the area of accounting and the development of new procedural and instrumental solutions in this area. It should be noted, however, that the use of indicators to assess the financial situation of enterprises is not a new phenomenon and dates back to the 19th century. Then, indicators describing the financial situation of enterprises were calculated on the basis of information contained in financial statements. The next step was to use financial ratios to predict potential bankruptcies (Beaver, 1966). Altman proposed a comprehensive indicator to assess the financial situation of the company and the likelihood of its bankruptcy (Altman, 1968). Other authors (Moorman and Rust, 1999; Ramaswami *et al.*, 2009; Briggs *et al.*, 2020) point out that the use of financial ratios to assess a company's performance can provide a number of benefits, the most important of which are the measurement of the performance of individual organisations and the performance of their managers or the forecasting of performance on the basis of historical data (Ross *et al.*, 2006). Currently, the authors of most of the papers on issues of proper analysis of financial performance and anticipation of potential bankruptcies, indicate the usefulness of unique sets of financial indicators in predicting the poor financial situation of enterprises (Kumar and Ravi, 2007; Olson *et al.*, 2012; Almansour, 2015). Other papers describe the use of increasingly complex statistical methods and IT tools to analyse the financial situation and predict bankruptcies of enterprises (Moscalu and Vintila, 2012). Most studies also indicate that the set of measures used to assess the financial situation is relatively constant and includes 20 to 30 of the most frequently used indicators. These indicators describe the profitability, liquidity, debt and productivity of the resources of the analysed company. Brannemo (2006) pointed out that to be able to survive in the long run, it is important for companies to think and react in a strategic manner. Only sourcing activities in one direction such as external suppliers is almost never an optimal solution for any company. Therefore, insourcing can be a method of improving a company's financial performance.

Research on the financial consequences of sourcing decisions is nothing new in the literature, but those concerning insourcing are not yet common. Table 1 shows the number of articles published in journals indexed in the Web of Science Core Collection and Scopus databases with a specific phrase related to the financial results of insourcing and

outsourcing. The database query uses the criterion of occurrence of the searched phrase in the title, abstract or keywords. The sole occurrence of the searched phrase does not mean, of course, that each article will focus on the impact of the use of insourcing or outsourcing on the financial performance of the companies, but on the basis of the conducted study, certain trends can be observed. The analysis of the collected data shows that there is relatively much research on the relationship between outsourcing and financial performance and little research on the financial consequences of insourcing. This shows a research gap which this article addresses. According to some authors (for example, Moorman and Rust, 1999; Ramaswami *et al.*, 2009; Briggs *et al.*, 2020), the assessment of the financial situation is reduced to a subjective answer to several questions in the research questionnaire, which may not correspond to the facts. Conducting research on the financial statements of a large group of companies and comparing the results with a reference group is a difficult task in practice, as it requires the acquisition of specific financial data. This is why there are not many articles on the subject.

Amongst the four articles that were the result of a query (insourcing AND "financial performance") in the title, abstract or keywords fields, one was duplicated in both databases. The authors of this article studied whether outsourcing moderates the effects of asset specificity on performance in Taiwanese hotels. The results confirmed that the form of governance moderates the relationship between asset specificity and performance (Espino-Rodríguez *et al.*, 2017). One article that contained insourcing in the title was based on secondary data from the 2004 to 2005 CTS Physician Survey and did not directly involve the analysis of financial indicators (Lee and Sikula, 2010). The last article concerns the drivers and performance implications of concurrent sourcing strategies in multinational firms in China. In this study, the variable performance (including market share, sales growth rate, return on sales and return on investment profit growth rate), was measured by the respondents' subjective opinions using a five-point scale (Ju *et al.*, 2019). Existing studies on sourcing and financial performance are usually related to outsourcing. For example, the results of studies conducted by Koteba and Mol (2009) and Lahiri (2016) did not indicate that there is a statistically significant link between outsourcing and improvement in the financial performance of the companies that carried out such projects. The results presented by Lahiri indicate that outsourcing may have both a positive and negative impact on the financial results of the surveyed companies and that such a relationship is often not statistically significant (Lahiri, 2016). According to research conducted in Switzerland and Greece by Arvanitis and Loukis (2012) with respect to the impact of outsourcing on performance, it has been concluded that it tends to enhance innovation, particularly process innovation, but only weakly enhances productivity. The results of research on the impact of back-sourcing on a

Table 1. The number of phrases related to financial performance and sourcing type in selected databases of scientific articles

Phrase	Article database: Web of the science core collection (title or abstract or author keywords or keywords plus)	Scopus (article title or abstract or keywords)	Sum
insourcing AND "financial performance"	2	2	4
outsourcing AND "financial performance"	83	116	199
sourcing AND "financial performance"	718	57	775

Data source: www.scopus.com/ and https://apps.webofknowledge.com/ https://scholar.google.pl/

firm's market value conducted by Nicholas-Donald and Osei-Bryson (2017) on data collected from 2005 to 2016 (for publicly traded companies located on a US stock exchange) show that the market reacted positively to back-sourcing announcements. However, no studies have discussed the impact of insourcing on the financial results of companies using it. Such a situation revealed a research gap to be filled by the research results presented in this article.

The authors are familiar with how much the aggregated category is the financial performance of a company when measured by financial ratios and how many factors from both a closer and a distant environment influence their final value. Therefore, the study adopted the broadest possible coverage of the indicators in the literature. When selecting companies for further statistical analyses, the motives of entrepreneurs when making decisions on insourcing were taken into account and a small group of those organisations that, on the basis of a survey, did not indicate the significance of cost reduction when making decisions on insourcing was eliminated from the research sample.

4. Data methods

4.1 Data collection

As part of a research project on insourcing, organisations operating in Poland in the years 2016–2017 were examined using the computer-assisted telephone interviewing (CATI) method. The survey was conducted by a professional agency with an outsourcing or purchasing manager, owner or board member from a database of randomly selected firms. The companies' data came from the statistical database, REGON, from Polish Central Statistical Office and the commercial database, Bisnode. The data collection consisted of two parts. In the first stage, based on the presented definitions and practical examples of insourcing, the respondents answered the questions about whether and when insourcing occurred. If it did not occur and no decision was made to implement it in the near future, the interview was completed. However, if a case of insourcing was detected, additional questions (second stage) were asked about the details, including the motives behind the decision to insource and its scale measured as a percentage of the company's income. In both cases, basic data on the organisation was collected. We wanted to collect at least 30 questionnaires describing cases of insourcing in each of the four groups according to the size measured by the number of employees (< 0, 10–49, 50–249, >249). To accomplish this, 1996 organisations were surveyed, of which 9.5% (190) stated that they used insourcing and 1.9% (37) decided to implement insourcing in the near future. Based on the comparison of the number of organisations in which insourcing was found with the total number of interviews conducted by the size of organisations, it can be concluded that insourcing was most frequent in large manufacturing companies. As a result of the research activities, a database was collected containing data of organisations that use insourcing and data of those organisations that did not use insourcing.

The research model assumed a comparison of the financial performance of companies that have implemented insourcing with a reference group where no insourcing was confirmed (on the basis of the CATI study). The reference group has been selected so that it has a similar industry structure on the basis of the dominant PKD[1] code. We hired a company that specialises in the acquisition of financial data available in public databases[2]. Most often, financial data was available for large companies in terms of the number of employees, but there were also small companies (employing up to 9 people), which exceeded the threshold of EUR 2m in revenue per year or voluntarily opted for accounting books kept in accordance with the Polish Accounting Act and their data can also be publicly accessed.

Then, for the companies for which financial statements were available, we wanted to acquire them at four points in time (Figure 1). Unfortunately, the data was not available for

all companies and for all the years required. For each organisation on the basis of the CATI study, the year in which insourcing was applied was called the "year of introducing insourcing". The year immediately before insourcing was set up as "1 year before insourcing", the year after insourcing was set up as "1 year after insourcing" and the year for which the latest data were available as the "year of the latest available data" (Figure 1). In this way, a comparative group with a similar structure in relation to the represented industries was established. Due to the lack of availability of financial statements, not all desired data was obtained for all companies.

4.2 Sample description

We obtained financial data for 103 enterprises whose representatives confirmed insourcing in recent years and, for analysis, available financial data of five companies who intended to insource were added to the data of the group that implemented insourcing (column "insourcing – yes" in Table 3). The comparison with the reference group was performed only for data from the "1 year before insourcing" period. In addition, we obtained financial data for 108 enterprises whose representatives confirmed no insourcing in recent years. The structure, size and the dominant sector of business activity were similar in both groups. From the data available, we selected those that were, for the years of interest to us, aligned with the research model adopted. Based on a previous interview, we assigned a base year (year of introducing insourcing) to each company and then checked the availability of financial data for 1 year before insourcing, the year of introducing insourcing, 1 year after insourcing and the year of the latest available data. Table 2 contains descriptive statistics about the different points in time that have been analysed.

To ensure that the data were as relevant as possible, certain companies were excluded from further analysis. These were cases where insourcing (based on interviews) was classified as very small scale or not motivated (even partially) by the intention to reduce costs. The organisations that answered that the intention to reduce costs had no influence at all on the decision to insource and those which, when asked about the scale of insourcing measured by the share of the costs of introducing insourcing in the annual income from the year of launching, chose the smallest possible option, that is, up to 0.1% of annual income, were eliminated from the database. In total, the exclusion criteria were met by 18 companies

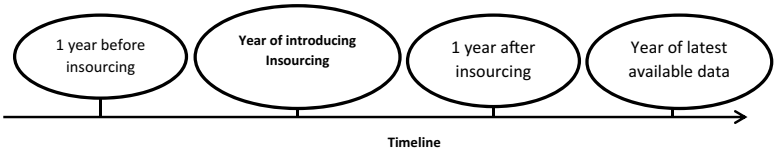

Figure 1. Visualization of relative benchmark points over time

Points in time	Minimum Insourcing		Maximum Insourcing		Mean Insourcing		Std. deviation Insourcing	
	No	Yes	No	Yes	No	Yes	No	Yes
1 year before insourcing	2004	2004	2015	2015	2,011.62	2,012.26	3.287	2.792
Year of introducing insourcing	2002	2002	2016	2016	2,011.79	2,011.87	3.609	3.579
1 year after insourcing	2003	2003	2016	2016	2,012.50	2,012.29	3.437	3.593
Year of latest available data	2012	2012	2016	2016	2,015.07	2,015.08	0.956	0.843

Table 2. Descriptive statistics concerning the different points in time that have been analysed

that implemented insourcing (14.8%). As some of those companies were not included in the database for financial calculation because of the lack of availability of financial data for them, the database on which comparisons of financial indicators were conducted was reduced by eight companies from the group that implemented insourcing. To maintain the same size in the reference group, the data of eight companies from a similar branch of industry were also removed. Finally, the database that was used to determine the differences in the level of financial ratios included data for 200 companies.

Table 3 shows the structure of the sample with regard to the size of the company and Table 4 shows the structure of the sample with regard to the dominant type of business activity. The largest number of enterprises included in the study were service-orientated (40.5%). If we consider the size of the enterprise, large enterprises dominate, employing at least 250 employees (42.5%), which is because of the greater availability of financial data for larger enterprises.

Chi-square tests were used to check whether the differences in numbers between the analysed groups in terms of both size and sector are statistically significant. Verification of differences using Chi-Square tests did not reveal statistically significant differences at a significance level of 0.05. For the sector, the Pearson Chi-square was 4.363, at a significance level of 0.225 and for the size of the company, Pearson Chi-square was 3,267 at a significance level of 0,352. Thus, it can be concluded that the structure of the size and the dominant sector of business activity was similar in both groups.

4.3 Research method

The financial statements of the surveyed companies included: the profit and loss statement (calculating and comparative version), balance sheet and cash flow statement. Based on the collected data, the following ratios were calculated:

- Ratios describing the company's profitability – net return on sales (ROS), return on assets (ROA) and return on equity (ROE).

Table 3.
The structure of the sample with regard to the size of the company

		Insourcing		
		No	Yes	Total
Company size (measured by the number of employees)	<10	9	9	18
	10–49	13	22	35
	50–249	31	31	62
	>249	47	38	85
Total		100	100	200

Table 4.
The structure of the sample with regard to the dominant type of business activity

	Insourcing		
Company sector	No	Yes	Total
Trade	15	24	39
Mixed	16	10	26
Production	25	29	54
Services	44	37	81
Total	100	100	200

- Liquidity ratios – current ratio.
- Cost structure descriptors – the share of manufacturing costs in sales revenue, the share of operating costs in sales revenue, costs of external services in sales revenue and remuneration costs in sales revenue.
- Productivity ratios asset productivity ratio (the quotient of sales revenues and total assets) and labour productivity ratio (being the quotient of sales revenues and salaries).
- Ratio describing the quality of cash flows (in this case, it was the value of cash flows on operating activity).

Ratios formulas and shortcuts used in the calculation results are presented in Table 5.

Following the specific research suggestions formulated by Foerstl *et al.* (2016) the authors of this article develop the research model presented in Figure 2. The model includes relative points of comparison in time and aims to verify the formulated research hypotheses and provide an answer to the research question posed in the title: does insourcing of processes pay off?

The company's financial performance is a dependent variable that is influenced by a number of factors in both the near and longer-term environments. The authors of the proposed research model are aware of this fact, and therefore the model takes into account "other factors" that may affect the results. According to the adopted definition, insourcing is a project that results from starting production of in-house goods previously sourced from outside the company. The incorporation of processes carried out externally into the organisation usually requires investment in both fixed assets and personnel; therefore, it is justified to adopt the ROI perspective, as described in the literature regarding project management (Thomas and Mullaly, 2007; Kwak and Ibbs, 2000; Aubry and Hobbs, 2011; Kuster *et al.*, 2015). In particular, the project life cycle view (Turner and Zolin, 2012; Labuschagne and Brent, 2005; Brandon, 2006), was supportive of the formulation of research hypotheses. Therefore, the shape of the curve showing the level of financial performance as in Figure 3 was proposed. To verify the hypotheses, the key was to select an appropriate reference group containing financial statements of companies from the same time (year of the financial statements) and industry. Figure 3 shows the return on investment in insourcing project lifetime.

Table 5.
Ratios, formulas and shortcuts used in calculations

Ratio name	Ratio formula	Shortcut used
Return on sales	= Operating profit/net sales	ROS
Return on equity	= Net income/equity	ROE
Return on assets	= Net income/total assets	ROA
Current ratio	= Current assets/current liabilities	CR
Cost of goods sold	= Manufacturing cost of products sold/revenues	COGS
Cost of revenue	= Total costs by type/revenues	COR
Share of costs of external services	= External services/total costs by type	ES
Share of costs of payroll	= Payroll/total costs by type	Pa
Share of inventory in current assets	= Inventory/current assets	Inv
Assets profitability	= Revenues/total assets	AP
Workforce productivity	= Revenues/payroll	WP
Net cash flows from operating activities	= Net profit (loss) + total adjustments	CF

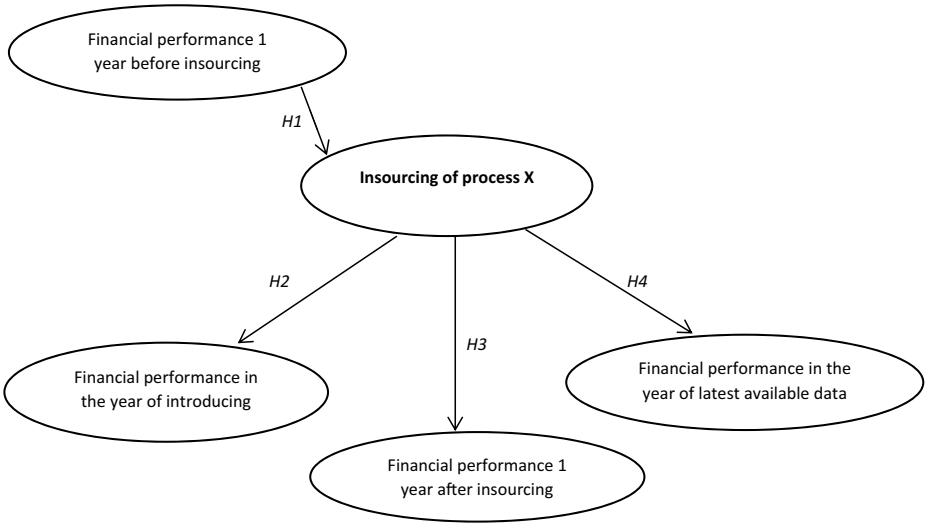

Figure 2.
Research model

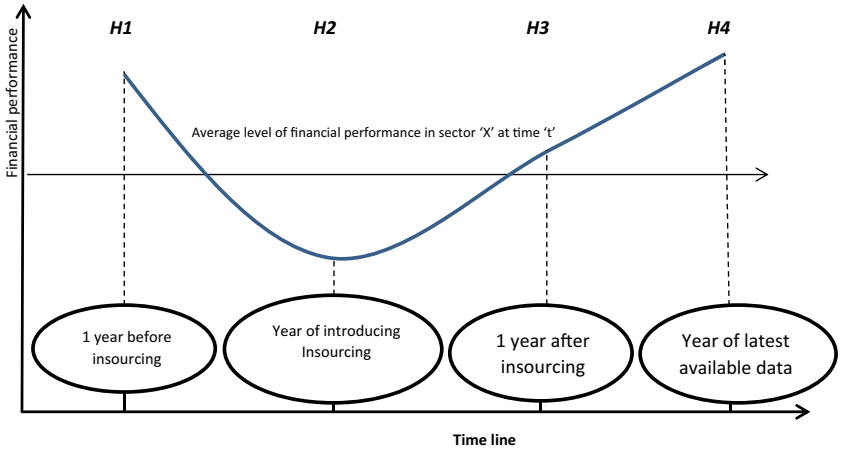

Figure 3.
Return on investment in the insourcing project lifetime

On the prepared database, statistical calculations were carried out, on the basis of which the hypotheses were verified. The following statistical methods were used for calculations: descriptive statistics and statistical tests (parametric and nonparametric). In view of the ratio level of measurement, we used parametric tests to analyse the statistical significance of differences. We checked homogeneity of variance using Levene's test for equality of variances. For financial ratios with equal variances in the compared groups, we decided to use the parametric Student's *t*-test or unequal variances *t*-test for cases with unequal variances (Ruxton, 2006). As the distribution of ratio values differed from the normal distribution for the significance level of 0.05, we used square root normalizing transformation (Garson, 2012). We also used the nonparametric Mann–Whitney U-

independent samples test to compare the results. To verify the hypothesis of differences in the structure of the research sample and reference group, the non-parametric Chi-Square test was used. For all statistics calculations, a significance level of alpha = 0.05 was assumed.

4.4 Hypotheses

In the case of the ratios examined, for some of them, higher values mean a better financial situation (such as ROE and ROI) while for some of them, lower values mean a better financial situation (such as cost of goods sold and cost of revenue). In formulating the hypotheses, we used the phrase better financial ratios, understood as more favourable values, for the financial ratios. The following research hypotheses have been formulated:

H1. In the year before the implementation of insourcing for the assessed financial ratios, there are statistically significant differences between the group of companies in which insourcing was implemented and the reference group in which no insourcing was identified on the basis of the CATI study. Financial ratios are weaker for companies that have not implemented insourcing.

In an enterprise, it is important to take care of financial performance, so entrepreneurs will look for ways to improve it. Achieving a different competitive position and the observed variance in the examined financial indicators show that some enterprises cope with it better and others do not. Assuming that decision-makers have preceded the decision to implement insourcing with financial analysis, as they decided to launch an investment project, the organisation should have a better than an average financial situation to cover the planned expenditure on insourcing (*H1*). A good financial situation is necessary both in the case of financing the investment from its own resources and when rating the credit score in the case of external sources of financing (Cagwin and Bouwman, 2002; Kostopoulos *et al.*, 2011; Kilic and Kaya, 2015). That is why a better financial situation should be reflected in the financial ratios in the year before the implementation of insourcing:

H2. In the year of implementation of insourcing for the assessed financial ratios, there are statistically significant differences between the group of companies in which insourcing was declared and the reference group in which no insourcing was identified on the basis of the CATI study. Financial indicators are weaker for companies that have implemented insourcing.

Implementation of insourcing of any process is an investment (Kalis, 2018), which, through the involvement of financial resources, has a negative impact on financial performance in the short term. An empirical analysis conducted by Rupeika-Apoga (2014) in 2009–2013 proves that the 2008–2009 financial crisis affected the availability of external financing for SMEs on a greater scale than it affected large enterprises, but the availability of alternative financing for the Baltic States is improving. According to Aboody *et al.*, research on upward revaluations of fixed assets by studied firms are significantly positively related to changes in future performance, measured by operating income and cash from operations, indicating that revaluations reflect asset value changes (Aboody *et al.*, 1999). Entrepreneurs who focus on efficiency are ready to decide on an investment whose payback period is longer than the current year and may reach many years. In the year of introducing insourcing with respect to the expenditures paid, the overall situation of the organisation may be weaker than the market average. Therefore, companies that opt for insourcing may report weaker financial results in the year of implementation. In comparison, companies that did not implement insourcing, operating in a similar industry may show better financial ratios:

H3. One year after the implementation of insourcing for the assessed financial ratios, there are statistically significant differences between the group of companies in which insourcing was implemented and a comparative group in which no insourcing was found on the basis of the CATI study. Financial ratios are weaker for companies that have not implemented insourcing.

We exclude from the research sample, companies that did not indicate cost reduction as a motive at the time of insourcing implementation and we also exclude those cases of insourcing whose launching cost was below 0.1% of annual income. The cost motivation of the remaining group can be expected to be reflected in the financial performance of the year following the implementation of insourcing. Therefore, over time, the effects of the insourcing project should result in a better than the average financial situation of organisations that have implemented insourcing (*H3*):

H4. For the latest available data for the assessed financial ratios, there are statistically significant differences between the group of enterprises in which insourcing was declared and the reference group in which no insourcing was detected on the basis of the CATI survey. Financial indicators are weaker for companies that have not implemented insourcing.

Following the curve shown in Figure 3, which illustrates return on investment in insourcing project lifetime, the net benefits of implementing insourcing should increase over time. Due to the fact that in the examined group, there were companies that implemented insourcing in different years and it was not possible to obtain data from several years after the implementation of insourcing, the latest available data was used. For the latest available data, differences in financial performance will be greater in favour of companies that have implemented insourcing for two reasons. Firstly, it will postpone the direct effects of return on investment as insourcing benefits are seen in the long run (Miller and Le Breton-Miller, 2005). In addition, the financial results may include the effects of other projects similar to insourcing. The identification of insourcing may be only one of many projects improving the financial performance of the surveyed companies, which may more often appear together with insourcing than in a reference group.

5. Research results on the financial impact of insourcing

The following symbols were used to describe the statistics of financial ratios from different years: postfix "−1_Year" was added to the ratios from 1 year before insourcing, postfix "0_Year" was added to the ratios from the year of introducing insourcing, postfix "+1_Year" was added to the ratios from 1 year after insourcing and postfix "latest_av." was added to the ratios from the year of the latest available data.

Table A1 in the appendix contains descriptive statistics of the ratios included in the financial performance analysis of the assessed enterprises divided into two groups. It is assumed that insourcing = 1 denotes a group of enterprises where insourcing has occurred and insourcing = 0 denotes a group where insourcing has not occurred. To analyse the data, both the average values of the ratios and the medians were used.

For those ratios for which it is possible to unequivocally determine which level is positive, Table 6 was prepared, in which a score of 1 was assigned to the group of companies (separated due to the occurrence of insourcing) where the mean could be interpreted favourably. After analysing the frequency of occurrence of more advantageous values of ratios, considering the assumed points in time, the research hypotheses were verified. For this purpose, aggregate graphs of the numbers of ratios were prepared, which are more

Ratios	Evaluation where median is better (1 – better; 0 – worse) Insourcing No	Yes	Evaluation where means is better (1 – better; 0 – worse) Insourcing No	Yes
ROS −1_Year	0	1	0	1
ROS 0_Year	1	0	1	0
ROS +1_Year	1	0	1	0
ROS latest_av.	1	0	0	1
ROE −1_Year	0	1	0	1
ROE 0_Year	1	0	1	0
ROE +1_Year	1	0	0	1
ROE latest_av.	1	0	0	1
ROA −1_Year	0	1	1	0
ROA 0_Year	1	0	1	0
ROA +1_Year	1	0	1	0
ROA latest_av.	1	0	1	0
CR −1_Year	0	1	0	1
CR 0_Year	0	1	0	1
CR +1_Year	1	0	0	1
CR latest_av.	0	1	0	1
COGS −1_Year	0	1	0	1
COGS 0_Year	0	1	0	1
COGS +1_Year	1	0	0	1
COGS latest_av.	0	1	0	1
COR −1_Year	0	1	0	1
COR 0_Year	1	0	1	0
COR +1_Year	1	0	1	0
COR latest_av.	1	0	1	0
Inv −1_Year	0	1	0	1
Inv 0_Year	0	1	0	1
Inv +1_Year	0	1	1	0
Inv latest_av.	0	1	0	1
AP −1_Year	0	1	1	0
AP 0_Year	1	0	1	0
AP +1_Year	1	0	1	0
AP latest_av.	0	1	1	0
WP −1_Year	0	1	0	1
WP 0_Year	0	1	0	1
WP +1_Year	0	1	0	1
WP latest_av.	1	0	1	0
CF −1_Year	0	1	0	1
CF 0_Year	1	0	1	0
CF +1_Year	1	0	0	1
CF latest_av.	0	1	0	1

Table 6. Evaluation of average and median values of ratios in groups

favourable at particular time points for each of the studied groups. Figure 4. contains the number of financial ratios that, on average, were better than the comparative group in particular years. Figure 5. contains the number of financial ratios where the median was better than the other group in particular years. Moreover, the significance of the observed differences was verified with statistical nonparametric and parametric tests. For financial ratios with equal variances in the compared groups, we decided to use the parametric Student's *t*-test or unequal variances *t*-test for cases with unequal variances. A level of

alpha < 0.05 was assumed for comparisons of individual ratios. Figure 6. contains the number of financial ratios whose averages were statistically significantly better than in the reference group in particular years.

The acquired data and performed calculations made it possible to evaluate the research hypotheses. In the case of *H1*, the verification of the mean values was positive. Financial ratios are weaker for companies that have not implemented insourcing. In the year before the implementation of insourcing for the assessed financial ratios, statistically significant differences (Student's *t*-test or unequal variances *t*-test, alpha < 0.05) were found between the group of companies in which insourcing was implemented and the comparative group in which no insourcing was found on the basis of the CATI study. The assessed average indicators were higher in 6 out of 10 cases for the group where insourcing occurred, of which, in 2 cases, these were statistically significant. None of the 4 indicators, the average of which was higher for the group in which no insourcing was found, turned out to be statistically significant. Significantly higher ROE in the year before the implementation of insourcing may confirm the better financial performance of companies from the group that declared the use of insourcing. It should be noted that apart from the year of insourcing implementation, the average ROE was higher for companies implementing insourcing. The

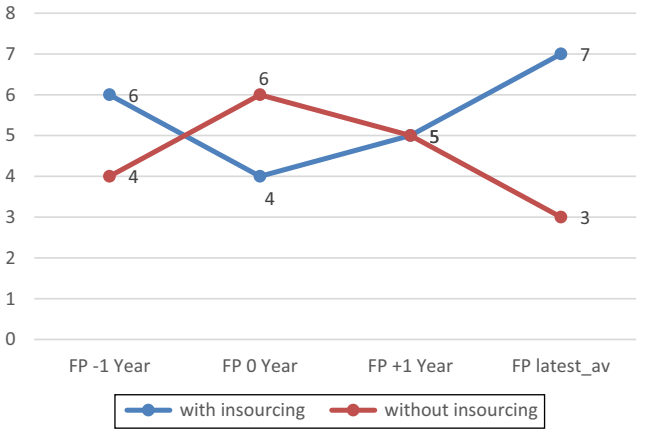

Figure 4.
Number of financial ratios that on average were better than in the comparative group in particular years

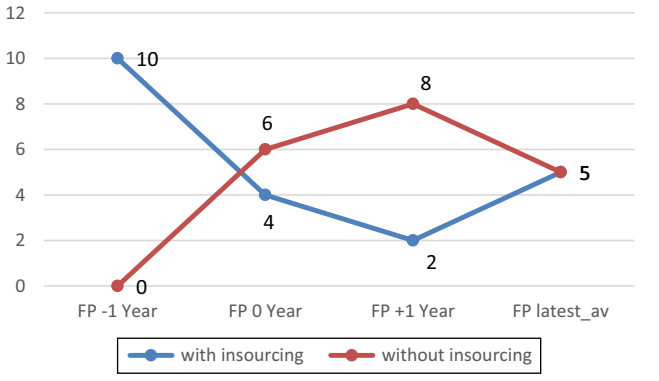

Figure 5.
Number of financial ratios in which the median was better than in the comparative group in particular years

median analysis showed differences of 10:0 ratio in favour of the group in which the use of insourcing was declared; however, the testing of statistical significance for alpha < 0.05 with the Mann-Whitey U-independent samples test showed no significant differences for ratios from 1 year before insourcing.

In the case of *H2*, the verification of the average values was positive. In the year of implementation of insourcing, financial indicators are weaker for companies that have implemented insourcing. For the assessment of statistically significant differences of financial ratios at the level of alpha < 0.05, a nonparametric median test (Mann–Whitey U-independent samples) showed a significant difference for the ROE (Test statistics = 6.11, alpha = 0.027). The assessed average ratios were higher in 6 out of 10 ratios in the group without insourcing. None of the four indicators, the average of which was more favourable for the group where insourcing was found, was statistically significant. In the case of comparing medians, they were higher in 6 out of 10 cases in the group without insourcing. Most probably, the expenses associated with the use of process insourcing had a negative impact on finances in the year when the insourcing was implemented, while the potential benefits did not exceed the expenses in the year of implementation. This may indicate that insourcing is treated as an investment with a payback time of more than a few months.

In the case of *H3*, the verification of mean values of analysed ratios was negative. A year after the implementation of insourcing for the assessed values of the average financial ratios, there was no evidence that they were weaker for companies that did not implement insourcing. The same number of average indicators was better in both groups. In the case of comparing medians, they were higher in 8 out of 10 cases in the group without insourcing. The verification of statistical significance using parametric and nonparametric tests (alpha < 0.05) showed no significant differences, but some of them were close to significant. Despite the lack of statistically significant differences at this point of time, which may indicate that the financial performance in both groups is statistically similar, a trend of changes (Figures 4 and 5) corresponding to the shape of the curve is presented in Figure 3.

The fourth hypothesis, in light of the analysed research results, should be considered as positively verified. For the latest available data for the assessed financial ratios, out of 10 analysed financial indicators, 7 have more favourable mean values for companies that have implemented insourcing. Verification of statistical significance (Student's *t*-test, alpha < 0.05) revealed significant differences in the case of 1 ratio (share of costs of external services in total costs), the average of which was more favourable in the group of companies that implemented insourcing. In the group of companies that did not implement insourcing, there was a lack of statistical significance of differences in ratios, the average of which was more favourable. Comparison of medians in both groups showed 5 more favourable values in each group. The verification of statistical significance for alpha < 0.05 with the Mann-Whitey U-independent sample test did not show any significant differences between the analysed groups.

6. Discussion

According to the literature, it is not only the financial situation that causes the implementation of insourcing. The most frequently indicated reasons for insourcing include cost savings and quality improvement (Drauz, 2014; Stentoft *et al.*, 2015; Hartman *et al.*, 2017a; Hartman *et al.*, 2017b; Foerstl *et al.*, 2016; Moschuris, 2015). For the organisations surveyed, it was found that the predominant motive was a desire to reduce costs; hence, an analysis of companies' financial statements was particularly justified. The studies carried out show that the greatest likelihood of insourcing occurs in large manufacturing companies. Out of 1,171 service companies surveyed, 9.8% were found to use insourcing and

out of 244 manufacturing companies, this rate was the highest (20.5%). Similarly, owing to the size, the largest share of companies applying to insource was in the case of large companies. However, as our research has confirmed, insourcing also occurred in the smallest companies with up to nine employees. This may seem surprising, but in light of the studies that have been carried out, it is possible. In most cases, insourcing concerns services in the smallest group of companies surveyed. For example, in the case of resignation from external transport services, where it was enough to hire 1 driver and buy or lease a suitable vehicle. Another example concerned graphic services in a company where the scale of demand for these services increased so much that it was profitable to hire a specialist in this field. The adopted definition of insourcing assumes the inclusion in the organisation of processes that have been carried out outside so far but allows for a situation in which the same services or components are simultaneously manufactured and purchased from the market.

The exclusion of 16 companies from the research group increased the number of indicators differentiating the compared groups but reduced the number of statistically significant differences. This effect can be explained by the well-known influence of sample size on statistical significance. Using the non-parametric Mann–Whitney U test was weaker than the parametric Student's *t*-test or unequal variances *t*-test. What is worth emphasizing is the trend of changes in the analysed points of time presented in Figures 4 and 5 corresponds to the shape of the curve presented in Figure 3. The results of the research confirm the linkage between ROE and insourcing in the surveyed group. Considering only the base year of implementation of insourcing, the financial ratios are worse than in the reference group, but they improve over time. This can be explained by learning and by gaining experience in handling the newly integrated processes, which makes the organisation more efficient in their execution, resulting in lower costs and improved quality. There are many well-known practices in business process redesign that help to improve them in time (Reijers and Mansar, 2005; Dumas *et al.*, 2013; Mansar and Reijers, 2007). The possibility of reducing costs through insourcing can also be explained by the development of technology, resulting in increased possibilities of automation of manufacturing processes. This makes the share of wages less important in the total production costs and maybe a premise for insourcing (Stentoft *et al.*, 2015).

The question arises as to why some companies opt for insourcing and others do not. In light of the research conducted, the reasons should be sought both inside and outside the company. The phenomenon of insourcing itself may also be considered as a sign of pro-efficiency actions taken by the management of the organisation resulting from a focus on efficiency and competitive pressure. Therefore, if the organisation uses insourcing (even on

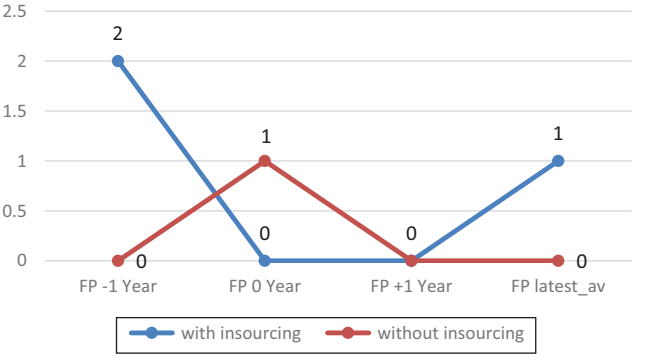

Figure 6.
Number of financial ratios whose averages were statistically significantly better than in the comparative group in particular years

a relatively small scale) to improve financial results, it can be assumed that it also uses other methods to improve financial results, which can be seen at the level of aggregated financial results. Insourcing as an example of an efficiency-enhancing project is expected to improve financial performance, but in reality, it may turn out that in a short period of time due to necessary investments the impact on financial performance may be negative. Moreover, it should be remembered that the aggregated financial results depend to a large extent on the effectiveness of the core processes implemented in the company and the conditions in the organisation's environment.

The limitations in the research included the sample size, which despite the number of 100 records in each of the separated groups, was characterised by data shortages for particular years covered relatively from the year of implementation of insourcing.

It can be assumed that insourcing was one of the many projects improving the effectiveness of the company's operations, so it can be hypothesised for verification in further studies that, with time, the difference in benefits for companies that implemented insourcing should be deepened. Another research question for further study may be the examination of what other projects accompany insourcing.

7. Conclusions

Conducted research sheds new light on the definition of insourcing and contributes to the growing number of studies on insourcing by bringing attention to the financial outcomes of insourcing in the long run. A unique aspect of the research conducted on financial effects is the application of a multi-point model when assessing financial effects. The calculations carried out together with the verification of statistical tests allowed us to conclude that the analysis of the values of ratios at 4-time points (1 year before insourcing, year of introducing insourcing, 1 year after insourcing, year of the latest available data) was justified. Multipoint-in-time analysis of financial indicators allowed us to identify non-linear dependence between financial results achieved by companies that implemented insourcing in comparison to the reference group. The U-shape can be observed as a curve of financial results in a time of enterprises that implemented insourcing and reverse U-shape for enterprises in the reference group that did not have insourcing. Such a shape of this dependency confirms the postponed financial effects of insourcing. In the year prior to insourcing, the surveyed companies in the group that implemented it were characterised by a better financial situation, so they could afford to invest in insourcing. These investments, by engaging financial resources in the short term contributed to the weakening of the financial situation, but in the long term proved to have a better impact on the finances of companies.

Properly executed insourcing projects are a low-risk investment with a stable perspective of return. The financial consequences of insourcing processes in relation to all activities undertaken by the employees of the company, disclosed in the form of financial data for the whole year and the entire organisation, turn out to be visible in financial ratios. However, the observed differences in both average and median values allow us to assume that insourcing was not a single project to improve the effectiveness of the surveyed companies.

It seems appropriate to repeat the research scheme proposed in this article for the empirical verification of the curve shape proposed in Figure 3. For insourcing projects. To obtain more homogeneous results for future research, it is reasonable to narrow down the criteria for selecting a research sample. Preferably, this can be done by choosing a specific manufacturing industry. To assess the financial effects of insourcing at the level of the entire organisation, we propose the use of a wide set of financial indicators subject to a specific analysis of the ROE. The practical implications include the possibility of using insourcing in an unstable environment. In our opinion, insourcing can be an important

option for managers when looking for opportunities to improve the stability of the supply chain (both in terms of delivery on time and price), especially in the event of problems with the supply of key components.

Notes

1. Polish Classification of Activities (PKD) code for official statistics has a multi-level structure – from general sections such as agriculture, building, transport, wholesale trade, down to very detailed subclasses, which allow to clearly indicate the full code of a particular activity. From www.biznes.gov.pl/en/firma/doing-business-in-poland/company-registration-in-poland/what-you-need-to-know-before-you-can-register-a-company-with-the-office/choosing-the-pkd-code
2. According to the law in Poland, an obligation to provide publicly available financial statements has been established for: companies which have to keep accounts in accordance with the Accounting Act, e.g. due to the amount of income (over 2m euros) or legal status and companies that have voluntarily opted for accounting books kept in accordance with the Polish Accounting Act.

References

Aboody, D., Barth, M.E. and Kasznik, R. (1999), "Revaluations of fixed assets and future firm performance: evidence from the UK", *Journal of Accounting and Economics*, Vol. 26 Nos 1/3, pp. 149-178, available at: https://doi.org/10.1016/s0165-4101(98)00040-8

Almansour, B.Y. (2015), "Empirical model for predicting financial failure", *American Journal of Economics, Finance and Management*, Vol. 1 No. 3, pp. 113-124.

Altman, E. (1968), "Financial ratios, discriminant analysis and the prediction of corporate bankruptcy", *The Journal of Finance*, Vol. 23 No. 4, pp. 589-609, available at: https://doi.org/10.1111/j.1540-6261.1968.tb00843.x

Altmann, E. (2006), *Insourcing-Turning the Tide on Outsourcing*, Victoria University of Technology.

Arvanitis, S. and Loukis, E.N. (2012), "Outsourcing and firm performance – a comparative study of Swiss and Greek firms", *Industrial and Corporate Change*, Vol. 22 No. 3, pp. 771-806, available at: https://doi.org/10.1093/icc/dts032

Aubry, M. and Hobbs, B. (2011), "A fresh look at the contribution of project management to organizational performance", *Project Management Journal*, Vol. 42 No. 1, pp. 3-16, available at: https://doi.org/10.1002/pmj.20213

Beaumont, N. and Sohal, A. (2004), "Outsourcing in Australia", *International Journal of Operations and Production Management*, Vol. 24 No. 7, pp. 688-700, available at: https://doi.org/10.1108/01443570410541993

Beaver, W. (1966), "Financial ratios as predictors of failure", *Journal of Accounting Research*, Vol. 4, pp. 71-111, available at: https://doi.org/10.2307/2490171

Brandon, D.M. (2006), "Project selection and initiation", *Project Management for Modern Information Systems*, pp. 29-47, available at: https://doi.org/10.4018/978-1-59140-693-8.ch003

Brannemo, A. (2006), "How does the industry work with sourcing decisions? Case study at two Swedish companies", *Journal of Manufacturing Technology Management*, Vol. 17 No. 5, available at: https://doi.org/10.1108/17410380610668513

Brege, S., Brehmer, P.O. and Lindskog, H. (2010), "Sourcing, insourcing and two times outsourcing: four phases of procurement of telecommunications services within the Swedish public sector", *Strategic Outsourcing: An International Journal*, Vol. 3 No. 2, pp. 144-162, available at: https://doi.org/10.1108/17538291011060358

Briggs, E., Deretti, S. and Kato, H.T. (2020), "Linking organizational service orientation to retailer profitability: Insights from the service-profit chain", *Journal of Business Research*, Vol. 107, pp. 271-278, available at: https://doi.org/10.1016/j.jbusres.2018.08.038

Cabral, S., Quelin, B. and Maia, W. (2014), "Outsourcing failure and reintegration: the influence of contractual and external factors", *Long Range Planning*, Vol. 47 No. 6, pp. 365-378, available at: https://doi.org/10.1016/j.lrp.2013.08.005

Cagwin, D. and Bouwman, M.J. (2002), "The association between activity-based costing and improvement in financial performance", *Management Accounting Research*, Vol. 13 No. 1, pp. 1-39, available at: https://doi.org/10.1006/mare.2001.0175

Capon, N., Farley, J.U. and Hoenig, S. (1990), "Determinants of financial performance: a meta-analysis", *Management Science*, Vol. 36 No. 10, pp. 1143-1159, available at: https://doi.org/10.1287/mnsc.36.10.1143

Caputo, A.C. and Palumbo, M. (2005), "Manufacturing re-insourcing in the textile industry: a case study", *Industrial Management and Data Systems*, Vol. 105 No. 2, pp. 193-207, available at: https://doi.org/10.1108/02635570510583325

Chakrabarty, S. (2006), "Making sense of the sourcing and shoring maze: various outsourcing and offshoring activities", *Outsourcing and Offshoring in the 21st Century: A Socio-Economic Perspective*, pp. 18-53, available at: https://doi.org/10.4018/978-1-59140-875-8.ch002

Chaudhury, R., Gerdemann, D. and Kapoor, B. (2015), "Innovation advantage: insourcing engineering", *Strategy and Leadership*, Vol. 43 No. 6, pp. 3-9, available at: https://doi.org/10.1108/sl-08-2015-0066

Damanpour, F., Magelssen, C. and Walker, R.M. (2020), "Outsourcing and insourcing of organizational activities: the role of outsourcing process mechanisms", *Public Management Review*, Vol. 22 No. 6, pp. 767-790, available at: https://doi.org/10.1080/14719037.2019.1601243

Drauz, R. (2014), "Re-insourcing as a manufacturing-strategic option during a crisis – cases from the automobile industry", *Journal of Business Research*, Vol. 67 No. 3, pp. 346-353, available at: https://doi.org/10.1016/j.jbusres.2013.01.004

Dumas, M., La Rosa, M., Mendling, J. and Reijers, H.A. (2013), *Fundamentals of Business Process Management*, Springer-Verlag, Berlin, available at: https://doi.org/10.1007/978-3-642-33143-5

Espino-Rodríguez, T.F., Chun-Lai, P. and Gil-Padilla, A.M. (2017), "Does outsourcing moderate the effects of asset specificity on performance? An application in Taiwanese hotels", *Journal of Hospitality and Tourism Management*, Vol. 31, pp. 13-27, available at: https://doi.org/10.1016/j.jhtm.2016.10.003

Foerstl, K., Kirchoff, J.F. and Bals, L. (2016), "Reshoring and insourcing: drivers and future research directions", *International Journal of Physical Distribution and Logistics Management*, Vol. 46 No. 5, pp. 492-515, available at: https://doi.org/10.1108/ijpdlm-02-2015-0045

Furubotn, E.G. and Richter, R. (2005), *Institutions and Economic Theory: The Contribution of the New Institutional Economics*, University of MI Press, available at: https://doi.org/10.3998/mpub.6715

Garson, G.D. (2012), *Testing statistical assumptions*, *Statistical Associates Publishing*, available at: www.statisticalassociates.com/assumptions.pdf

Ghoshal, S. and Moran, P. (1996), "Bad for practice: a critique of the transaction cost theory", *Academy of Management Review*, Vol. 21 No. 1, pp. 13-47, available at: https://doi.org/10.5465/amr.1996.9602161563

Gray, J.V., Skowronski, K., Esenduran, G. and Johnny Rungtusanatham, M. (2013), "The reshoring phenomenon: what supply chain academics ought to know and should do", *Journal of Supply Chain Management*, Vol. 49 No. 2, pp. 27-33, available at: https://doi.org/10.1111/jscm.12012

Grela, G. (2020), "Make and buy strategy as a result of an insourcing project", *Scientific Papers of Silesian University of Technology Organization and Management*, Vol. 144, pp. 137-146, available at: http://dx.doi.org/10.29119/1641-3466.2020.144.11

Hartman, P.L., Ogden, J.A. and Hazen, B.T. (2017b), "Bring it back? An examination of the insourcing decision", *International Journal of Physical Distribution and Logistics Management*, Vol. 47 Nos 2/3, pp. 198-221, available at: https://doi.org/10.1108/ijpdlm-09-2015-0220

Hartman, P.L., Ogden, J.A., Wirthlin, J.R. and Hazen, B.T. (2017a), "Nearshoring, reshoring, and insourcing: moving beyond the total cost of ownership conversation", *Business Horizons*, Vol. 60 No. 3, pp. 363-373, available at: https://doi.org/10.1016/j.bushor.2017.01.008

Hirschheim, R. and Lacity, M. (2000), "The myths and realities of information technology insourcing", *Communications of the ACM*, Vol. 43 No. 2, pp. 99-107, available at: https://doi.org/10.1145/328236.328112

Horrigan, J.O. (1965), "Some empirical basis of financial ratio analysis", *Accounting Review*, Vol. 40 No. 3, pp. 558-568.

Ju, M., Murray, J.Y., Gao, G.Y. and Kotabe, M. (2019), "Concurrent sourcing strategy of multinational firms in China: drivers and performance implications", *Journal of World Business*, Vol. 54 No. 6, p. 101015, available at: https://doi.org/10.1016/j.jwb.2019.101015

Kalis, M. (2018), "Outsourcing is a shortcut; insourcing is an investment", *Entrepreneur*, available at: www.entrepreneur.com/article/312380 (accessed 20 September 2020)

Kilic, M. and Kaya, İ. (2015), "Investment project evaluation by a decision making methodology based on type-2 fuzzy sets", *Applied Soft Computing*, Vol. 27, pp. 399-410, available at: https://doi.org/10.1016/j.asoc.2014.11.028

Kostopoulos, K., Papalexandris, A., Papachroni, M. and Ioannou, G. (2011), "Absorptive capacity, innovation, and financial performance", *Journal of Business Research*, Vol. 64 No. 12, pp. 1335-1343, available at: https://doi.org/10.1016/j.jbusres.2010.12.005

Koteba, M. and Mol, J., M. (2009), "Outsourcing and financial performance: a negative curvilinear effect", *Journal of Purchasing and Supply Management*, Vol. 15 No. 4, pp. 205-213, available at: https://doi.org/10.1016/j.pursup.2009.04.001

Kumar, P.R. and Ravi, V. (2007), "Bankruptcy prediction in banks and firms via statistical and intelligent techniques – a review", *European Journal of Operational Research*, Vol. 180 No. 1, pp. 1-28, available at: https://doi.org/10.1016/j.ejor.2006.08.043

Kuster, J., Huber, E., Lippmann, R., Schmid, A., Schneider, E., Witschi, U. and Wüst, R. (2015), "Project controlling", *In Project Management Handbook*, pp. 165-186, available at: https://doi.org/10.1007/978-3-662-45373-5_17

Kwak, Y.H. and Ibbs, C.W. (2000), "Calculating project management's return on investment", *Project Management Journal*, Vol. 31 No. 2, pp. 38-47, available at: https://doi.org/10.1177/875697280003100205

Labuschagne, C. and Brent, A.C. (2005), "Sustainable project life cycle management: the need to integrate life cycles in the manufacturing sector", *International Journal of Project Management*, Vol. 23 No. 2, pp. 159-168, available at: https://doi.org/10.1016/j.ijproman.2004.06.003

Lacity, M.C. and Willcocks, L.P. (1995), "Interpreting information technology sourcing decisions from a transaction cost perspective: findings and critique", *Accounting, Management and Information Technologies*, Vol. 5 No. 3-4, pp. 203-244, available at: https://doi.org/10.1016/0959-8022(96)00005-7

Lahiri, S. (2016), "Does outsourcing really improve firm performance? Empirical evidence and research agenda", *International Journal of Management Reviews*, Vol. 18 No. 4, pp. 464-497, available at: https://doi.org/10.1111/ijmr.12075

Lee, D. and Sikula, A. Sr, (2010), "The utilization of hospitalists associated with compensation: Insourcing instead of outsourcing health care", *Journal of Health Care Finance*, Vol. 36 No. 4, pp. 17-27.

Li-Ying, J. and Nell, P. (2020), "Navigating opportunities for innovation and entrepreneurship under COVID-19", *California Management Review*, available at: https://cmr.berkeley.edu/2020/06/innovation-entrepreneurship/ (accessed 20 September 2020)

McLaughlin, D. and Peppard, J. (2006), "IT backsourcing: from 'make or buy' to 'bringing it back in-house", *European Conference on Information Systems (ECIS) Proceedings*, available at: https://aisel.aisnet.org/ecis2006/117/ (accessed 20 September 2020).

Mansar, S.L. and Reijers, H.A. (2007), "Best practices in business process redesign: use and impact", *Business Process Management Journal*, Vol. 13 No. 2, pp. 193-213, available at: https://doi.org/10.1108/14637150710740455

Miller, D. and Le Breton-Miller, I. (2005), *Managing for the Long Run: Lessons in Competitive Advantage from Great Family Businesses*, Harvard Business Press.

Moorman, C. and Rust, R.T. (1999), "The role of marketing", *Journal of Marketing*, Vol. 63 No. 4_suppl1, pp. 180-197, available at: https://doi.org/10.1177/00222429990634s117

Moscalu, M. and Vintila, G. (2012), "Business failure risk analysis using financial ratios", *Procedia – Social and Behavioral Sciences*, Vol. 62, pp. 728 -732, available at: https://doi.org/10.1016/j.sbspro.2012.09.123

Moschuris, S.J. (2015), "Decision-making criteria in tactical make-or-buy issues: an empirical analysis", *EuroMed Journal of Business*, Vol. 10 No. 1, pp. 2-20, available at: https://doi.org/10.1108/emjb-02-2014-0010

Muhic, M. and Johansson, B. (2014), "Sourcing motives behind sourcing decisions exposed through the sourcing decision framework", *International Journal of Information Systems and Project Management*, Vol. 2 No. 1, pp. 5-17, available at: https://doi.org/10.12821/ijispm020101

Murray, J.Y. and Kotabe, M. (1999), "Sourcing strategies of US service companies: a modified transaction–cost analysis", *Strategic Management Journal*, Vol. 20 No. 9, pp. 791-809, available at: https://doi.org/10.1002/(sici)1097-0266(199909)20:9<791::aid-smj49>3.0.co;2-u

Nicholas-Donald, A. and Osei-Bryson, K.M.A. (2017), ""The economic value of back-sourcing: an event study", International Conference on Information Resources Management (CONF-IRM) Proceedings 31, Association For Information Systems, available at: https://aisel.aisnet.org/confirm2017/31/ (accessed 20 September 2020).

Nujen, B.B., Mwesiumo, D.E., Solli-Sæther, H., Slyngstad, A.B. and Halse, L.L. (2019), "Backshoring readiness", *Journal of Global Operations and Strategic Sourcing*, Vol. 12 No. 1, pp. 172-195, available at: https://doi.org/10.1108/jgoss-05-2018-0020

Olson, D.L., Delen, D. and Meng, Y. (2012), "Comparative analysis of data mining methods for bankruptcy prediction", *Decision Support Systems*, Vol. 52 No. 2, pp. 464-473, available at: https://doi.org/10.1016/j.dss.2011.10.007

Opler, T.C. and Titman, S. (1994), "Financial distress and corporate performance", *The Journal of Finance*, Vol. 49 No. 3, pp. 1015-1040, available at: https://doi.org/10.1111/j.1540-6261.1994.tb00086.x

Ozturk, E. (2018), "The impact of R&D sourcing strategies on basic and developmental R&D in emerging economies", *European Journal of Innovation Management*, Vol. 21 No. 4, pp. 522-542, available at: https://doi.org/10.1108/ejim-10-2017-0152

Puranam, P., Gulati, R. and Bhattacharya, S. (2013), "How much to make and how much to buy? An analysis of optimal plural sourcing strategies", *Strategic Management Journal*, Vol. 34 No. 10, pp. 1145-1161, available at: https://doi.org/10.1002/smj.2063

Ramaswami, S.N., Srivastava, R.K. and Bhargava, M. (2009), "Market-based capabilities and financial performance of firms: insights into marketing's contribution to firm value", *Journal of the Academy of Marketing Science*, Vol. 37 No. 2, pp. 97-116, available at: https://doi.org/10.1007/s11747-008-0120-2

Reijers, H.A. and Mansar, S.L. (2005), "Best practices in business process redesign: an overview and qualitative evaluation of successful redesign heuristics", *Omega*, Vol. 33 No. 4, pp. 283-306, available at: https://doi.org/10.1016/j.omega.2004.04.012

Reza-Gharehbagh, R., Hafezalkotob, A., Asian, S., Makui, A. and Zhang, A.N. (2020), "Peer-to-peer financing choice of SME entrepreneurs in the re-emergence of supply chain localization",

International Transactions in Operational Research, Vol. 27 No. 5, pp. 2534-2558, available at: https://doi.org/10.1111/itor.12715

Ross, S., Westerfield, R. and Jordan, B. (2006), *Fundamentals of Corporate Finance*, 6th ed., McGraw Hill Education, Inc., New York, NY.

Rupeika-Apoga, R. (2014), "Financing in SMEs: case of the Baltic states", *Procedia – Social and Behavioral Sciences*, Vol. 150, pp. 116-125, available at: https://doi.org/10.1016/j.sbspro.2014.09.013

Ruxton, G.D. (2006), "The unequal variance t-test is an underused alternative to student's t-test and the Mann–Whitney U test", *Behavioral Ecology*, Vol. 17 No. 4, pp. 688-690, available at: https://doi.org/10.1093/beheco/ark016

Schniederjans, M.J. and Zuckweiler, K.M. (2004), "A quantitative approach to the outsourcing-insourcing decision in an international context", *Management Decision*, Vol. 42 No. 8, pp. 974-986, available at: https://doi.org/10.1108/00251740410555461

Schneider, C.O., Bremen, P., Schönsleben, P. and Alard, R. (2013), "Transaction cost economics in global sourcing: assessing regional differences and implications for performance", *International Journal of Production Economics*, Vol. 141 No. 1, pp. 243-254, available at: https://doi.org/10.1016/j.ijpe.2011.02.025

Silva, L.E.D., Doratiotto, K. and Vieira, J.G.V. (2019), "Outsourcing or insourcing logistics activities: a Brazilian case study", *International Journal of Integrated Supply Management*, Vol. 12 No. 3, pp. 167-192, available at: https://doi.org/10.1504/ijism.2019.099702

Singhania, M. and Gupta, P. (2014), "First telecom: insourcing vs", *Emerald Emerging Markets Case Studies*", Vol. 4 No. 5, pp. 1-7, available at: https://doi.org/10.1108/eemcs-10-2013-0203

Stentoft, J., Mikkelsen, O.S. and Johnsen, T.E. (2015), "Going local: a trend towards insourcing of production?", *Supply Chain Forum: An International Journal*, Vol. 16 No. 1, pp. 2-13, available at: https://doi.org/10.1080/16258312.2015.11517363

Taffler, R.J. (1983), "The assessment of company solvency and performance using a statistical model", *Accounting and Business Research*, Vol. 13 No. 52, pp. 295-308, available at: https://doi.org/10.1080/00014788.1983.9729767

Tate, W.L. and Bals, L. (2017), "Outsourcing/offshoring insights: going beyond reshoring to rightshoring", *International Journal of Physical Distribution and Logistics Management*, Vol. 47 Nos 2/3, pp. 106-113, available at: https://doi.org/10.1108/ijpdlm-11-2016-0314

Thakur-Wernz, P. (2019), "A typology of backsourcing: short-run total costs and internal capabilities for re-internalization", *Journal of Global Operations and Strategic Sourcing*, Vol. 12 No. 1, pp. 42-61, available at: https://doi.org/10.1108/jgoss-01-2018-0004

Thomas, J. and Mullaly, M. (2007), "Understanding the value of project management: first steps on an international investigation in search of value", *Project Management Journal*, Vol. 38 No. 3, pp. 74-89, available at: https://doi.org/10.1002/pmj.20007

Turner, R. and Zolin, R. (2012), "Forecasting success on large projects: developing reliable scales to predict multiple perspectives by multiple stakeholders over multiple time frames", *Project Management Journal*, Vol. 43 No. 5, pp. 87-99, available at: https://doi.org/10.1002/pmj.21289

Watjatrakul, B. (2005), "Determinants of is sourcing decisions: a comparative study of transaction cost theory versus the resource-based view", *The Journal of Strategic Information Systems*, Vol. 14 No. 4, pp. 389-415, available at: https://doi.org/10.1016/j.jsis.2005.05.001

Williamson, O.E. (1979), "Transaction-cost economics: the governance of contractual relations", *The Journal of Law and Economics*, Vol. 22 No. 2, pp. 233-261, available at: https://doi.org/10.1086/466942

Williamson, O.E. (1981), "The economics of organization: the transaction cost approach", *American Journal of Sociology*, Vol. 87 No. 3, pp. 548-577, available at: https://doi.org/10.1086/227496

Further reading

Delen, D., Kuzey, C. and Uyar, A. (2013), "Measuring firm performance using financial ratios: a decision tree approach", *Expert Systems with Applications*, Vol. 40 No. 10, pp. 3970-3983, available at: https://doi.org/10.1016/j.eswa.2013.01.012

Jensen, P.A. (2017), "Strategic sourcing and procurement of facilities management services", *Journal of Global Operations and Strategic Sourcing*, Vol. 10 No. 2, pp. 138-158, available at: https://doi.org/10.1108/jgoss-10-2016-0029

Mishra, C.S. and Zachary, R.K. (2015), "The theory of entrepreneurship", *Entrepreneurship Research Journal*, Vol. 5 No. 4, pp. 251-268, available at: https://doi.org/10.1515/erj-2015-0042

Corresponding author

Grzegorz Grela can be contacted at: grzegorz.grela@umcs.lublin.pl

Appendix

Table A1.
Descriptive statistics

Ind.	N Insourcing 0	N Insourcing 1	Mean Insourcing 0	Mean Insourcing 1	Std. deviation Insourcing 0	Std. deviation Insourcing 1	Median Insourcing 0	Median Insourcing 1
ROS −1_Year	26	30	−0.01907	−0.01134	0.01079	0.02222	0.19028	0.21546
ROS 0_Year	29	29	0.04831	0.00321	0.04484	0.01634	0.07773	0.13583
ROS +1_Year	28	23	0.05863	0.04482	0.04337	0.03789	0.07140	0.07086
ROS latest_av.	88	84	−0.01477	−0.01082	0.02354	0.01761	0.37724	0.31221
ROE −1_Year	26	31	−1.15475	0.14504	0.03473	0.06122	3.34201	0.28905
ROE 0_Year	29	30	0.28927	0.19667	0.11918	0.04356	1.31483	0.44579
ROE +1_Year	28	24	0.98027	2.28992	0.11263	0.04247	4.24381	10.95576
ROE latest_av.	88	85	−1.09031	0.03268	0.09936	0.06052	5.64068	0.59164
ROA −1_Year	26	31	−0.00092	−0.09925	0.02410	0.05739	0.41225	0.94638
ROA 0_Year	29	30	0.12273	−0.13672	0.12071	0.03786	0.28228	1.21370
ROA +1_Year	28	24	0.19466	0.07360	0.09547	0.06397	0.29005	0.29555
ROA latest_av.	88	84	0.02725	−0.08850	0.08170	0.05629	0.39977	0.93088
CR −1_Year	26	31	1.02813	3.78485	0.84133	1.66468	0.57965	7.65541
CR 0_Year	29	30	1.14819	2.65257	0.89899	1.06396	0.73336	5.47841
CR +1_Year	28	24	1.40874	3.29926	1.07178	0.99715	0.94848	7.57330
CR latest_av.	87	83	1.90087	2.86350	1.07201	1.31638	2.00486	7.29977
COGS −1_Year	7	8	0.88265	0.80571	0.93850	0.84350	0.20182	0.20933
COGS 0_Year	7	8	0.86947	0.82367	0.89045	0.86182	0.10589	0.21414
COGS +1_Year	8	7	0.87636	0.83526	0.87723	0.89604	0.12032	0.25842
COGS latest_av.	27	18	0.78178	0.77646	0.80738	0.77119	0.28134	0.23495
COR −1_Year	19	23	1.02830	0.95444	0.97496	0.97422	0.18333	0.09562
COR 0_Year	20	21	0.95528	1.00882	0.96715	0.98966	0.08922	0.16976
COR +1_Year	18	14	0.93679	0.99054	0.91913	0.98461	0.08828	0.06886
COR latest_av.	42	50	0.99665	1.03534	0.96845	0.98537	0.24282	0.35221
ES −1_Year	19	23	0.20369	0.14652	0.11792	0.09753	0.21161	0.17330
ES 0_Year	22	21	0.17706	0.19076	0.15610	0.11967	0.13939	0.21273
ES +1_Year	20	17	0.19345	0.21470	0.12266	0.13489	0.21428	0.23815

(*continued*)

Ind.	N Insourcing 0	N Insourcing 1	Mean Insourcing 0	Mean Insourcing 1	Std. deviation Insourcing 0	Std. deviation Insourcing 1	Median Insourcing 0	Median Insourcing 1
ES latest_av.	61	65	0.18151	0.27119	0.13590	0.15965	0.19532	0.27125
Pa −1_Year	19	22	0.21099	0.20696	0.16504	0.16117	0.17830	0.15711
Pa 0_Year	22	20	0.26210	0.19861	0.18413	0.17264	0.20401	0.14631
Pa +1_Year	20	17	0.23245	0.19022	0.14378	0.13031	0.20928	0.14676
Pa latest_av.	61	60	0.20640	0.19747	0.16354	0.16479	0.17928	0.14311
Inv −1_Year	23	29	0.30343	0.27270	0.30607	0.20981	0.21078	0.23739
Inv 0_Year	25	29	0.29805	0.27561	0.31731	0.22898	0.22399	0.21427
Inv +1_Year	23	22	0.27171	0.28548	0.25279	0.23267	0.21416	0.22654
Inv latest_av.	81	76	0.26338	0.25578	0.22035	0.19381	0.21462	0.21894
AP −1_Year	26	31	1.89456	1.54802	1.41879	1.54555	1.81152	0.82383
AP 0_Year	28	30	2.10465	1.50296	1.56842	1.32016	1.46570	0.95336
AP +1_Year	27	24	2.14094	1.82464	1.74355	1.53461	1.51336	1.64279
AP latest_av.	88	85	1.94103	1.66356	1.45729	1.63749	1.73736	1.04729
WP −1_Year	18	22	9.55493	9.82867	6.24629	6.47063	11.67426	8.54632
WP 0_Year	22	20	8.49937	10.77232	5.86821	5.98641	10.18647	14.66395
WP +1_Year	20	17	10.02029	17.37789	7.47021	7.99769	11.00196	31.86905
WP latest_av.	60	60	10.87070	10.01185	6.50135	6.30947	11.14149	9.70091
CF −1_Year	14	10	11,383,799.0	17,953,708.3	4,536,227.3	7,015,528.5	12,879,388.5	27,653,594.9
CF 0_Year	14	14	32,949,258.7	11,152,469.8	5,469,816.1	5,448,354.0	58,897,231.0	14,993,344.8
CF +1_Year	10	11	−5,682,186.7	9,824,741.4	4,877,231.9	4,432,996.4	139,150,691.6	16,943,603.6
CF latest_av.	35	27	4,926,292.8	65,296,132.1	4,310,128.6	4,689,148.9	10,2917,862.8	159,508,230.1

Table A1.