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CASH HOLDINGS, CASH SHORTAGES, ASSET WRITE-OFFS AND THE PREDICTABILITY OF LIQUIDITY AND PROFITABILITY

DOCTORAL DISSERTATION

Ljubljana, 2021

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ACKNOWLEDGEMENTS

First and foremost I am extremely grateful to my mentor, Prof. Aljoša Valentinčič, PhD, who inspired and motivated me to commence my PhD journey. I am forever grateful for his invaluable advice, continuous support and patience during my PhD study. My gratitude extends to the member of my thesis committee for their insightful comments and suggestions. I would like to thank my mother, whom without this would not have been possible. I also appreciate all the support and patience I received from the rest of my family.

DENARNA SREDSTVA, DENARNI PRIMANJKLJAJI, ODPISI SREDSTEV TER PREDVIDLJIVOST LIKVIDNOSTI IN DOBIČKONOSNOSTI

POVZETEK

Mala in srednje velika podjetja (MSP) igrajo ključno vlogo v evropskem gospodarstvu. Po zadnjih statističnih podatkih, MSP predstavljajo 99,8% vseh podjetij (ali 24,5 milijonov) v nefinančnem poslovnem sektorju 28 držav članic EU in zagotavljajo dve tretjini celotne zaposlenosti (66,4%) ter več kot polovico (56,8%) dodane vrednosti sektorja (Evropska komisija, 2018). MSP so zelo odvisna od zunanjega financiranja, vendar so tudi informacijsko nepregledna. Na splošno se upniki soočajo z negotovostjo glede finančnega stanja podjetij in možnih posledic njihovih posojilnih dejanj. Računovodski podatki v obliki računovodskih izkazov lahko pripomorejo zmanjšati to negotovost, zato ker zagotavljajo informacije o finančni uspešnosti in položaju podjetja v določenem trenutku. Posojilodajalci bi morali biti sposobni sprejemati premišljene odločitve o alokaciji njihovih sredstev na podlagi računovodskih informacij, predstavljenih v računovodskih izkazih.

V tej doktorski disertaciji preučujemo koristnost informacij iz računovodskih izkazov pri ocenjevanju likvidnosti in donosnosti malih in srednje velikih podjetij, ki sta dve ključni značilnosti za uspešno in trajnostno poslovanje. Disertacija je organizirana v treh delih, od katerih vsak obravnava drugačen vidik likvidnosti ali donosnosti, opredeljen kot denarna sredstva, denarni primanjkljaj in prevrednotenja sredstev zaradi oslabitve. Empirična raziskava temelji na velikem vzorcu slovenskih malih in srednje velikih podjetij ter na različnih vrstah regresijskih analiz, ki so bili aplicirani odvisno od predmeta raziskave.

Prvi del raziskuje dejavnike, ki določajo denarna sredstva, ki jih slovenska MSP hranijo na svojih računih. Model, ki temelji na finančnih kazalnikih, izračunanih iz letnih računovodskih izkazov, gradimo za določitev motivov, ki vplivajo na raven denarnih sredstev v lasti malih in srednje velikih podjetij. V empiričnem delu uporabljamo metodo Fame in MacBetha, ki je ustrezna glede na neuravnoteženo strukturo vzorca podatkov. Rezultati kažejo, da se ta podjetja ob likvidnosti vedejo preudarno, kar pomeni, da odločitev o vzdrževanju denarnih sredstev na računu večinoma temelji na transakcijskih in previdnostnih motivih, a kljub temu razkrivajo tudi indikacije spekulativnega motiva.

Drugi del obravnava napovedno moč finančnih kazalnikov pri napovedovanju kratkoročne likvidnosti zasebnih podjetij. Z uporabo logistične regresije oblikujemo dve vrsti modelov: enega, ki temelji le na finančnih kazalnikih, in drugega, ki temelji na kombinaciji med

finančnimi kazalniki in kazalnikom likvidnosti, predstavljen kot blokada transakcijskega računa. Podatki iz računovodskih izkazov, izraženi kot finančni kazalniki, imajo le omejeno moč pri napovedovanju prihodnjega denarnega primanjkljaja. Finančni kazalniki z visoko natančnostjo napovedujejo podjetja, ki v bližnji prihodnosti ne bodo imela likvidnostnih težav, vendar ne uspejo prepoznati podjetij, ki se bodo srečali z likvidnostnimi težavami. Napovedovalna sposobnost modela se izboljša, če so vključeni podatki o prejšnjih blokadah računov, vendar je še vedno težko napovedati prihodnje denarne primanjkljaje.

Tretji del se osredotoča na prevrednotenja sredstev zaradi oslabitve kot možni napovedovalci prihodnje donosnosti. V tem delu raziskujemo, ali slovenska MSP poročajo prevrednotenje sredstev zaradi oslabitve v skladu z računovodskimi standardi in znižujejo bilančno vrednost sredstev, da bi signalizirali resnično finančno uspešnost podjetja. Vendar bi podjetja lahko uporabljala prevrednotenja sredstev zaradi oslabitve kot mehanizem za upravljanje z dobičkom s tem, da prihodnje stroške prenašajo v obstoječe obdobje. Rezultati, dobljeni z metodo linearne regresije z ugrozdenimi standardnimi napakami po enotah kažejo, da so pri evidentiranju prevrednotenj sredstev zaradi oslabitve prisotni tako operativni kot diskrecijski razlogi, zaradi česar imajo računovodski izkazi omejeno uporabnost za sprejemanje odločitev o prihodnji donosnosti.

Na splošno ugotovitve, predstavljene v disertaciji omogočajo dodaten vpogled v koristnost informacij, razkritih v računovodskih izkazih, za ocenjevanje gospodarske uspešnosti MSP z vidika zunanjega uporabnika. Analiziramo informativnost računovodskih izkazov s treh različnih vidikov in povzemamo, da je njihova uporaba pri napovedovanju prihodnje finančne uspešnosti teh podjetij omejena, vendar dobro odražajo trenutno likvidnostno stanje MSP.

KLJUČNE BESEDE: denarna sredstva, denarni primanjkljaj, odpisi sredstev, MSP, finančna kriza

CASH HOLDINGS, CASH SHORTAGES, ASSET WRITE-OFFS AND THE PREDICTABILITY OF LIQUIDITY AND PROFITABILITY

SUMMARY

Small and medium sized entities (SMEs) play a key role in the European economy. According to the latest available statistics, 99.8% of all enterprises (or 24.5 million) in the non-financial business sector of the 28 EU member states in the year 2017 were SMEs providing two thirds of total employment (66.4%) and more than half (56.8%) of the sector's value added (European Commission, 2018). While SMEs are highly dependent on external finance, they are also informationally opaque. In general, creditors face uncertainty when it comes to a firm's financial condition and the possible consequences of their borrowing actions. This uncertainty should be reduced by accounting data in the form of financial statements, which provide information on the financial performance and position of a firm at a certain point in time. Lenders should be able to make informed decisions about their resource allocation based on the accounting information presented in financial statements.

In this PhD dissertation we study the usefulness of financial statement information in assessing the liquidity and profitability of small and medium sized firms, two vital ingredients for a successful and sustainable business. The dissertation is organized in three parts, each of which deals with a different aspect of liquidity or profitability, identified as cash holdings, cash shortages and asset write offs. We work on a large sample of Slovenian small and medium sized enterprises with a special care devoted to quality data preparation. We apply different types of regression analyses subject to the problem studied.

The first part investigates the factors that determine the cash holdings of Slovenian SMEs. We build a model based on financial ratios calculated from annual financial statements to determine the motives that influence the level of cash held by SMEs. We apply the Fama-MacBeth method, which is appropriate considering the unbalanced panel data set. The results imply that these firms behave prudently when it comes to liquidity, meaning that the decision to maintain cash in-house is mostly driven by the transactions and precautionary motive. Nevertheless, we find indications of the speculative motive as well.

The second part deals with the predictive power of financial ratios in forecasting short-term liquidity of private firms. Applying logistic regression, we devise two types of models: one based on financial ratios only and the second based on a combination of financial ratios and a lagged liquidity indicator in the form of an account block. The information derived from financial statements expressed as financial ratios has only limited power in forecasting future cash shortages. Financial ratios do a good job in predicting firms that will not incur liquidity

issues in the near future, however they fail in identifying firms which will encounter liquidity problems. The predictive ability of the model is improved when data on previous account blocks is included, however it is still difficult to predict the occurrence of a future cash shortage.

The third part focuses on asset write-offs as possible predictors of future profitability. We investigate whether Slovenian SMEs decrease the balance sheet value of an asset to signal its true financial performance, as prescribed by accounting standards or to bring future expenses forward, as an earnings management mechanism. The results obtained with clustered standard errors linear regression analyses indicate that both operating and discretionary reasons are present when recording asset write-offs, rendering this financial statement data of limited use for making inferences about future profitability.

In general, the findings presented in this dissertation provide additional insight in the usefulness of financial statement information in the setting of small and medium sized firms. We analyse the informativeness of financial statements from three different aspects and draw the general conclusion that their use is of limited value when making assumptions about the future financial performance of these firms, but they are a good mirror of the current financial condition of an SME.

KEYWORDS: cash holdings, cash shortages, asset write-offs, SMEs, financial crisis

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INTRODUCTION

Small and medium sized enterprises (SMEs) have crucial economic significance within the EU. As presented in the 2018/2019 European Commission's annual report on European SMEs, these firms account for almost all business entities (99.8%) in the non-financial business sector in the EU28 and they provide more than half (56.4%) of the value added generated in this sector. Also, they constitute a significant driver of employment, as nearly 98 million people work in small and medium sized firms (European Commission, 2019). Despite their significant contribution to the economy in general, SMEs are impeded in achieving their growth and development potential by different obstacles, among which limited access to finance is one of the most important (Beck & Demirgüc-Kunt, 2006, p. 2942).

One of the key reasons for the narrow source of external finance available to SMEs is their informational opacity (UNCTAD, 2016). SMEs are much less transparent compared to public firms, since the contracts they conclude with employees, suppliers or customers are not available to the wider public, they are not listed on security markets, where shares are continually priced and many of them (the small ones) do not have audited financial statements (Berger & Udell, 1998, p. 616). As a result, these firms have difficulties with communicating their quality to outside agents and as a consequence face higher agency costs of debt (Pettit & Singer, 1985, p. 55). In that respect, the accounting and financial reporting practices of SMEs can play a key role on their path to growth by mitigating the informational discrepancy towards stakeholders. If SMEs provided transparent and reliable information about their financial performance, lenders would have solid grounds for assessing the riskiness of the borrower and for making informed resource allocation decisions (UNCTAD, 2016; Flood, 2019, p. 14). Indeed, financial reporting aims to mitigate the agency problems and thus reduce the associated costs, by lessening the information asymmetry and enabling contracting between various stakeholders of a firm (Minnis & Shroff, 2017; p. 479).

A number of studies have demonstrated that accounting information is important for private firms. For example, Allee and Yohn (2009, p. 24) highlight better access to credit and lower cost of capital as advantages obtained by U.S. small private companies from audited financial statements or accrual-based reporting. Minnis (2011, pp. 457-506) also shows how the authentication of financial statements benefits the external financing of U.S. privately held firms, in that firms with audited financial statements enjoy lower interest rates. Hope, Thomas and Vyas (2011, p. 951) present international evidence on the positive impact of higher credibility of financial reporting on reducing the financing constraints faced by private firms. Chen, Hope, Li and Wang (2011, p. 1283) further find positive association between the quality of financial statements and investment efficiency of private firms in emerging markets.

The quality and usefulness of financial statement information are thus relevant and interesting issues in both national and international context. This doctoral dissertation examines the usefulness of the information disclosed in financial statements for evaluating the economic performance of SMEs from an external user's point of view. In the three chapters that follow we investigate whether lenders or creditors can reliably assess or forecast the liquidity and profitability of private firms using data presented in financial statements. Profitability and liquidity are aspects of firm performance of highest interest to external stakeholders. Analysis of profitability aims to evaluate whether managers efficiently implement the business strategy and thus provides indication of the firm's survival in the long run (Wahlen, Baginski & Bradshaw, 2010 p. 248). It is perceived as "margin of safety" by creditors (Gilkar, 2008, p. 2). Liquidity is often described as the lifeblood of the business. Insufficient cash resources to cover outstanding obligations could result in late or no payment to creditors, who in that case face opportunity costs of not being able to invest the money elsewhere or even more serious financial consequences if the borrower cannot repay the (full) principal (Mramor & Valentinčič, 2003, p. 745). That is why, the understanding whether financial reporting provides credible information on the liquidity and profitability condition of SMEs should be a valuable input to external users.

The examination of SMEs and their financial reporting is particularly interesting, not only because of their great importance to the economy but also because they are different compared to publicly traded firms in many respects, rendering the findings on public companies not applicable to SMEs (Gaganis, Pasiouras & Voulgari, 2019, p. 276). Private firms operate under different governance, financing, management and compensation frameworks compared to public companies (Ball & Shivakumar, 2005, p. 95). Private firms are closely held and most often management-owned, whereas public firms' ownership is divided among thousands of stockholders. Also, private firms are less reliant on external financing as the access to it is quite limited (Beck & Demirgüç-Kunt, 2006, p. 2931). Consequently, these firms encounter lower degree of agency problems between owners and managers as well as between owners and lenders (Garrod, Kosi, & Valentinčič, 2008, p. 3). In such a setting, where little motivation exists to alter the perception of stakeholders about the firm's economic performance by manipulation of accounting numbers, we expect that SMEs adhere to accounting rules and produce reliable financial reports, based on which external users could make rational assumptions about their liquidity and profitability.

In this doctoral dissertation we focus on the evaluation of liquidity and profitability of private firms from three different aspects, identified as cash holdings, cash shortages and asset write offs. More specifically, the objective of the following research is to provide evidence on the reliability of accounting data in assessing the cash position, short-term liquidity problems and future profitability of small and medium sized firms. For the purpose of this research the term private firm is used as an equivalent to small and medium sized enterprise. We use the European

Commission definition of SMEs, which categorizes them as firms which employ fewer than 250 persons with an annual turnover not exceeding €50 million and an annual balance sheet total not exceeding €43 million (European Commission, 2003). The empirical research in all three chapters rests on a large sample of Slovenian small and medium sized enterprises.

The first chapter aims to assess the factors that influence the current cash position of Slovenian SMEs. Various financial ratios calculated from annual reports are used to determine the drivers that affect the level of cash holdings in Slovenian SMEs. Given the main characteristics of this group of firms, identified as concentrated ownership structure, financial constraints and limited access to external finance, we expect that these firms behave prudently when it comes to their cash reserves, meaning that their cash policies are driven by the transactions and precautionary motive. We therefore postulate that SMEs tend to lower their costs related to securing liquidity, utilize their cash substitutes at hand and accumulate cash as a buffer against difficult circumstances. Applying the Fama-MacBeth regression method on an unbalanced panel data set we find significant association between cash holdings and the ratios used as proxies for the transactions and precautionary motive. We also find evidence in favour of the speculative motive.

The second chapter focuses on the predictability of short-term liquidity of private firms based on information derived from firms' financial statements. The aim is to evaluate whether external users can rely on financial ratios to forecast short-term cash shortages with sufficient accuracy. Cash shortage is defined as the occurrence of transaction account block, which is imposed by the bank when a firm does not have sufficient funds to cover its due obligations. We apply clustered standard errors logistic regression to an unbalanced sample to predict a dichotomous result, that is whether a firm will experience an account block in the near future or not. We test two groups of models: one based solely on financial ratios and the other based on a combination of financial ratios and lagged liquidity indicators. We find that both models predict with high accuracy those firms that will not experience a cash shortage in the forthcoming period, however they fail to identify those firms that will incur a liquidity problem. The model built on financial ratios only is less efficient than the models including information on previous liquidity shortages, which produce lower percentage of misclassified firms with cash problems. However, Type I error still remains rather high in all models.

In the third chapter, we analyse the usefulness of accounting data on asset write-offs in predicting future profitability of SMEs. Write-offs should be a signal of declining future cash flows expected from an asset, as prescribed by accounting standards. However, they can be also utilized to manage earnings, as they enable shift of future expenses forward, accounting-wise. We examine the relation between current period write-offs and future changes in earnings to assess whether SMEs follow accounting rules regarding their disclosure or they use them

opportunistically. If write-offs are employed as prescribed, then they should exhibit a significant and negative relation with future changes in earnings. If that were true, then external users could use this information to make assumptions about the future profitability of the firm. The results of the clustered standard errors linear regression analyses run on the unbalanced sample of Slovenian SMEs imply that these firms write assets off due to operating and discretionary reasons, since they exhibit both significant and negative, as well as insignificant or positive association with future changes in profitability. Considering that both elements of the accounting decision are present, we conclude that write-offs are merely noisy predictors of future profitability.

Taken together, the results of our empirical analysis suggest that the accounting information produced by SMEs is of limited practicality to external users for evaluating their liquidity and profitability. On one hand, financial ratios provide solid basis for assessing the current cash position of these firms, but they underperform when it comes to predicting short-term cash shortages and short-term profitability. The finding that financial ratios produce high percentages of Type I error is disappointing, since these types of errors are more expensive to creditors. It is in the creditors' interest to protect themselves from potential non-payers and while they largely depend on financial ratios in the process of creditworthiness evaluation, their most valuable tools fail to identify SMEs that will incur cash problems in the near future. Furthermore, the discovery that write-offs are not necessarily negatively correlated to future changes in earnings implies to their discretionary use and discredits them as signals of lower expected cash flows. Therefore, a common implication that can be drawn from the present analyses is that the financial information disclosed by SMEs should be treated with caution when making predictions about their short-term liquidity and profitability.

1 DETERMINANTS OF CASH HOLDINGS IN PRIVATE FIRMS

1.1 Introduction

Managing cash is an important component of a firm's financing policy, especially in the case of small businesses, which are often more dependent on short term financing sources (Peel, Wilson & Howorth, 2000 p. 17; Walker & Petty, 1978, p. 66). The old phrase ″cash is king″ is particularly descriptive of small and medium sized firms, considering they face much more limited access to external financing compared to larger firms (Mramor & Valentinčič, 2003, p. 747). Also, the recent financial crisis put cash and its management back in the spotlight. When liquidity is scarce, efficient cash management is vital for ensuring that every spare monetary unit has been fully utilized (Nason & Patel, 2016, p. 4242). Even in good times an adequate cash policy is crucial for the firm as lack of liquidity may result in an inability to settle liabilities as contracted or as economically efficient, increased costs, and, in the worst case, insolvency. Thus, the management of cash holdings often marks the difference between corporate failure and success. Cash holdings in general represent "cash on hand or readily available for investment in physical assets and to distribute to investors" (Gill & Shah, 2012, p. 70). Cash is a liquid asset necessary to support the day-to-day operations and working capital needs of a firm.

The purpose of this study is to investigate the determinants of cash holdings in small and medium sized firms in Slovenia. These are the firms which employ fewer than 250 persons with an annual turnover not exceeding €50 million and/or an annual balance sheet total not exceeding €43 million (European Commission, 2003). We assume that firms behave prudently when it comes to liquidity. We postulate that the transactions and precautionary motive prevail when deciding on the level of cash to hold. Thus, we posit that SMEs tend to lower their costs related to securing liquidity, utilize their cash substitutes at hand and accumulate cash as a buffer against difficult circumstances. We also seek to examine the effect of the recent financial crisis and the consequent stringent credit conditions on the cash holdings behaviour of Slovenian SMEs. All our hypothesis rest on the specific characteristics of SMEs, which are outlined below. We use a large sample of 27,573 unique small and medium-sized firms during the period 2006-2013 for a total of 170,220 firm-year observations.

Small and medium sized enterprises play a central role in the EU economy as a whole, but they represent a sector of even greater importance for the economic development of Slovenia, which makes it a particularly interesting choice of country to examine the characteristics of SMEs. According to the Annual Report on European SMEs 2014/2015 (European Commission, 2015) there were 22.3 million SMEs in the non-financial business sector of the 28 EU member states in the year 2014, accounting for 99.8% of all enterprises in this sector, providing 66,9% of total

employment and 57,8% of the sector's value added (or EUR 3.7 trillion in absolute value). As reported in the 2015 SBA Fact Sheet (European Commission, 2015) it is estimated that in Slovenia the SMEs constituted 99.8% of all non-financial business entities, accounting for 72,7% of employment and providing 63,1% of the value added in the local non-financial sector in 2014. According to our data analysis, cash holdings represent a significant part of the asset base of Slovenian SMEs, as they average around 18% of their net assets, which is much higher than the average 6% found in Spanish SMEs (García-Teruel & Martínez-Solano, 2008, p. 135) and the average 5% in Portuguese SMEs (Pastor & Gama, 2013, p. 107).

One of the crucial differences between public and private firms is the ownership structure. While the ownership of private firms is in the hands of just one or a few owners, public firms' ownership is divided among thousands of shareholders. The coincidence between ownership and control in smaller firms provides managers with greater flexibility in changing the asset base and consequently in changing the risk of the firm (Pettit & Singer, 1985, p. 52). Furthermore, private businesses are usually characterized by greater informational opacity, which contrasts with the comparably informationally transparent public listed firms. This exacerbates the information asymmetry problems (Berger & Udell, 1998, p. 614). As a result of the aforementioned characteristics, private businesses face more serious agency costs of debt (Pettit & Singer, 1985, p. 55). Also, smaller firms are more susceptible to temporary economic downturns, as a result of the higher transaction costs they encounter and the consequently shorter maturity debt they use (Tittman & Wessels, 1988, p. 14). Finally, smaller firms are challenged with more severe financing constraints, due to limited internal finance, the information asymmetry they bear and presumably due to the lack of collateral to support their borrowing (Whited, 1992, p. 1426).

We find strong support for both the transactions and precautionary motive in the cash policies of the firms in our sample, but we also find evidence of the speculative motive. Specifically, our results show that smaller firms tend to hold higher levels of cash, thus mitigating the potential costs for obtaining external finance. In the same vein, we find that keeping close relationships with banks provides a buffer and thus leads to lower cash levels. In addition, cash substitutes such as net working capital and debt are indeed utilized as such. Higher ability for generating funds internally, expressed as operating cash flow generated, is negatively related to the amounts of cash held. We also find weak empirical support for the negative influence of the interest rate level on cash holdings. Reported evidence further shows that longer cash conversion cycles and the requirements for mandatory retirement benefit contributions result in higher cash balances, implicating that precaution drives the cash policy in financially constrained firms. The finding that exporting and more profitable firms hold more cash, implies that the speculative motive drives the decision to keep the cash holdings "in-house" in order to be able to take advantage of profit-making opportunities.

The results of our research make several contributions to the existing literature on cash holdings. First, our analysis establishes new and so far untested factors as determinants of cash holdings, such as the export activities and the requirement for mandatory retirement benefit contributions. Furthermore, to our knowledge, this is the first study that addresses the effect of the recently changed interest rate climate on the cash amounts held by firms. Another contribution is that the research focuses on cash holdings of small and medium-sized (and generally private) firms, a sector that has received relatively little attention by researchers thus far compared to the extensive literature on cash policies in large firms listed on capital markets. Thus, our research builds on the limited existing body of knowledge devoted to a sector of great significance to the global economy. Lastly, there are no empirical studies in the field of cash holdings' determinants for small and medium firms in Slovenia so far, even though they constitute the core of its economy.

The remainder of this chapter is structured as follows. Section 1.2 provides theoretical foundations and develops the empirical hypothesis. Section 1.3 describes the data set and the methodology, section 1.4 discusses the results, section 1.5 presents additional robustness tests, while section 1.6 concludes.

1.2 Literature review and hypothesis development

1.2.1 Reasons and motives for holding cash

Firms hold a certain amount of cash holdings on their balance sheets for various reasons and purposes. The two main motives for holding cash indicated in the current literature are the transactions motive and the precautionary motive. The transactions motive arises from the firms' need of a certain amount of cash balances necessary for covering payments related to their day-to-day business operations. Keynes (1936, p. 91) defines the transactions motive as "the need of cash for the current transaction of personal and business exchanges". By securing cash for these purposes, the firm avoids or reduces transaction costs associated with raising external finance. As shown by Miller and Orr (1966, p. 425), higher transaction costs prompt firms to hold more liquid assets.

The precautionary motive for holding cash relates to a firm's intention of protecting itself against uncertain future events. To hedge against uncertainty, firms reserve cash to meet future eventualities which would require sudden spending in times of poor cash flow. Almeida, Campello and Weisbach (2004, p. 1778) demonstrate that the precautionary demand for cash is present in financially constrained firms, which show significant propensity to save cash out of their cash flows, whereas unconstrained firms do not. During the financial crisis, though, both constrained and unconstrained firms demonstrated a significantly increased propensity to save

cash (Sun & Wang, 2015, p. 185). McLean (2011, p. 713) finds that the precautionary motive has increased its presence in general among share issuing U.S. firms in the period between 1971 and 2008.

Another reason for holding cash is ensuring flexibility, that is, it concerns the objective of exploiting unforeseen opportunities. This is called the speculative motive. Firms keep speculative cash on their accounts to seize profit making opportunities in the future, which result from price volatility. Speculative cash balances provide the firm with the possibility to purchase assets at attractive prices at any time (Michalski, 2009, p. 52). It may sound similar to the precautionary motive for holding cash, as both these motives deal with uncertainty, however there is a difference. Namely, the precautionary demand for cash arises from uncertainty in the timing of payments and receipts between the current and future purchase or sale of an asset, while the speculative motive relates to the uncertainty in interest rates (Whalen, 1966, p. 322; Sprenkle, 1969, p. 836).

An additional motive for holding cash identified by Miller and Orr (1966, p. 418) is the compensating-balance requirement. Namely, firms are required to hold a certain minimum amount of cash on their current accounts, which is not allowed to fall below a certain pre-defined level, as a form of compensation to the bank instead of paying service charges. More specifically, compensating balances are a form of agreement between the commercial bank and the business customer when the bank opens a line of credit in favour of the customer and in return it demands an average minimum cash balance to be maintained on the firm's deposit account.

Being able to take advantage of trade discounts can also be considered a reason for keeping cash on hand. Suppliers often offer their clients the option of discounts for early payment of obligations, which would be easily obtainable if there was extra cash lying on the firm's account (Ehrhardt, 2006, p. 583). Kling, Paul and Gonis (2014, p. 129) conclude that cash holdings improve the access to trade credit, by sending a positive signal to the suppliers regarding the ability to pay back the trade credit offered.

1.2.2 Implications of holding cash

Holding cash has its implications, both in the form of benefits and costs. The two main benefits of having cash on hand are tightly linked to the two main motives for holding cash, i.e. the transactions and precautionary motive. With regard to the former motive, by holding cash the firm avoids transaction costs necessary to raise funds for making payments and also avoids the trouble of liquidating assets, issuing debt and/or equity, renegotiating existing financial contracts or cutting dividends (Opler, Pinkowitz, Stulz & Williamson, 1999, p. 4; Ozkan &

Ozkan, 2004, p. 2106). Relating to the latter motive, by keeping cash in the firm, it secures liquid assets to finance its operations or favourable investment projects in cases when other resources are limited, unavailable or too costly to acquire. In other words, cash holdings reduce the possibility of financial distress and the costs associated with it, they improve the position towards desired investment activities and minimize the costs of being dependent on external funds (Faulkender & Wang, 2006, p. 1957; Gill & Shah, 2012, p. 70; García-Teruel & Martínez-Solano, 2008, p. 129). These latter benefits of cash holdings are especially emphasized in financially constrained firms, i.e. firms which are facing difficulties in obtaining external financing. Denis and Sibilkov (2010, p. 260) show that constrained firms place higher value on cash holdings for two reasons: (i) because cash holdings enable constrained firms to increase investment; and (ii) because the marginal profitability of an investment project is higher for constrained firms compared to unconstrained ones.

The costs associated with holding cash include lower rate of return, possible tax disadvantages and agency costs of free cash flow. The most obvious cost of holding cash arises from the fact that cash generates lower return compared to other investments of the same risk (Dittmar, Mahrt-Smith & Servaes, 2003, p. 115). Consequently, by holding on to it, the firm forgoes more productive investments and thus incurs opportunity cost of not investing it in some other income earning assets (Whalen, 1966, p. 316-317; García-Teruel & Martínez-Solano, 2008, p. 129). Another view of the opportunity costs of cash provided by Almeida et al. (2004, p. 1778) is that greater cash holdings necessitate reductions in existing, profitable investment projects.

Tax disadvantages might occur as a result of the higher corporate tax rate compared to the personal tax rate levied on interest income. Taking that into account, investors are in a more prosperous position if they hold on to the excess cash instead of the firm (Faulkender & Wang, 2006, p. 1961). In a different view provided by Foley, Hartzell, Titman and Twite (2007, p. 604), U.S. multinationals face tax costs associated with repatriating foreign income, which is why they choose to leave the cash abroad and accumulate foreign cash holdings in their foreign affiliates.

Holding higher levels of cash in the firm can be a trigger for agency costs of managerial discretion due to conflict of interest between shareholders and managers. Namely, managers have the incentive to accumulate cash and channel it for purposes that might be damaging or disadvantageous to the interests of shareholders. This is emphasized especially in cases when the firm generates large free cash flows, defined as “cash flow in excess of that required to fund all projects that have positive net present values when discounted at the relevant cost of capital” (Jensen, 1986, p. 323). In the presence of free cash flows in firms where ownership and control are represented by two distinct bodies, managers might be inclined to hold higher levels of cash because of several possible reasons: (i) to reduce firm risk; (ii) to pursue their own personal

objectives and interests; (iii) to avoid making pay-outs to shareholders and instead keep the cash in the firm. The situation is different in small and medium sized firms, where management and control generally coincide, thus conflicts among them are non-existent or seldom (García-Teruel & Martínez-Solano, 2008, p. 130; Garrod, Kosi & Valentinčič, 2008, p. 3; Kosi & Valentinčič, 2013, p.12 ; Szczesny & Valentinčič, 2013, p. 286).

1.2.3 Empirical studies on determinants of cash holdings

As previously mentioned, the majority of studies of cash holdings deals with the question of determining their factors in the setting of large publicly traded firms. Only a few studies deal with the problem of determinants of cash holdings in private firms and even fewer have focused on small and medium sized businesses. The first to fill that void is Faulkender (2002, pp. 1-40), who studied the cash policies of small businesses and found that costs of financial distress and information asymmetries play a significant role in determining the cash positions of U.S. small firms. Higher cash balances are found at firms which expect to encounter difficulties in obtaining external funds in the future, at firms which conduct more research and at higher leveraged firms, providing evidence for the precautionary motive. The last result is contrary to the finding of Opler et al. for large public firms (1999, pp. 24-29), suggesting important differences in the relative costs and benefits of cash balances for these two groups of firms. Furthermore, Faulkender (2002, p. 40) re-asserts the economies of scale in holding cash by observing that cash holdings decrease with firm size, a factor previously established for large public firms.

In a subsequent study conducted on a sample of Spanish small and medium sized firms, García-Teruel and Martínez-Solano (2008, pp. 127-149) show that these firms maintain a target level of cash, which is higher for firms with better growth prospects and higher cash flows. In contrast, this target level is lower in times of higher interest rates, increased bank debt and higher liquidity. Interestingly, SMEs demonstrate a higher speed of adjustment towards their optimal cash levels compared to large firms. The reason might lie in that SMEs are subject to greater information asymmetries and agency problems related to debt compared to larger firms, thus the costs of being further away from the optimal cash levels are higher for them as well.

Similar results are reported and developed further by Pastor and Gama (2013, pp. 104-112) by adding the relationship with banks and debt structure as significant factors which influence the cash holdings of Portuguese SMEs. The negative impact of bank relationship on the amount of cash held suggests that maintaining close contact with the banks helps lessen the information asymmetry problems regarding the use of financial debt, which are more emphasized in SMEs. Furthermore, long term debt is associated with lower cash holdings, giving support to the transaction motive.

Orens and Reheul (2013, p. 549) report that CEO demographics play an important role in structuring the liquidity policy in Belgian SMEs. Their findings suggest that CEOs who are longer tenured, older and experienced only in one industry, place more emphasis on the precautionary motive and are less concerned with the opportunity cost of cash, so they prefer higher cash holdings compared to shorter tenured, younger and diversely experienced CEOs.

Bigelli and Sánchez-Vidal (2012, pp. 26-35) study the factors that determine the cash holdings of Italian private firms, which mainly coincide with the ones of public firms. Similarly to Opler et al. (1999, p. 12), they show that significantly larger cash positions are found at smaller and riskier firms, while less cash is held by firms with more net working capital, viewed as its substitute. In the same vein, lower cash levels are found at firms with a higher proportion of bank debt, as also reported by Ferreira and Vilela for large public EMU firms (2004, p. 22). In addition, Bigelli and Sánchez-Vidal (2012, p. 32) note that firms facing longer cash conversion cycles, lower financing deficits and lower effective tax rates hold significantly higher levels of cash.

Gao, Harford and Li (2013, p. 630) conduct a large sample comparison of cash policies between public and private U.S. firms to find that private firms hold approximately half as much cash compared to public firms, owing to the greater agency problems present at the latter group of firms. In contrast, Hall, Mateus and Bezhentseva Mateus (2014, p. 114) find the opposite situation when they compare public and private firms in Central and Eastern Europe. They find that privately held firms maintain higher levels of cash, most probably due to the precautionary motive. As private firms have limited access to capital markets, they hold on to higher cash levels as a buffer against future financial distress.

1.2.4 Research questions

The motives and implications for holding cash are the starting point in devising the research questions of this study. The hypothesis development also rests on a number of previously established explanations for the level of cash held in firms. The following paragraphs elaborate on the firm characteristics which have already been recognised as determinants of cash holdings, and are further complemented by introducing certain novel explanatory variables.

Firm size has been determined as a significant factor that affects the cash level in a considerable amount of research. As there are transaction costs related to raising funds from external sources, which are fixed no matter the amount borrowed, it is assumed that there are economies of scale in raising funds (Faulkender, 2002, p. 5). Therefore, it is relatively costlier for smaller firms to obtain funds from external sources, which can be a cause for retaining more cash on their

accounts. In the case of small and medium sized firms several other factors related to their size need to be considered, as indicated by García-Teruel and Martínez-Solano (2008, p. 130). Namely, SMEs are subject to more serious information asymmetries, face more financial constraints and are more susceptible to financial distress, all of which leads to relatively higher fixed costs for smaller firms. Therefore, an inverse relationship between size and cash holdings is expected, considering both the transactions and precautionary motive.

Another firm characteristic influencing the amount of cash holdings is the cash flow generated by the firm. There are two opposing explanations regarding the effect of the cash flow magnitude on cash levels. According to the financing hierarchy model presented by Myers and Majluf (1984, pp. 293–315), firms with high cash flows will hold more cash, because they prefer to fund profitable investment projects with internally-generated funds rather than raising external capital, due to information asymmetries. This is contrary to Kim, Mauer and Sherman (1998, p. 348), who see a negative relation between cash flow and cash holdings in the sense that cash flow presents a ready source of liquidity. Therefore, if the transaction motive prevails, we hypothesize that higher cash flows lead to lower cash levels. On the other hand, if the precautionary or speculative motive are the main cash decision drivers, we hypothesize a positive relation between these two variables.

The speculative motive brings about the question on how growth opportunities influence the level of cash retained on the firm's accounts. If a firm foresees profitable investment projects, then it will do its best not only to avoid cash shortages, but also to have enough resources to fund those projects when the moment to invest comes. This is even more emphasized for small firms as their access to external financing is more limited and can be also assigned to the precautionary motive. Therefore, it is expected that stronger growth opportunities result in higher cash holdings, as has been shown in various empirical studies (Opler et al., 1999, p. 44; Ferreira & Vilela, 2004, p. 19; Ozkan & Ozkan, 2004, p. 2106).

Leverage can be considered as an indicator of a firm's ability to generate external funds, but it can also be seen as a cash substitute. A significant negative effect on the cash holding on UK SMEs is documented by Belghitar and Khan (2013, p. 65). Since debt can serve as an alternate source of liquidity for firms with access to borrowing capacities, an inverse relation between leverage and cash holdings is assumed, giving rise to the transactions motive.

A different channel through which debt is expected to manifest its influence on the level of cash is its maturity structure. Namely, when a firm uses short-term financing, it is obligated to periodically renegotiate and renew its credit terms, thus facing refinancing risk (Ferreira & Vilela, 2004, p. 8). Consequently, if the majority of debt in a firm is constituted of short-term borrowing facilities, it is expected that such firm will hold on to higher cash levels in order to

secure a buffer against financial distress in case the loan is not prolonged (García-Teruel & Martínez-Solano, 2008, p. 131). Therefore, considering the precautionary motive, we expect that shorter debt maturities will result in higher cash holdings and vice versa, longer maturities will result in lower cash levels.

Petersen and Rajan (1994, p. 34) report that maintaining a close relationship with financial institutions brings benefits to the borrower as it increases the availability of credit. They also find a small evidence that building relationships with lenders reduces the price of credit. This might come as a result of mitigating the informational opacity and agency costs of debt by disclosing internal information, which is accumulated by lenders when relationships last longer. On the other hand, Nakajima and Sasaki (2016, p. 165) argue that bank-dependent firms accumulate cash to foster better relationships with banks. Considering the transaction motive, it is assumed that stronger firm-bank relationships lead to lower cash levels, because they offer a certain financial buffer to the firm.

Net working capital can be considered as a cash substitute, in terms of bank lines of credit or certain non-cash liquid assets which can be readily converted to cash. In the case of small and medium sized firms, this mostly applies to selling accounts receivable to a third party. As with all variables representing cash substitutes, a negative relation between net working capital and cash is expected, considering the transactions motive (Bigelli & Sánchez-Vidal, 2012, p. 29).

Another factor that can affect the liquidity of the firm is the cash conversion cycle. This measure expresses the number of days it takes for a firm to convert the resources invested in inputs into cash. The longer the cash conversion cycle, the longer the liquid assets are tied up in operations. Taking into account the precautionary motive, we would expect that firms with longer cash conversion cycles, that is, with a weaker ability to generate cash from ongoing operations, will exhibit higher cash balances. Bigelli and Sánchez-Vidal (2012, p. 34) show supporting evidence among Italian SMEs.

One of the novel determinants to be tested in this empirical analysis is the requirement for compulsory retirement benefit contributions. According to the Slovenian pension system, employers are obliged to pay certain prescribed amounts as mandatory benefit contributions to the Institute of Pension and Invalidity Insurance of Slovenia (Pension and Disability Insurance Act, 2012, Official Gazette of the RS, no. 96/2012 and subsequent amendments – ZPIZ-2; Social Security Contributions Act, 1996, Official Gazette of the RS, no. 5/1996 and subsequent amendments). The literature provides evidence that legally prescribed retirement contributions have negative impact on firm liquidity, especially in the case of financially constrained firms, a characteristic common for small private firms (Phan & Hedge, 2013, p. 407; Rauh, 2006, p. 68). Based on the above, the requirement for mandatory pension insurance is expected to

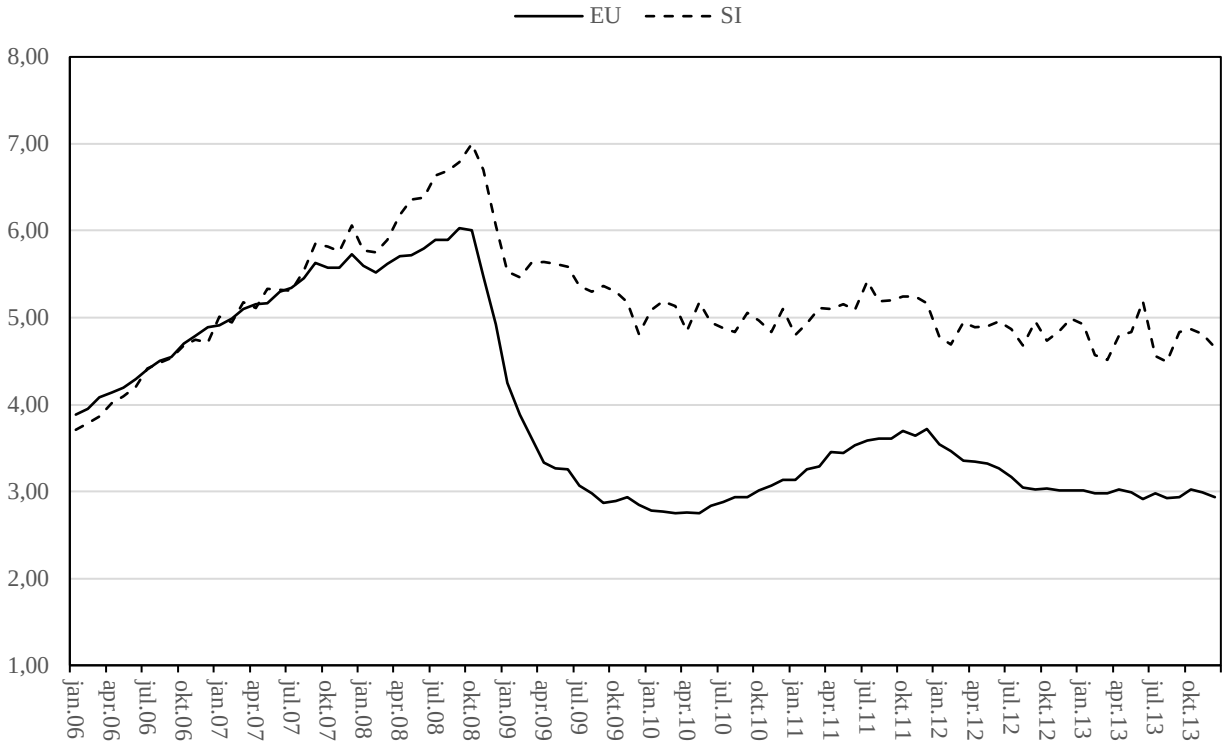
demonstrate a negative impact on cash balances. On the other hand, the literature suggests that financially constrained firms pose positive cash flow sensitivities of cash due to the precautionary motive (Almeida et al., 2004, p. 1778). Therefore, we expect a positive relation between these obligations and cash levels.

The next determinant we introduce is the exports volume. It has been shown that more liquid firms are more likely to export (Greenaway, Guariglia & Kneller, 2007, p. 387). Looking at this relationship from the opposite side, the question is whether a reciprocal effect of export activities on firm's liquidity exists. If the firm is capable of generating cash from ongoing operations, then the need for precautionary cash accumulation is lower and we can assume a negative relation between sales generated abroad and cash holdings.

We test the relationship between cash levels and profitability, which has been seldomly used in previous studies on determinants of cash holdings (e.g. Faulkender & Wang, 2006, p. 28; Kling et al., 2014, p. 124). There could be two channels through which a causal connection might be expected. The first causal relation is expected because profitability is considered a proxy for the operating performance of a firm. In that case it can be assumed that more profitable (more operationally-efficient) firms are more capable of internally generating cash. Therefore, it might be expected that higher profitability is associated with lower cash levels, as the precautionary demand is lower. The second channel relates to cash being the least profitable liquid asset associated with opportunity costs, which might negatively influence firm's profitability, so the firm will opt for lower levels.

We investigate the impact of interest rates on the amount of cash maintained in a firm. The sample was constructed to stretch throughout the years before and during the recent financial crisis, in order to study the influence of the recent low-interest rate environment. Figure 1 shows the movement of the composite cost-of-borrowing indicator, which combines Monetary financial institutions' (MFIs) interest rates on all loans to corporations (European Central Bank, 2013) in the Euro zone and Slovenia in the period preceding and during the economic downturn. It is evident that after the peak reached just before the outburst of the financial crisis, the low general level of interest rates persists throughout our sample period.

Figure 1.1. Composite Cost of Borrowing Indicator in Eurozone and Slovenia, 2006-2013



Source: European Central Bank Statistical Data Warehouse.

In such an environment, when funds from external sources are more affordable and cash deposits bring even lower earnings, it might be expected that firms will reduce their cash holdings. On the other hand, the overall economic uncertainty accompanied by the reluctance of banks to grant loans might have a prevailing impact and drive firms to hold higher levels of cash as a precaution. Campello, Graham and Harvey (2010, p. 481) report that financially constrained firms in the U.S., Europe, and Asia were forced to reduce their cash holdings by sizeable amounts during the crisis, while the unconstrained firms' cash levels remained unaffected. Song and Lee (2012, p. 639) identify a systematic change in the cash holding policies of East Asian firms, caused by the crisis of 1997-1998. They determine that the cause for the long-term increase in the demand for cash is a result of the precautionary motive in that these firms become more conservative in investing and more sensitive to cash flow risk. Sun and Wang (2015, p. 185) find evidence of corporate precautionary savings during the financial crisis. They report a decrease in cash holdings among constrained and unconstrained firms in the first year of the crisis when the sources of external finance are tightened and an increase in holdings afterwards when the precautionary demand prevails. Therefore, it is unclear whether an opposite or correlated relationship between interest rates and cash holdings is to expect.

1.3 Method

1.3.1 Sample and variables' definition

This study uses financial data on Slovenian small and medium sized firms for the years 2006-2013 from the Agency of the Republic of Slovenia for Public Legal Records and Related Services (AJPES). AJPES maintains a central database, which publishes financial information on all business entities based on the territory of the Republic of Slovenia, derived from their annual reports and other corporate data, according to Article 11 of the Companies Act (Official Gazette of the RS, 65/2009, and subsequent amendments) and Article 71 of the Payment Transactions Act (Official Gazette of the RS, 110/2006, and subsequent amendments).

The period between the years 2006 and 2013 was primarily chosen to gauge the effects of the financial crisis on the cash policies of Slovenian SMEs. Even though data was available for the years before 2006, it was excluded from the analysis in order to achieve consistency and comparability among the financial statements across the years. Slovenia revised its accounting standards effective from January 1st 2006[1].

SMEs are as defined by the EU recommendation 2003/361. More specifically, an SME is a firm that meets the following main criteria: a) has less than 250 employees; b) realizes an annual turnover of less than or equal to €50 million; and c) its balance sheet assets are less than or equal to €43 million. The initial sample is the set of all Slovenian SMEs provided by AJPES.

Prior to analysing the data, the initial sample was refined by applying several criteria. First, financial firms were excluded. Then, firm-year observations with missing values or errors in the accounting data were eliminated. We also exclude firms with negative equity. To minimize the effect of outliers, 1% of the extreme values of the variables for cash, cash flow magnitude, leverage, liquidity, cash conversion cycle, profitability and growth were dropped. This left an unbalanced panel of 27,573 unique firms with an average of 6.2 years per firm, leading to an aggregate sample of 170,220 firm-year observations. The sample is made up of 24% wholesale and retail trade firms, 22% firms involved in professional, scientific and technical activities, 17% manufacturing firms, 11% transporting firms and the rest are dispersed. The sample formation is shown in Table 1.1.

[1] See Valentinčič, Novak & Kosi (2017) for a detailed overview of historic development of accounting standards in Slovenia, including an empirical investigation of properties of accounting constructs.

Table 1.1. Sample formation

	Firm-year observations	SMEs
Initial sample of non-financial SMEs 2007-2012	244,552	30,569
- Observations with missing data	41,214	
- Observations with negative equity	21,821	
- Observations with outliers	11,297	
Final sample of non-financial SMEs 2007-2012	170,220	27,573

Source: Own work.

The dependent variable (*CASH*) expressing the level of cash holdings is measured as the ratio of cash to total assets minus cash, as in Opler et al. (1999, p. 15). Following their logic, we use the natural logarithm of the book value of assets as a proxy for firm size (*SIZE*). The ability of the firm to generate cash or the cash flow magnitude (*CF*) is presented by the ratio of pre-tax profit plus depreciation to sales. The variable for growth (*GROW*) is approximated by the ratio of sales generated in the current year to sales from previous year. The variable for leverage (*LEV*) is calculated as total debt over equity following García-Teruel and Martínez-Solano (2008, p. 134). Debt maturity structure (*DEBTM*) is defined as long-term debt over total debt. The financial statements available for this research, provide information on short- and long-term debt maintained with banks, as two separate lines within the liabilities' side of the balance sheet. Therefore, we use the ratio of total bank debt to total debt (*BANKR*) to approximate the relationship with financial institutions.

Following Bigelli and Sánchez-Vidal (2012, p. 31), the variable for liquidity (*LIQ*) is calculated as net working capital less cash divided by net assets. The cash conversion cycle (*CCC*) is the sum of average inventory conversion period and receivables collection period less the average payment period for accounts payable.

The financial data available for this research provides information on annual pension insurance costs, however these include payments for both mandatory and voluntary pension insurance, while we want to test the effect of the mandatory part of the costs, as suggested by Phan and Hedge (2013, p. 377). The pension and disability insurance system in the Republic of Slovenia is a three-tier system. The first pillar is a compulsory pension and disability insurance scheme based on intergenerational solidarity and is therefore a pay-as-you-go system. The scheme is identical and obligatory for all employed persons and those generating income from other gainful activity, while inactive persons can join the system voluntarily. The contributions are divided among the insured (at a rate of 15.5 percent of the base) and his employer (at a rate of 8.85 percent from the base), whereby the base is the salary including bonuses and work-related

reimbursement of expenses. The second pillar is an occupational pensions scheme which is mandatory for certain sectors and voluntary for others. The third pillar is a voluntary personal savings scheme (ZPIZ-2). Nevertheless, the total expenses for pension insurance are very indicative of the amounts paid as mandatory, thus we use the ratio of total pension insurance costs to sales to approximate the variable for compulsory retirement benefits (*RET*). To test the robustness of the results, an alternative variable is used and that is the number of employees, considering that the impact of compulsory pension insurance on cash holdings might be effectuated through the number of people working in a firm. The variable for the number of employees (*EMP*) is derived from the average number of employees based on hours worked in the accounting period.

To capture the relationship between export activities and cash levels and in order to test the robustness of the regression results, two alternative variables are used: one variable expressing the magnitude of exports volume, calculated as revenues generated abroad over total sales (*EXPO*); and the other alternative is a dummy variable set to one for the firm-year observations where exports occur and zero otherwise (*EXPOD*). Profitability is expressed as the profit margin (*PROFM*).

Interest revenues earned on bank deposits are not separately shown in the non-operating revenue section of the income statement, while interest expense on bank loans is a separate line. Therefore, we use the interest expense to bank debt ratio as an estimate of the interest rate a firm is paying on its outstanding debt (*INT*) as is existing literature (e.g. Karjalainen, 2011, p. 95).

The model for investigating the relation between cash holdings and the explanatory variables is specified as follows:

$$CASH = \alpha + \beta_1 SIZE_i + \beta_2 CF_i + \beta_3 GROW_i + \beta_4 LEV_i + \beta_5 DEBTM_i + \beta_6 BANKR_i + \beta_7 LIQ_i + \beta_8 CCC_i + \beta_9 RET_i + \beta_{10} EXPO_i + \beta_{11} PROF_i + \beta_{12} INT_i + \varepsilon \quad (1)$$

where i represents the firm, α is a constant, β_i (i = 1,...,12) are the regression coefficients, ε represents the error term.

1.4 Results

1.4.1 Summary statistics

Table 1.2 illustrates some of the main characteristics of the firms in the sample. It reveals a quite dispersed ratio of cash to assets. While on average Slovenian SMEs hold 18% of cash relative to non-cash assets, the median firm holds approximately 5% in cash. This is much higher than

the average 6% and 5% found in their Spanish and Portuguese counterparties, respectively (García-Teruel & Martínez-Solano, 2008, p. 135; Pastor & Gama, 2013, pp. 107). The sample is indeed made up of small entities considering that the mean and median firms have an asset base of approximately €160,000 and they employ an average of about 8 people. The firms are highly leveraged, with total debt 2.43 times their equity. Bank debt represents 16% of their total debt, which is mostly short term considering that long term debt represents only 18% of their total external financing. Table 1.2 also shows that the firms in the sample are not very export oriented, with their exports volume making up only 10% of total revenues. Finally, Slovenian SMEs show weak operating efficiency and performance, turning only 1.3% of revenues into profit.

Table 2.2. Descriptive statistics of variables for the 2006-2013 sample (pooled)

	N	Mean	25th Percentile	Median	75th Percentile	Std. Deviation
$CASH_D$	170,220	0.18057	0.00808	0.04710	0.17774	0.35799
SIZE	170,220	11.99834	10.73242	11.92710	13.19018	1.78890
CF	170,220	0.07058	0.01945	0.05628	0.11801	0.13380
GROW	170,220	1.14484	0.85901	1.01639	1.21035	0.68810
LEV	170,220	2.43270	0.38669	1.17112	2.97614	5.93718
DEBTM	170,220	0.18203	0.00000	0.00000	0.32840	0.26146
BANKR	170,220	0.15819	0.00000	0.00000	0.27285	0.23841
LIQ	170,220	0.03462	-0.13637	0.06577	0.29248	0.45341
CCC	170,220	-47.31781	-79.01311	-4.84592	54.43796	301.51055
RET	170,220	0.01709	0.00388	0.01219	0.02407	0.01988
EMP	170,220	7.66648	1.00000	2.20000	6.20000	18.16697
EXPO	170,220	0.10069	0.00000	0.00000	0.03250	0.23776
PROFM	170,220	0.01266	0.00178	0.01557	0.05139	0.12284
INT	170,220	0.11319	0.00000	0.00000	0.04080	7.16420

Note. ***CASH*** is the ratio of cash to total assets minus cash. ***SIZE*** is the natural logarithm of total assets. ***CF*** is the ratio of pre-tax profit plus depreciation to sales. ***GROW*** is the ratio of sales in the current year to sales from previous year. ***LEV*** is total debt over equity. ***DEBTM*** is the ratio of long-term debt over total debt. ***BANKR*** is the ratio of total bank debt to total debt. ***LIQ*** is net working capital less cash divided by net assets. ***CCC*** is the sum of average inventory conversion period and receivables collection period less the average payment period for accounts payable. ***RET*** is the ratio of total pension insurance costs to sales. ***EMP*** is the average number of employees based on hours worked. ***EXPO*** is the ratio of revenues generated abroad to total sales. ***PROFM*** is net income over sales. ***INT*** is the interest expense to debt ratio.
$_D$ Denotes dependent variable.

Source: Own work.

Table 1.3 reports bivariate Pearson's correlation coefficients of the variables. Overall, the correlations between the variable *CASH* and the explanatory variables show the expected

relation directions, except for the variables for cash conversion cycle, employees and profitability margin. Furthermore, the correlation between *CASH* and *EXPO* is not statistically significant. The majority of bivariate correlations are not particularly high, except for the case of *CF* and *PROFM*, with a correlation coefficient of 0.78.

Table 1.3. Correlation matrix

	$CASH_D$	*SIZE*	*CF*	*GROW*	*LEV*	*DEBTM*	*BANKR*	*LIQ*	*CCC*	*RET*	*EMP*	*EXPO*	*PROF*	*INT*
$CASH_D$	1													
SIZE	-0.240**	1												
CF	0.010**	0.140**	1											
GROW	0.036**	-0.061**	0.071**	1										
LEV	-0.083**	0.143**	0.013**	0.052**	1									
DEBTM	-0.209**	0.325**	0.177**	-0.021**	0.130**	1								
BANKR	-0.240**	0.384**	0.078**	-0.048**	0.118**	0.463**	1							
LIQ	-0.160**	0.090**	0.099**	-0.054**	-0.051**	0.036**	-0.015**	1						
CCC	-0.040**	0.074**	-0.092**	-0.037**	-0.024**	0.028**	0.081**	0.316**	1					
RET	0.026**	-0.121**	-0.158**	-0.087**	-0.061**	-0.043**	-0.037**	-0.031**	-0.184**	1				
EMP	-0.103**	0.501**	-0.010**	-0.027**	0.031**	0.080**	0.187**	0.025**	0.047**	0.052**	1			
EXPO	-0.003	0.212**	-0.003	0.033**	0.031**	0.022**	0.045**	0.027**	0.047**	-0.060**	0.195**	1		
PROFM	0.078**	0.118**	0.780**	0.128**	0.020**	0.008**	0.026**	0.192**	0.007**	-0.155**	0.026**	0.030**	1	
INT	-0.007**	0.007**	0.004	-0.002	0.007**	0.006*	-0.006*	0.000	-0.001	-0.005	-0.001	-0.002	0.002	1

Note. ***CASH*** is the ratio of cash to total assets minus cash. ***SIZE*** is the natural logarithm of total assets. ***CF*** is the ratio of pre-tax profit plus depreciation to sales. ***GROW*** is the ratio of sales in the current year to sales from previous year. ***DEBTM*** is the ratio of long-term debt over total debt. ***LEV*** is total debt over equity. ***BANKR*** is the ratio of total bank debt to total debt. ***LIQ*** is net working capital less cash divided by net assets. ***CCC*** is the sum of average inventory conversion period and receivables collection period less the average payment period for accounts payable. ***RET*** is the ratio of total pension insurance costs to sales. ***EMP*** is the average number of employees based on hours worked. ***EXPO*** is the ratio of revenues generated abroad to total sales. ***PROFM*** is net income over sales. ***INT*** is the interest expense to debt ratio.

$_D$ Denotes dependent variable. * Denotes significant at 5%. ** Denotes significant at 1%. (2-tailed).

Source: Own work.

1.4.2 Univariate analysis

Size should be an important factor that influences different aspects of the firm, such as its profitability, riskiness, access to external financing and the like, all of which are expected to have a certain level of impact on the level of cash. Therefore, a univariate analysis was performed, assuming independent samples in t-testing, to establish whether significant differences exist between smaller and larger SMEs. The sample was ranked in size-deciles according to the variable *SIZE*. Table 1.4 reports the results for the characteristics of the 1st and 10th decile firms, from which it can be determined that they are significantly different.

Table 1.4. Characteristics of smaller versus larger SMEs

	N	1st decile firms		N	10th decile firms		Mean difference	t-value
		Mean	Median		Mean	Median		
$CASH_D$	17,022	0.33941	0.13930	17,022	0.06425	0.01220	0.27516	66.898***
SIZE	17,022	9.01316	9.20019	17,022	15.25310	15.09172	-6.23994	-39.372***
CF	17,022	0.03025	0.03217	17,022	0.09148	0.06860	-0.06123	19.309***
GROW	17,022	1.25795	1.02969	17,022	1.09911	1.02964	0.15884	-39.262***
LEV	17,022	0.90324	0.41552	17,022	3.40767	1.63745	-2.50443	-108.303***
DEBTM	17,022	0.04009	0.00000	17,022	0.30076	0.25256	-0.26067	-128.245***
BANKR	17,022	0.02868	0.00000	17,022	0.32693	0.29828	-0.29825	-24.758***
LIQ	17,022	-0.07101	0.08815	17,022	0.08190	0.06151	-0.15291	-22.462***
CCC	17,022	-78.10286	-22.58997	17,022	-1.26703	26.64490	-76.83583	32.217***
RET	17,022	0.02039	0.01096	17,022	0.01275	0.00954	0.00765	-116.534***
EMP	17,022	0.93912	1.00000	17,022	37.28030	22.46500	-36.34118	-64.642***
EXPO	17,022	0.04509	0.00000	17,022	0.22438	0.04359	-0.17929	-34.674***
PROFM	17,022	-0.02157	0.00744	17,022	0.02820	0.02109	-0.04977	-3.818***
INT	17,022	0.02116	0.00000	17,022	0.09058	0.03867	-0.06942	66.898***

Note. ***CASH*** is the ratio of cash to total assets minus cash. ***SIZE*** is the natural logarithm of total assets. ***CF*** is the ratio of pre-tax profit plus depreciation to sales. ***GROW*** is the ratio of sales in the current year to sales from previous year. ***LEV*** is total debt over equity. ***DEBTM*** is the ratio of long-term debt over total debt. ***BANKR*** is the ratio of total bank debt to total debt. ***LIQ*** is net working capital less cash divided by net assets. ***CCC*** is the sum of average inventory conversion period and receivables collection period less the average payment period for accounts payable. ***RET*** is the ratio of total pension insurance costs to sales. ***EMP*** is the average number of employees based on hours worked. ***EXPO*** is the ratio of revenues generated abroad to total sales. ***PROFM*** is net income over sales. ***INT*** is the interest expense to debt ratio.
$_D$ Denotes dependent variable. ***Denotes significant at 1%.

Source: Own work.

Comparing the 1st and 10th decile firms in terms of size, we can see that there is a significant difference. As could be expected, smaller firms have significantly higher cash holdings. Also, they pose lower level of overall leverage and bank debt, which confirms that their

higher riskiness limits the access to external sources. Furthermore, smaller firms are less liquid, seen from the negative net working capital and cash conversion cycle, which indicates that they do not pay their suppliers until they receive payments from their customers. Even though smaller firms show higher growth, they are less profitable and generate lower cash flows.

Since most of the variables do not follow a normal distribution (*CASH, SIZE, LEV, DEBTM, BANKR, RET, EMP, EXPO, INT*) we perform an additional means difference test, the Mann Whitney U Test. This test is suitable for comparison of means of two independent samples when the assumption of a normally distributed population is not satisfied (Black, 2016, p. 678). The results presented in Table 1.5 slightly differ from the previous test in that the two groups of SMEs are not statistically significantly different from each other according to growth and liquidity. The Mann Whitney U value of zero for the variable *SIZE* confirms that all the values for *SIZE* in one sample (the 10th decile sample) are higher compared to all the values in the other sample (1st decile).

Table 1.5. Mann-Whitney U test for smaller versus larger SMEs

Variable		N	Mean Rank	Z
$CASH_D$	1st decile	17,022	21,675.40	-87.357***
	10th decile	17,022	12,369.60	
SIZE	1st decile	17,022	8,511.50	-159.788***
	10th decile	17,022	25,533.50	
CF	1st decile	17,022	14,513.59	-47.103***
	10th decile	17,022	19,531.41	
GROW	1st decile	17,022	17,119.58	-1.823
	10th decile	17,022	16,925.42	
LEV	1st decile	17,022	13,072.53	-74.158***
	10th decile	17,022	20,972.47	
DEBTM	1st decile	17,022	10,967.72	-124.150***
	10th decile	17,022	23,077.28	
BANKR	1st decile	17,022	10,999.28	-124.748***
	10th decile	17,022	23,045.72	
LIQ	1st decile	17,022	17,014.66	-0.147
	10th decile	17,022	17,030.34	
CCC	1st decile	17,022	14,509.42	-47.181***
	10th decile	17,022	19,535.58	
RET	1st decile	17,022	16,802.70	-4.157***
	10th decile	17,022	17,242.30	
EMP	1st decile	17,022	9,073.42	-149.992***
	10th decile	17,022	24,971.58	
EXPO	1st decile	17,022	11,836.10	-108.436***
	10th decile	17,022	22,208.90	
PROFM	1st decile	17,022	14,953.64	-38.841***
	10th decile	17,022	19,091.36	
INT	1st decile	17,022	11,372.11	-121.263***
	10th decile	17,022	22,672.89	

Note. ***CASH*** is the ratio of cash to total assets minus cash. ***SIZE*** is the natural logarithm of total assets. ***CF*** is the ratio of pre-tax profit plus depreciation to sales. ***GROW*** is the ratio of sales in the current year to sales from previous year. ***LEV*** is total debt over equity. ***DEBTM*** is the ratio of long-term debt over total debt. ***BANKR*** is the ratio of total bank debt to total debt. ***LIQ*** is net working capital less cash divided by net assets. ***CCC*** is the sum of average inventory conversion period and receivables collection period less the average payment period for accounts payable. ***RET*** is the ratio of total pension insurance costs to sales. ***EMP*** is the average number of employees based on hours worked. ***EXPO*** is the ratio of revenues generated abroad to total sales. ***PROFM*** is net income over sales. ***INT*** is the interest expense to debt ratio.

$_D$ Denotes dependent variable. ***Denotes significant at 1%.

Source: Own work.

1.4.3 Regression results

Considering the nature of the data set (unbalanced panel data) we applied the Fama-MacBeth method (Fama & MacBeth, 1973, pp. 607-634) to empirically estimate the model presented above. The Fama-MacBeth regression approach removes the problem of correlated residuals across time, an issue that might be present in panel data sets. If residuals are correlated then the standard errors of the coefficient estimates can be biased, which in turn clouds the usefulness of the regression model. The Fama-MacBeth procedure consists of two steps. In the first step, a cross-sectional regression is run for each time period. Then, in the second step, the estimates for the parameters are obtained by averaging the coefficients of each cross-sectional regression. Time-series standard errors of the average coefficients are used to draw inferences. More specifically, the standard errors are calculated as the time-series standard deviation of the regression coefficients divided by the square root of the number of years (Fama & French, 2002, p. 19).

Table 1.6 shows the results of the Fama-MacBeth regressions using alternative proxies for some of the variables explained above to evaluate the robustness of the regression results. The t-statistics are shown in brackets. Columns 1 and 2 show the results using the proxy for the mandatory retirement benefits expressed as the ratio of pension insurance costs to sales (*RET*) combined with the two alternatives for the export variable, exports as their ratio to sales (*EXPO*) and the dummy variable for the firm-year observations where exports occur (*EXPOD*). Columns 3 and 4 present the results using the variable for the mandatory retirement benefits approximated by the number of employees (*EMP*) with the same combination of the export variables. The results obtained with all four regression models are consistent. All variables are significant at the 1% level, except for the variable expressing the level of interest rates (*INT*) and the growth variable (*GROW*) which are statistically insignificant.

Table 1.6. Determinants of Cash Holdings in SMEs

	Predicted sign	1	2	3	4
(Constant)		0.69633***	0.69159***	0.72654***	0.72735***
		(30.415)	(27.991)	(28.739)	(27.039)
SIZE	-	-0.03788***	-0.03746***	-0.04038***	-0.04050***
		(-17.083)	(-15.084)	(-16.205)	(-14.742)
CF	+/-	-0.20623***	-0.20702***	-0.20535***	-0.20482***
		(-16.379)	(-17.304)	(-17.098)	(-17.788)
GROW	+	-0.00381	-0.00284	-0.00418	-0.00323
		(-1.571)	(-1.241)	(-1.691)	(-1.389)
LEV	-	-0.00259***	-0.00258***	-0.00255***	-0.00253***
		(-18.117)	(-17.837)	(-18.499)	(-18.021)
DEBTM	-	-0.08031***	-0.08079***	-0.07779***	-0.07769***
		(-24.584)	(-23.282)	(-22.264)	(-20.997)
BANKR	-	-0.21686***	-0.21825***	-0.21693***	-0.21837***
		(-31.357)	(-31.042)	(-31.778)	(-31.361)
LIQ	-	-0.15605***	-0.15616***	-0.15533***	-0.15538***
		(-8.756)	(-8.789)	(-8.654)	(-8.673)
CCC	+	0.00004***	0.00004***	0.00004***	0.00004***
		(6.209)	(6.310)	(5.524)	(5.643)
RET	+	0.18927***	0.18945***	-	-
		(3.901)	(4.051)	-	-
EMP	+		-	0.00038***	0.00047***
			-	(7.416)	(10.160)
EXPO	-	0.06645***	-	0.06387***	-
		(16.254)	-	(15.149)	-
EXPOD	-	-	0.01494***	-	0.01438***
		-	(5.580)	-	(5.224)
PROFM	-	0.61167***	0.61243***	0.60985***	0.61015***
		(16.736)	(17.345)	(16.530)	(17.051)
INT	+/-	-0.00119	-0.00120	-0.00119	-0.00120
		(-2.167)	(-2.171)	(-2.167)	(-2.170)
R^2		0.145	0.143	0.145	0.143
N		170,220	170,220	170,220	170,220

Note. ***CASH*** is the ratio of cash to total assets minus cash and is the dependent variable. ***SIZE*** is the natural logarithm of total assets. ***CF*** is the ratio of pre-tax profit plus depreciation to sales. ***GROW*** is the ratio of sales in the current year to sales from previous year. ***DEBTM*** is the ratio of long-term debt over total debt. ***LEV*** is total debt over equity. ***BANKR*** is the ratio of total bank debt to total debt. ***LIQ*** is net working capital less cash divided by net assets. ***CCC*** is the sum of average inventory conversion period and receivables collection period less the average payment period for accounts payable. ***RET*** is the ratio of total pension insurance costs to sales. ***EMP*** is the average number of employees based on hours worked. ***EXPO*** is the ratio of revenues generated abroad to total sales. ***EXPOD*** is the dummy variable set to one for firm-year observations where exports occur and zero otherwise. ***PROFM*** is net income over sales. ***INT*** is the interest expense to debt ratio. T-statistics are in parentheses.

* Denotes significant at 10%. ** Denotes significant at 5%. *** Denotes significant at 1%.

Source: Own work.

Furthermore, not only that the coefficients are statistically significant, but in most cases, they are also economically significant. Exceptions are the variables *GROW* and *INT*, because their statistical and economic insignificance does not allow drawing any conclusions about the relation between growth or interest rates and cash holdings. It seems that growth opportunities and interest rates do not play a significant role in deciding on the level of cash to be held in Slovenian SMEs. To gauge the economic importance of the influence of the explanatory variables on the dependent variable, the principle of Kim et al. (1998, p. 352) is followed. Namely, the economic impact is seen as the percentage change over the mean value of the dependent variable as a result of a one standard deviation change in the explanatory variable, all else equal.

In general, the signs of the estimated coefficients are in favour of the expectations outlined above and support our hypothesis that the main motives in the cash policies of Slovenian SMEs are the transactions and precautionary. The notable exceptions from our expectations are the coefficients of the variables representing exporting activities and profitability, which provide support for the speculative motive. With regards to the effect of exporting activities, the coefficients for these variables suggest that exporting firms are more liquid and that higher sales generated abroad lead to higher cash holdings. Viewed through the logic of precautionary demand, if the firm is capable of internally generating cash, then the need for precautionary balances is lower and should lead to lower cash holdings, which is contrary to our results. The fact that exporting firms maintain more cash might be explained by the speculative motive. Namely, the presence on foreign markets might open more growth or investments possibilities. In order to be able to take advantage of positive investments, which are currently uncertain, the firms decide to maintain higher cash levels. The same implication is provided by the positive sign of the coefficient for profitability. Namely, the results show that more profitable firms are more capable of internally generating funds, which are maintained on their accounts. More profitable or more operationally efficient firms, have higher probability to reap the benefits of positive investment opportunities, so they hold on to their funds in order to be able to take on profitable projects, once they arise. The variable *PROFM* is also the one with the most important economic significance, as an increase of one standard deviation leads to an average 41.5% increase in cash.

The estimated regression coefficient on size implies that firm size does matter in the decision on the level of cash holdings. The coefficient for *SIZE* is negative and statistically significant. A similar result is also found by Bigelli and Sánchez-Vidal for Italian SMEs (2012, p. 32) and Pastor and Gama (2013, p. 109) for Portuguese SMEs. The size of the coefficient suggests a substantial economic impact, as an increase of one standard deviation of *SIZE* produces a decrease in the cash held by between -37.1% and -40.1%. This finding indicates that there are economies of scale in raising funds from external sources. Given that small firms suffer from severe exposure to informational asymmetries (Berger & Udell, 1998, p. 614), they face more severe borrowing constraints and higher costs of external financing (Kim et al., 1998, p. 347), and are more susceptible to financial distress (Titman

& Wessels, 1988, p. 14), such characteristics can induce higher fixed costs of holding cash. These relatively higher costs prompt smaller firms to retain more cash on their accounts due to transactions and precautionary reasons.

The negative sign of the *CFLOW* coefficients supports the idea that cash flow represents a ready source of liquidity, a finding contrary to the situation in Spanish (García-Teruel & Martínez-Solano, 2008, p. 145) and Portuguese SMEs (Pastor & Gama, 2013, p. 109), where firms prefer internally generated funds when information asymmetries exist. In our case, the ability to internally generate funds lowers the need for precautionary balances so the cash holdings are used for current transactions.

All variables related to debt provide support for their expected influence on cash holdings. The negative sign of the variable *LEV* implies that operating and financial debt can be an alternative source of liquidity, albeit one with a relatively small economic impact, as the increase of one standard deviation decreases the level of cash by an average -8.4%. Given that leverage can be seen as a cash substitute and as a proxy for the firm's ability to generate external finance (Belghitar & Khan, 2013, p. 65), we might conclude that these external resources are used for satisfying the transactions demand for liquid assets as well. The negative sign of *DEBTM* is in line with the hypothesis that when long-term debt prevails in the debt structure of a firm, the need for securing financial buffer is less emphasized, so firms tend to hold lower amounts of cash, a finding consistent with García-Teruel and Martínez-Solano (2008, p. 131) and Pastor and Gama (2013, p. 109). Looking at the other side of the coin, short-term debt financing means higher risk, such that the firm that uses short-term finance has to renegotiate and renew its credit lines, which is uncertain and incurs costs. Therefore, a firm chooses to hold on to more cash holdings in order to secure a certain buffer due to precautionary reasons. Our findings are consistent with Kling et al. (2014, p. 130), who observe a significant decline of short-term bank finance among UK listed firms, followed by an accumulation of cash. They explain this relationship by banks denying access to short term finance, inducing firms to hold cash as an alternative funding source. Finally, the coefficient of the variable *BANKR* provides evidence that information asymmetries are reduced by maintaining close relationship with banks. It thus increases the ability of generating external funds and reduces the precautionary demand for cash. As was expected, firms with higher ratio of bank debt to total debt hold lower levels of cash, which is also the case with Portuguese and Spanish SMEs. Furthermore, the economic importance of this variable is rather high, as an increase in *BANKR* of one standard deviation brings about a reduction in cash holdings of an average -28.7%, all else equal.

Liquidity is one of the determinants with the highest economic significance resulting in a 39% decrease in the level of cash for an increase of one standard deviation in the variable *LIQ*. This provides strong support that other liquid assets may be used as a substitute for cash, consistent with the findings of García-Teruel and Martínez-Solano (2008, p. 145), Bigelli and Sánchez-Vidal (2012, p. 32) and Pastor and Gama (2013, p. 109). By having

cash substitutes at disposal, the firm reduces its precautionary demand for cash and maintains lower levels.

The results obtained for the cash conversion cycle are very indicative of the precautionary behaviour of the SMEs in our sample, as we find that firms with longer cash conversion periods maintain higher cash holdings. From the positive effect of the length of the cash conversion cycle on cash levels, we might conclude that firms with weaker ability to generate cash from ongoing operations decide to keep higher cash balances, in order to hedge against uncertainty when cash turnover is low. Such results were also obtained for Italian SMEs (Bigelli & Sánchez-Vidal, 2012, p. 32). The economic impact of this variable is relatively small, resulting in an average 7.2% decrease in cash levels for a one standard deviation increase in *CCC*.

Turning to the proxies for compulsory retirement benefit contributions (*RET* and *EMP*), we find a positive influence on cash holdings, providing further support for the precautionary motive. Contrary to the previous findings that legally required retirement contributions negatively influence the liquidity of a firm, the results of this research suggest that Slovenian SMEs hold higher cash levels associated with higher pension costs. We can say that the firms in our sample act prudently and cautiously, in that they accumulate cash to be able to meet future known obligations. Nevertheless, the economic impact of this effect is rather small. An increase of one standard deviation of the variables *RET* or *EMP* results in an increase in cash balances by 2.1% and 4.7% respectively.

Finally, limited evidence is found to support the theoretical expectation for the effect of the recently changed interest rate climate on the cash amounts held by firms. The coefficient's sign is negative, suggesting that in the period of falling interest rates, i.e. more affordable external financing and lower earnings on deposits, firms are inclined to increase their cash holdings, presumably due to precautionary reasons. This is partially in line with the finding of Sun and Wang (2015, p. 185) who observe an increase in cash holdings, but only after the first year of the crisis, when cash holdings start to follow precautionary firm behaviour. The relation between interest rates and cash holdings is, however, not statistically significant (even if it were, its economic impact would be small).

1.5 Robustness and additional tests

In order to evaluate the robustness of our results, we conduct some additional analyses. For the sake of brevity, the tabulated regression results of many of these analyses are not presented, but are available from the authors upon request.

We first turn to the interest rate environment and its relation to cash holdings. As outlined above, one of the objectives of this study is to analyse the impact of the changes in interest rates on the level of cash held. The effect is observed based on the average cross-sectional

coefficients that span the period before, during and after the global financial crisis, which can average out their effect. Therefore, we conduct a subsample analysis by splitting the sample into different time periods: (i) pre-crisis period between the years 2006 and 2008; (ii) crisis period between the years 2009 and 2012; and (iii) after crisis period in the year 2013. We perform pooled cross-section regression analyses for each period with the same variable combinations as the original model.

Almost all regression coefficients have the same sign as the original regression model, with the exception of the coefficient for the variable *GROW*, which has a positive sign in three of the four regression models in the period before the crisis. Nevertheless, this variable is not statistically significant in this period, whereas it becomes significant at $p = 0.05$ in the 2009-2012 period. The most noteworthy difference is the fact that the interest rate variable is not statistically significant in the periods before and after the crisis, while in the crisis period it approaches significance with an even smaller economic impact than in the original model (an increase of one standard deviation of *INT* causes a decrease in cash holdings of only -1.24% on average). The number of employees does not seem to have any effect on the SME cash levels before the crisis, as this variable is statistically insignificant in the period 2006-2008. This is also the case for the third regression model in 2013, whereas it becomes significant at $p = 0.05$ level in the fourth model in 2013. Finally, the export dummy variable is not statistically significant in the 2013 regression models.

Next, we analyse the difference in cash management policies between zero bank debt firms and indebted firms in order to assess the robustness of the conclusions based on leverage related items. For that purpose, we define two subsamples based on the ratio of bank debt to total debt (variable *BANKR*), for which we present some descriptive statistics, we test for the mean difference and perform separate pooled cross-section regression analyses. As we can see from Table 1.7 these two groups of firms mostly differ with regard to the amount of cash they bear and the number of employees they have. The results show that firms with zero bank debt keep 28% of their assets in cash and employ 4 people on average, while indebted firms keep on average only 5% of their assets in cash and have around 12 employees. According to the *t*-test for comparison of the means between these two samples, the two groups of SMEs are statistically significantly different.

Table 1.7. Descriptive statistics of SMEs with zero and positive bank debt

	Zero bank debt SMEs			Positive bank debt SMEs			Mean difference	t value
	Mean	Median	Std. Deviation	Mean	Median	Std. Deviation		
CASH$_D$	0.28249	0.11342	0.44260	0.05665	0.01459	0.13349	-0.22584	-147.973***
SIZE	11.28473	11.17303	1.62291	12.86594	12.80840	1.58645	1.58121	202.517***
CF	0.06548	0.05178	0.14495	0.07678	0.06067	0.11854	0.01130	17.699***
GROW	1.17635	1.01601	0.77031	1.10653	1.01683	0.57013	-0.06982	-21.461***
LEV	1.64323	0.67048	5.47078	3.39251	1.90638	6.32775	1.74928	60.296***
DEBTM	0.09416	0.00000	0.21999	0.28885	0.23474	0.26803	0.19469	161.498***
BANKR	0.00000	0.00000	0.00000	0.35051	0.31198	0.24193	0.35051	401.555***
LIQ	0.04852	0.11747	0.54151	0.01772	0.02886	0.31384	-0.03080	-14.648***
CCC	-67.01304	-13.31384	324.66207	-23.37291	4.81291	268.77488	43.64013	30.340***
RET	0.01835	0.01269	0.02247	0.01555	0.01181	0.01604	-0.00280	-29.925***
EMP	4.19438	1.50000	11.74231	11.88776	4.39000	23.04748	7.69338	83.988***
EXPO	0.08876	0.00000	0.23393	0.11519	0.00000	0.24154	0.02643	22.783***
PROFM	0.01060	0.01617	0.13697	0.01517	0.01502	0.10304	0.00457	7.851***
INT	0.00603	0.00000	1.38635	0.24348	0.04615	10.55269	0.23744	6.193***
N	93,398			76,822				

Note. Zero bank debt firms are defined as firms with ratio of bank debt to total debt equal to zero. Positive bank debt firms are SMEs with ratio of bank debt to total debt higher than zero. ***CASH*** is the ratio of cash to total assets minus cash. ***SIZE*** is the natural logarithm of total assets. ***CF*** is the ratio of pre-tax profit plus depreciation to sales. ***GROW*** is the ratio of sales in the current year to sales from previous year. ***LEV*** is total debt over equity. ***DEBTM*** is the ratio of long-term debt over total debt. ***BANKR*** is the ratio of total bank debt to total debt. ***LIQ*** is net working capital less cash divided by net assets. ***CCC*** is the sum of average inventory conversion period and receivables collection period less the average payment period for accounts payable. ***RET*** is the ratio of total pension insurance costs to sales. ***EMP*** is the average number of employees based on hours worked. ***EXPO*** is the ratio of revenues generated abroad to total sales. ***EXPOD*** is the dummy variable set to one for firm-year observations where exports occur and zero otherwise. ***PROFM*** is net income over sales. ***INT*** is the interest expense to debt ratio.

$_D$ Denotes dependent variable. *** Denotes significant at 1%

Source: Own work.

As in the previous univariate analysis, also here we perform the Mann Whitney U Test, due to the non-normality in the distribution of the variables *CASH*, *LEV*, *DEBTM*, *BANKR*, *RET*, *EMP*, *EXPO*, *INT*. The results of this non-parametric test presented in Table 1.8 show that the group of SMEs with zero bank debt is statistically significantly different from the group of SMEs with positive bank debt with regard to all variables considered.

Table 1.8. Mann-Whitney U test for SMEs with zero and positive bank debt

		N	Mean Rank	Z
CASH$_D$	0 bank debt	93,398	105,669.64	-190.352***
	+ bank debt	76,822	60,115.28	
SIZE	0 bank debt	93,398	65,088.29	-185.363***
	+ bank debt	76,822	109,452.94	
CF	0 bank debt	93,398	82,270.24	-26.295***
	+ bank debt	76,822	88,563.60	
GROW	0 bank debt	93,398	85,440.88	-3.059***
	+ bank debt	76,822	84,708.84	
LEV	0 bank debt	93,398	70,401.31	-136.175***
	+ bank debt	76,822	102,993.51	
DEBTM	0 bank debt	93,398	64,518.03	-205.247***
	+ bank debt	76,822	110,146.24	
BANKR	0 bank debt	93,398	46,699.50	-389.190***
	+ bank debt	76,822	131,809.50	
LIQ	0 bank debt	93,398	90,440.99	-49.349***
	+ bank debt	76,822	78,629.84	
CCC	0 bank debt	93,398	80,611.03	-41.655***
	+ bank debt	76,822	90,580.82	
RET	0 bank debt	93,398	85,558.96	-4.164***
	+ bank debt	76,822	84,565.28	
EMP	0 bank debt	93,398	68,128.09	-157.744***
	+ bank debt	76,822	105,757.23	
EXPO	0 bank debt	93,398	78,901.62	-66.688***
	+ bank debt	76,822	92,659.08	
PROFM	0 bank debt	93,398	85,384.93	-2.541**
	+ bank debt	76,822	84,776.86	
INT	0 bank debt	93,398	55,271.46	-324.174***
	+ bank debt	76,822	121,387.95	

Note. ***CASH*** is the ratio of cash to total assets minus cash. ***SIZE*** is the natural logarithm of total assets. ***CF*** is the ratio of pre-tax profit plus depreciation to sales. ***GROW*** is the ratio of sales in the current year to sales from previous year. ***LEV*** is total debt over equity. ***DEBTM*** is the ratio of long-term debt over total debt. ***BANKR*** is the ratio of total bank debt to total debt. ***LIQ*** is net working capital less cash divided by net assets. ***CCC*** is the sum of average inventory conversion period and receivables collection period less the average payment period for accounts payable. ***RET*** is the ratio of total pension insurance costs to sales. ***EMP*** is the average number of employees based on hours worked. ***EXPO*** is the ratio of revenues generated abroad to total sales. ***PROFM*** is net income over sales. ***INT*** is the interest expense to debt ratio.

$_D$ Denotes dependent variable. ***Denotes significant at 1%. ** Denotes significant at 5%.

Source: Own work.

Most of the coefficients from the subsample regression analyses have the same sign as in the initial model, except for the negative sign of the variable EMP in zero debt SMEs; and the positive sign of *GROW* and negative sign of *EXPOD* in indebted SMEs. What is interesting is that the variable *GROW* is statistically significant in both subsample analyses, however with a rather small economic impact and with an opposite effect between the subsamples. Namely, it has a negative impact on cash holdings in zero debt SMEs, which is contrary to our expectations that future profitable investment opportunities urge firms to keep cash on their accounts to be able to fund them. Therefore, neither the precautionary nor the speculative motive are particularly strong in these firms. The situation is opposite with SMEs that carry bank debt on their balance sheets, which show signs of precaution and possibly speculation by maintaining more cash on their accounts associated with sales growth. We also find that the variable *INT* is not statistically significant in any of the regression models. Therefore, we cannot make any inferences about the effect of the interest rate climate on cash holdings for neither of the groups od SMEs. Furthermore, mandatory retirement benefit contributions do not seem to influence the level of cash in leveraged SMEs, as both *RET* and *EMP* variables are not statistically significant for this group of firms. On the other hand, the variable *RET* has a positive impact on cash holdings in SMEs with zero debt, while higher number of employees is associated with lower cash holdings in these firms. This suggests that the number of employees might not be a good approximation of the requirements for mandatory retirement benefits. The positive impact of *RET* on cash holdings points to the precautionary motive, while the negative impact of *EMP* points to the transactions motive. Liquidity and profitability are again the determinants with the highest economic significance. Namely, an increase of one standard deviation in the variable *LIQ* or *PROFM*, results in a decrease in the level of cash by 35% and an increase of 36% for zero bank debt SMEs respectively, and in a decrease of 46% and an increase of 47% in the level of cash in leveraged SMEs respectively.

Next, we control for micro firms and for that purpose we divide the sample in two subsamples, one consisting of firms with zero or one employee, and the other one consisting of firms with more than 1 employee. The results are similar with the initial model, with just minor exceptions. The variables approximating mandatory retirement benefit contributions are statistically insignificant in three out of the four regression models for the micro firms. A possible explanation for this might be the fact that these are indeed micro firms and hence have very low expenditures related to mandatory benefit contributions. In the other group of firms only the variable *EMP* is not statistically significant, which is another sign that it might not be a good approximation for mandatory retirement benefit contributions. We also separately analyse exporting and non-exporting firms, however we obtain similar results as the Fama-MacBeth regressions, with just one exception and that is the negative sign of the variable for number of employees in non-exporting firms.

Finally, we control for industries and perform pooled cross-section regression analysis using dummy variables at the two-digit industry classification code level. The Slovenian

classification of economic activities is adjusted to the EU statistical classification of economic activities, abbreviated as NACE. These regressions lead to the same results as the Fama-MacBeth regressions, so we can conclude that industry does not play an important role in the cash management policies of Slovenian SMEs.

1.6 Conclusion

The purpose of this study was to examine the determinants of cash holdings in small and medium sized firms. In order to do so, a large sample of Slovenian firms was used. The panel data consisted of 170,220 firm-year observations corresponding to 27,573 firms in the period between 2006 and 2013. Slovenia is a particularly interesting choice of country to examine the characteristics of SMEs, since they constitute the majority of all non-financial business entities and provide significant economic value.

We observe that the cash policies of Slovenian SMEs are generally driven by the transactions and precautionary motive, however we also find evidence for the speculative motive. Our results show that smaller firms opt for higher cash holdings out of precaution and due to transaction needs, as there are economies of scale in raising funds from external sources. The precautionary demand for cash prevails at firms with longer cash conversion cycles and higher retirement benefit obligations, where we record higher cash balances. Firms that are facing poor cash turnover and higher expenditures, tend to hold on to higher cash balances in order to secure funds for unexpected needs. In addition, when short-term debt dominates the debt structure of a firm, it faces uncertainty arising from the ability to prolong the loans. Consequently, such firms need more financial buffer and therefore maintain higher cash balances.

On the other hand, firms that have cash substitutes at disposal, such as other liquid assets and debt, do tend to use them as such and thus keep lower cash balances on their accounts. Lower cash amounts are found at firms with higher cash flows as well. Keeping close relationship with banks reduces agency costs and information asymmetries among lenders and borrowers, which results in lower costs of external financing and better access to it. These firms, which are more capable of generating either internal or external funds, pose lower need for precautionary balances and use up their cash for transaction purposes. Little empirical support is found for the direct negative influence of the interest rate level on cash holdings, suggesting that the overall economic uncertainty accompanied with tightening credit conditions, might induce firms to increase their cash holdings, due to precautionary reasons.

The finding that exporting and more profitable firms hold more cash than others provides support for the speculative motive. These firms have a higher probability of taking advantage of positive growth or investment projects, so they decide to hold on to their funds in order to be able to seize profitable opportunities when they arise.

This chapter contributes to the existing literature on cash holdings decisions on several grounds. First, it expands the scarce literature on determinants of cash holdings in small and medium sized firms, a sector of great importance for the economy in general. Second, it focuses on a large sample of Slovenian SMEs, a country where no such research has been conducted so far. Third, it brings new evidence on the factors that influence the levels of cash by investigating so far untested determinants and by validating previous results. Lastly, it is the first study that analyses the effect of the low interest rate environment on cash holdings of SMEs.

Even though this study makes a contribution towards better understanding of cash policies of SMEs, we acknowledge some limitations which we hope will serve as a prompt for future research. The empirical investigation is based on a large sample of Slovenian SMEs. Therefore, the study could only be generalized to firms similar to those included in our research. In order to be able to apply the findings of our research to SMEs in other countries, a comparison of their characteristics and cash policies needs to be conducted. Another possible direction for further research is that our empirical results show that SMEs hold large proportion of assets as cash. It would be interesting to examine the evolution of cash holdings in SMEs through time and the reasons thereof. Furthermore, it would be valuable to study the effect of cash holdings on SME performance, taking into account that SMEs are more financially constrained and have limited access to external finance.

2 ARE FINANCIAL RATIOS USEFUL TO DETERMINE THE LIQUIDITY OF SMES?

2.1 Introduction

Small and medium sized enterprises (SMEs) play a key role in the economy of many countries around the world, constituting almost the whole population of business entities and providing a large share of employment and value added. According to the Annual Report on European SMEs 2017/2018 (European Commission, 2018) there were 24.5 million SMEs in the non-financial business sector of the 28 EU member states in 2017, accounting for 99.8% of all enterprises, providing 66.4% of total employment and 56.8% of value added (or 95 million people and €4.2 trillion value added in absolute numbers). The importance of SMEs is especially emphasized in the Slovenian economy, where they provided 73.4% of all jobs and 65.1% of the total value added in the local non-financial sector in 2017 (European Commission, 2017).

SMEs are often viewed as an engine of economic growth. Nevertheless, there are limits to their growth as there are limits to their access to external finance (Beck, Demirgüç-Kunt & Maksimovic, 2005, p. 171). SMEs rely on bank loans as their crucial and most widely spread source of external financing (OECD, 2015), followed by trade credit for the ones which are unable to reach the traditional credit institutions (Petersen & Rajan, 1997, p. 662). However, SMEs are perceived by lenders as more risky customers compared to their large public counterparts, mostly due to the informational opacity they bear (Haines, Orser & Riding, 1999, p. 292). Namely, these firms are not required to publish financial information with the same quality and quantity as public firms do, they usually do not have audited financial statements, they do not issue securities that are traded and priced on public markets and they do not conclude contracts that are publicly accessible or reported in the press (Berger & Udell, 1998, p. 616; Coleman, 2000, p. 40). Consequently, small firms have difficulties with communicating their financial quality and prospects to lenders and are faced with more serious agency costs of debt (Pettit & Singer, 1985, p. 55). From the lender's perspective, this means that sometimes a credit is denied to a firm which is creditworthy, but unable to show it (Coleman, 2000, p. 40).

In the complex process of credit evaluation and decisioning, lenders, investors, and vendors rely on the information conveyed in financial statements to build various models where financial ratios are scaled and combined differently to achieve some kind of failure prediction score. Most of these models aim at predicting bankruptcy probability of large quoted firms, because data on non-quoted firms (such as SMEs) and other indications of financial distress is usually unavailable. However, dividing all business entities in two broad groups of bankrupt and non-bankrupt firms, fails to recognize other symptoms of financial distress (Baixauli & Módica-Milo, 2010, p. 61). Other stages of financial weakness of a firm

can be also detrimental to a creditor. For example, short-term liquidity shortages can result in late payments, when the lender misses out potential income earned by not being able to immediately reinvest the amounts owed. The lender will face even more severe financial consequences if the borrower cannot repay the (full) principal. Every time a bank grants a loan or a supplier extends a trade credit, they risk that the borrowing firm will not return the due amount on time or in full. That is why assessing short term liquidity is of essential importance to creditors, as each cash shortage causes opportunity costs arising from late payments on one side, while on the other, each missed opportunity to grant a credit to a firm which is capable of full repayment, means losing potential interest earned or even losing the customer (Mramor & Valentinčič, 2003, p. 745).

This chapter focuses on the role that financial and economic factors, derived from balance sheets and income statements in the form of financial ratios, can play in forecasting the short-term liquidity of small and medium sized enterprises. With that we try to fill an important void in the current literature, which centres around bankruptcy prediction in large publicly listed firms. Even though bankruptcy is the worst stage of financial incapability, short-term liquidity problems can have significant negative financial implications for both the firm itself and its creditors. More specifically, we focus on the predictive power of financial ratios in forecasting short-term cash shortages. We define cash shortage as the occurrence of a transaction account blocks. Namely, in the case of Slovenia, the bank may block a transaction account of a firm when there are insufficient funds to settle a particular obligation of the account holder, in accordance with the Enforcement and Securing of Civil Claims Act (Official Gazette of the RS, no. 3/07, and subsequent amendments) and the Tax Procedure Act (Official Gazette of RS, no. 13/2011 and subsequent amendments). Since the information about transaction account blocks is publicly available at any time, the Slovenian payment system enables a real-time insight into the liquidity situation of firms. Even though these insufficient cash balances are often only temporary, they can be a signal of financial trouble, they can indicate long-term insolvency or even bankruptcy, but in any case, they definitely lead to late payments to creditors (Mramor & Valentinčič, 2003, p. 747).

We use a large sample of 60,602 unique small and medium sized firms encompassing a period of 6 years, from 2007 to 2012. We perform clustered standard errors logit analysis to develop three models: the first model is based on financial ratios only, while the second and third models are based on a combination of financial ratios and information on transaction account blocks experienced one and two years prior to the prediction period, respectively.

The results of our empirical analysis imply that firms that will not incur cash shortages in the short future can be identified with high accuracy. Namely, all three models produce very high percentages of correctly classified firms, ranging from 87.9% to 89%. However, it is quite difficult to predict SMEs that will experience liquidity problems. The results of our models, which predict that 60% to 99.5% of SMEs will not incur cash shortages, while in reality they will, do not provide high certainty in prediction. Information on previously

experienced account blocks does add to the predictive power of models based on financial ratios, however the errors in classification remain rather high. This is unfortunate, because these types of errors are more expensive to creditors.

In addition to focusing on predicting short-term liquidity shortages as opposed to the prevailing bankruptcy prediction, we enrich the current literature on several other grounds. First and foremost, the poor performance of the models in predicting incidence of transaction account blocks provides caution to external users of financial statements, to limit their reliance on the data presented in balance sheets and income statements, as it seems irrelevant in recognizing poor performing firms. On the other hand, these models provide a solid basis for identifying firms which are financially stable and therefore creditworthy. Second, we focus on small and medium sized firms, a sector that has been largely neglected in the field of failure prediction, but with a great importance for the economy in general. Finally, no previous study has investigated cash shortages of Slovenian SMEs. Given the importance of SMEs for the economy of Slovenia as outlined above, the results of our research could be of particular interest in this country.

The remainder of this chapter is structured as follows. Section 2.2 provides theoretical foundations. Section 2.3 develops the empirical hypothesis, describes the data set and the methodology. Section 2.4 presents the main empirical results and section 2.5 reports additional robustness tests. Section 2.6 concludes.

2.2 Literature review

In this section, we review some of the most important works about failure prediction in small and medium sized enterprises.

Starting from the late 60's the topic of business failure prediction has grown into a research area of great interest and applicability. The vast majority of literature on default prediction focuses on predicting bankruptcy of large publicly traded firms. Many authors have dealt with devising various corporate business failure prediction models based on different methods: Beaver (1966, pp. 71–111) was the pioneer who developed a univariate discriminant analysis model based on financial ratios, Altman (1968, pp. 589–609) introduced the multiple discriminant analysis and devised the so-called Z-score model, Ohlson (1980, pp. 109–131) was the first to apply the logit analysis to the problematics of failure prediction, whereas Zmijewski (1984, pp. 59–86) was the first to apply the probit analysis.

Amidst the extensive literature on failure prediction, there is a relatively small body of research that is concerned with default prediction of small and medium sized enterprises and even a smaller one dedicated to short-term liquidity prediction. The interest on credit risk modelling for SMEs started increasing only after the Basel II Accord, which requires setting

up rating systems in banks and prescribes a formula for calculating the minimum bank capital requirement based on the probability of default.

Altman and Sabato (2005, pp. 15-42) investigate the effects of the Basel II Accord on bank capital requirements for small and medium sized enterprises and for that purpose they devise three different models (based on logistic regression, corporate scorecard credit rating and Altman Z-score) to calculate the probability of default for firms in Italy, Australia and US. In all three models, they use financial ratios as input variables grouped in three groups: leverage, profitability and liquidity. Among the variables with the most predictive power are the following: debt to equity, bank debt to total assets reduced by bank debt, long term liabilities to total assets, economic value added to total assets, cash to total assets, tangible to total assets, accounts payable to total assets, long term bank debt to total bank debt, working capital to total assets, retained earnings to total assets, EBIT to total assets, book value of equity to book value of total liabilities.

In a subsequent study, Altman and Sabato (2007, pp. 332-357) use logit regression to develop a one-year default prediction model for a panel data of some 2,000 US SMEs over the period 1994-2002. They develop a credit risk model specific for SMEs based on combined use of five financial ratios, each of them related to leverage, liquidity, profitability, coverage and activity. More specifically, the variables used are: EBITDA to total assets, short-term debt to equity book value, retained earnings to total assets, cash to total assets and EBITDA to interest expenses.

In a study conducted on a sample of 1,238 Dutch SMEs, Rikkers and Thibeault (2009, pp. 229-264) use a structural form model for default prediction and find that the model produces promising results in distinguishing between defaulted and non-defaulted firms. Furthermore, the structural form model can be used either on a standalone basis or in combination with other variables as an input in a credit risk model. The significant variables detected in their model are net income to total assets, total liabilities to total assets and natural logarithm of total assets.

Behr and Güttler (2007, pp. 194-213) estimate a scoring model applying binary logistic regression analysis to a sample of 40,254 German SMEs in the period 1992-2002. The results implicate that variables expressing equity ratio and equity ratio growth, external equity financing, return on sales and return on sales growth, depreciation, temporary liquidity problems, industry and ownership structure represent valid inputs for calculating the probability of default.

In a more advanced approach, Ciampi and Gordini (2013, pp. 23-45) apply artificial neural networks to a sample of some 7,000 Italian small enterprises (with less than €1.8 million annual turnover). The prediction model is based on a set of economic-financial ratios, which were chosen through multicollinearity analysis and stepwise method: cash flow to total debt,

total debt to total debt plus equity, acid test ratio, interest charges to turnover, current ratio, equity to long-term material assets, return on investments, net financial position to turnover, long-term assets to number of employees and interest charges to bank loans. They show that the artificial neural networks model provides better accuracy rates in default prediction compared to multivariate discriminant analysis and logit regression.

Mselmi, Lahiani and Hamza (2017, pp. 67-80) examine the ability of financial ratios to signal financial distress in a sample of 212 French SMEs in the period 2010-2013. Using stepwise regression, they select the financial variables that do the best job in distinguishing between distressed and non-distressed firms one and two years prior to failure. They determine six most adequate financial ratios for detecting failure one year ahead and those are: liquidity ratio, net profit to current assets, net profit to total debt, solvency ratio, debt to equity ratio and long-term liabilities to total assets. For the two-year period failure prediction, they select ten ratios and those are: financial charges to turnover, repayment capacity, profit margin, net profit margin, net profit to fixed assets, (natural logarithm of) total assets, equity to fixed assets, current liabilities to total liabilities in addition to two already selected variables for the one-year period prediction: net profit to current assets and long-term liabilities to total assets. Comparing different models, they show that the predictive ability improves for the two-year period and that the hybrid model combining support vector machine with partial least squares brings best accuracy results, followed by support vector machine, logit model, partial least squares and artificial neural networks.

There is a limited source of literature on predicting financial distress in the context of Slovenia. Mramor and Valentinčič (2003, pp. 745-771) focus on Slovenian very small private firms in the period 1996-1998. They use a publicly available liquidity indicator alone and in combination with a set of financial ratios to predict possible cash shortages for a sample of 19,627 firms. The wide selection of financial ratios consists of financing ratios (equity to fixed assets, retained earnings to total assets, etc.); liquidity ratios (current, quick and quick-quick ratio, working capital to total assets, etc.); turnover ratios (days sales outstanding, days payables, cash conversion cycle, etc.); profitability ratios (profit margin, times interest earned, return on assets); productivity ratios (total assets per worker and total sales per worker); internal cost-efficiency ratios (gross profit minus earnings before interest and taxes over total sales). The results indicate that both groups of indicators (liquidity indicator and financial ratios) do a good job at identifying firms that will not incur cash shortages. However, it is very hard to predict the ones that will incur cash shortages, especially in the case of financial ratios, which bring noise to the credit record data.

In their two papers devoted to predicting bankruptcy, Brezigar-Masten and Masten (2012, pp. 10153–10159; 2012, pp. 121–133) aim to bridge the two groups of methodological approaches used for this purpose: statistical methods and artificial intelligence methods. In the first paper, they apply semi-parametric binary-choice model to predict bankruptcy on the whole population of Slovenian firms in the period 1995-2001 and find that such model

produces better results in identifying healthy firms contrary to the logit model which does a better job at detecting bad risks. In the second paper, they apply classification and regression trees (CART) on the same sample as a method of selecting predictor variables. They construct a set of dummy variables which are inserted as predictor variables in a logit model. When compared to the standard logit model based on classic stepwise selection of financial ratios and the non-parametric CART, they find that the novel approach produces highest overall predicting accuracy. The financial ratios used in both analyses are classified in three groups: profitability, solvency and liquidity.

2.3 Research design

2.3.1 Hypotheses development

SMEs are more financially constrained compared to larger firms, as they are faced with more credit restrictions and a narrower pool of external financial resources. On the other hand, creditors face difficulties in assessing their financial condition as a result of the informational opacity common to SMEs. Only the managers of SMEs, who in most cases are also their owners, have complete overview of their day-to-day liquidity situation, while external stakeholders cannot know how many times a firm faced cash shortages and had to undertake expensive supplier financing or sell assets at a loss (Mramor & Valentinčič, 2003, p. 747).

In the absence of capital market data for SMEs, creditors rely on models built on combinations of financial ratios to predict the probability of a firm going bankrupt. The main disadvantage of these models is the narrow definition of failure as bankruptcy, whereby they divide all business entities in just two groups of bankrupt and non-bankrupt firms. The latter group can be very heterogeneous in the sense that it contains firms with various degrees of financial health, some of them experiencing different symptoms of financial distress (Baixauli & Módica-Milo, 2010, p. 61). Furthermore, bankruptcy is the last stage of insolvency of a firm, when it is usually too late for creditors to change their lending decisions or to undertake actions to salvage their investments (Mramor & Valentinčič, 2003, p. 747).

For that reason, it is of creditors' interest to consider other aspects of the financial strength of a firm when assessing its creditworthiness. One important component of the financial condition of a firm is its short-term liquidity position. A liquid firm is one that has sufficient funds to cover its financial liabilities on time and with minimum cost (Maness & Zietlow, 2005, p. 31). Insufficient liquidity, on the contrary, results in late payments to creditors, who face opportunity costs in the form of lost interest, as they are incapable of reinvesting the funds owed to them (Mramor & Valentinčič, 2003, p. 747). Furthermore, deteriorating liquidity leads to increased risk of bankruptcy (Cagle, Campbell, & Jones, 2013, p. 44). Given that short-term liquidity problems can be important indications of financial distress, the assessment of a firm's short-term liquidity is essential to creditors. These circumstances justify the attempt to develop a model for forecasting short-term liquidity shortages, which

might improve the ability to evaluate the repayment capacity of SMEs and thus mitigate the credit or default risk faced by creditors. Therefore, the primary objective of this chapter is to verify whether it is possible to devise a model that would be able to forecast the future liquidity position of SMEs expressed as a cash shortage or transaction account block.

Data on short-term liquidity is usually not available, which is not the case in Slovenia, where the information about transaction account blocks is publicly available as is the data on financial statements for all business entities. The most common and basic tools used by creditors to assess the financial situation of a firm are the financial ratios derived from financial statements. Thus, the purpose of our research is to determine whether the information conveyed in SME financial statements in the form of financial ratios can represent a reliable and solid basis for developing a liquidity shortage forecasting model, i.e. to determine whether financial ratios are helpful or noisy predictors of future liquidity. We devise the first hypothesis as follows:

H1: The level of financial ratio is a predictor of financial distress of a small or medium sized firm.

As stated previously, cash shortage is defined as a block imposed by the bank on the transaction account of a firm. According to the Enforcement and Securing of Civil Claims Act (Official Gazette of the RS, no. 3/07 and subsequent amendments) the creditor can initiate an enforcement procedure against the debtor in case of late or non-payment of obligations. When the court reaches a decision on enforcement against the funds of the debtor held at the bank, it orders the bank to block the debtor's account and money held on it in the amount of the obligations owed. When cash inflows enable settling the liabilities of the debtor, the bank unblocks the account. Even though the insufficient cash balances are often only temporary, they could be a sign of long-term insolvency and they definitely result in late payments, hence we consider them as a signal for financial distress. Information on past liquidity shortages is expected to add to the predictive power of models in forecasting liquidity problems. Hence, the second hypothesis that we try to verify is defined as follows:

H2: Firms with previously experienced account blocks are more likely to incur cash shortage in the short future.

2.3.2 Sample formation and descriptive statistics

This study uses financial data on Slovenian small and medium sized firms for the years 2006-2013 from the AJPES database. Agency of the Republic of Slovenia for Public Legal Records and Related Services (AJPES) is a central database that publishes accounting and financial information on all business entities based on the territory of the Republic of Slovenia, derived from their annual reports and other corporate data, according to Article 58 of the Companies Act (Official Gazette of the RS, 65/2009, and subsequent amendments)

and Article 71 of the Payment Transactions Act (Official Gazette of the RS, 110/2006, and subsequent amendments). Given the predominance and economic significance of private firms in the Slovenian (and European) economy, investigation of their financial behaviour is particularly interesting. SMEs are determined as defined by EU law: EU recommendation 2003/361. More specifically, SME is a firm that meets the following main criteria: a) has less than 250 employees; b) realizes an annual turnover of less than or equal to €50 million; and c) its balance sheet assets are worth less than or equal to €43 million.

The initial sample is the set of all Slovenian non-financial SMEs provided by AJPES. We apply several criteria to form an adequate sample. First, firm-year observations with missing values were eliminated. To minimize the effect of outliers, 1% of the extreme values of all variables, except for the variable for size, were dropped. Since we use information on account blocks in the period t+1, t and t-1 simultaneously in some of our models, we actually use financial ratios from the years 2007-2012 for the logit analysis to achieve consistency among the models. The final sample is an unbalanced panel consisting of 60,602 unique firms with an average of 3.9 years per firm, translating into 234,873 firm-year observations. Sample formation is presented in table 2.1.

Table 2.1. Sample formation

	Firm-year observations	SMEs
Initial sample of non-financial SMEs 2007-2012	319,729	74,445
- Observations with missing data	50,812	
- Observations with outliers	34,044	
Final sample of non-financial SMEs 2007-2012	234,873	60,602

Source: Own work.

To achieve simplicity in industry classification, we use the "high-level SNA/ISIC aggregation", which aggregates the International Standard Industrial Classification of all Economic Activities of the United Nations (ISIC) and the European Classification of Economic Activities (NACE) sections into 10 industry categories (Eurostat, 2008). The sample is made up of 36% of firms involved in wholesale and retail trade, transportation and storage, accommodation and food service activities, 24% of firms involved in professional, scientific, technical, administrative and support service activities, 15% of firms involved in manufacturing, mining and quarrying and other industrial activities, 11% of firms involved in construction and the rest are dispersed.

Table 2.2 shows the descriptive statistics of financial ratios for the overall sample of SMEs distinguishing between firms with and without account blocks. We compare those firms that experience an account block in the period t+1, t or t-1, with the group of firms that do not record an account block. We test the significance of financial ratios mean differences

between the two groups of firms with the *t*-test and we find that all are statistically significant at the p = 0.01 level. Furthermore, all of them are of the expected sign. For instance, in the profitability group of ratios, firms with account blocks show lower ratios in all cases. Similarly, firms with account blocks are relatively more indebted, have lower coverage levels and are less liquid. Finally, in the operational efficiency group of ratios, all ratios show better operating performance for the firms without account blocks.

Table 2.2. Descriptive statistics of financial ratios for SMEs with and without account blocks

Financial ratio	Account block	N	Average	Std. Deviation	Mean difference	t-value
P_ROA	Yes	43,052	-0.06810	0.30124	-0.07439	-48.342***
	No	191,821	0.00629	0.22353		
P_PM	Yes	43,052	-0.19352	0.75402	-0.15460	-40.814***
	No	191,821	-0.03893	0.46808		
P_ROS	Yes	43,052	-0.16178	0.72624	-0.13135	-35.778***
	No	191,821	-0.03043	0.48510		
P_EBITDATA	Yes	43,052	-0.01114	0.30050	-0.07579	-49.012***
	No	191,821	0.06466	0.23753		
LEV_TDEQ	Yes	43,052	3.21664	9.05719	0.67251	14.659***
	No	191,821	2.54413	6.18033		
LEV_EQR	Yes	43,052	0.08297	0.67955	-0.26935	-77.686***
	No	191,821	0.35233	0.49842		
LEV_FDEQ	Yes	43,052	1.18184	4.40005	0.18668	8.255***
	No	191,821	0.99516	3.43936		
LEV_STDEQ	Yes	43,052	2.39149	7.20838	0.45354	12.410***
	No	191,821	1.93795	4.97046		
COV_SR	Yes	43,052	0.07093	0.44316	-0.19014	-72.568***
	No	191,821	0.26107	0.66473		
COV_ NFDEBITDA	Yes	43,052	1.73567	14.53961	0.87962	11.559***
	No	191,821	0.85605	12.99937		
COV_CFD	Yes	43,052	0.09766	0.49985	-0.19194	-64.885***
	No	191,821	0.28960	0.75189		
COV_ACR	Yes	43,052	1.22338	3.97621	-1.21404	-52.381***
	No	191,821	2.43742	5.70960		
LIQ_QR	Yes	43,052	1.43374	3.30932	-0.76001	-41.204***
	No	191,821	2.19375	4.05772		

(Table continues)

Table 2.2. (Continued)

Financial ratio	Account block	N	Average	Std. Deviation	Mean difference	t-value
LIQ_CASHTA	Yes	43,052	0.04430	0.11362	-0.09540	-135.834***
	No	191,821	0.13970	0.19264		
LIQ_CASHR	Yes	43,052	0.11487	0.53015	-0.49003	-116.168***
	No	191,821	0.60490	1.47002		
LIQ_NWC	Yes	43,052	-0.08902	0.68580	-0.23092	-65.860***
	No	191,821	0.14190	0.51250		
OP_EQTURN	Yes	43,052	4.26073	10.44683	-1.07074	-19.329***
	No	191,821	5.33148	10.11860		
OP_TATURN	Yes	43,052	1.19085	1.22738	-0.40516	-60.376***
	No	191,821	1.59601	1.38772		
OP_OPR	Yes	43,052	1.19871	0.78089	0.14034	35.440***
	No	191,821	1.05837	0.53942		
OP_SIZE	Yes	43,052	11.64626	1.63945	-0.18131	-20.316***
	No	191,821	11.82757	1.81724		
Note. *** Denotes significant at 1%.						

Source: Own work.

In addition to the *t*-test we also perform the Mann Whitney U Test to analyse the difference in means between the two groups of firms. The Mann Whitney U Test is a non-parametric alternative to the *t*-test, which is used to compare the means of two independent populations when the assumption for normal distribution of the population is not satisfied (Black, 2016, p. 678). We employ this test since neither of the variables, except for *OP_SIZE*, follow a normal distribution. As can be seen from the data in Table 2.3, the Mann Whitney U Test confirms the findings from the *t*-test on all accounts.

Table 2.3. Mann-Whitney U test for SMEs with and without account blocks

Financial ratio	Block	N	Mean Rank	Z
P_ROA	Yes	43,052	96,158.93	-72.053***
	No	191,821	122,212.62	
P_PM	Yes	43,052	100,141.09	-58.569***
	No	191,821	121,318.87	
P_ROS	Yes	43,052	106,927.12	-35.589***
	No	191,821	119,795.82	
P_EBITDATA	Yes	43,052	98,126.15	-65.392***
	No	191,821	121,771.10	
LEV_TDEQ	Yes	43,052	123,396.43	-20.180***
	No	191,821	116,099.48	
LEV_EQR	Yes	43,052	84,966.64	-109.953***
	No	191,821	124,724.60	
LEV_FDEQ	Yes	43,052	115,594.78	-6.392***
	No	191,821	117,850.47	
LEV_STDEQ	Yes	43,052	123,380.57	-20.127***
	No	191,821	116,103.03	
COV_SR	Yes	43,052	89,105.06	-95.940***
	No	191,821	123,795.78	
COV_NFDEBITDA	Yes	43,052	125,094.58	-25.931***
	No	191,821	115,718.34	
COV_CFD	Yes	43,052	92,719.61	-83.700***
	No	191,821	122,984.53	
COV_ACR	Yes	43,052	87,172.06	-102.485***
	No	191,821	124,229.61	
LIQ_QR	Yes	43,052	95,070.94	-75.738***
	No	191,821	122,456.80	
LIQ_CASHTA	Yes	43,052	70,386.18	-159.365***
	No	191,821	127,997.01	
LIQ_CASHR	Yes	43,052	66,211.74	-173.504***
	No	191,821	128,933.92	
LIQ_NWC	Yes	43,052	93,389.40	-81.432***
	No	191,821	122,834.21	
OP_EQTURN	Yes	43,052	104,888.62	-42.492***
	No	191,821	120,253.34	
OP_TATURN	Yes	43,052	95,521.44	-74.212***
	No	191,821	122,355.69	
OP_OPR	Yes	43,052	128,897.47	-38.808***
	No	191,821	114,864.83	
OP_SIZE	Yes	43,052	112,343.17	-17.249***
	No	191,821	118,580.25	
Note. *** Denotes significant at 1%.				

Source: Own work.

2.3.3 Variables

The dependent variable is defined as transaction account block that happened one year ahead (t+1) of the financial ratios used as predictors, which are calculated based on the financial statements prepared in year t. The dependent variable is set to 1 if a firm had a transaction account block for at least 1 day in period t+1 and zero otherwise.

Following the logic of Mramor & Valentinčič (2003, p. 750) we use financial ratios as well as account blocks as predictive variables. The account blocks used as explanatory variables are constructed in the same way as the dependent variable and they represent information on liquidity shortages incurred one and two years prior to the prediction period.

The ratios selected as potential independent variables for this study have been found to be significant predictors of financial distress in previous empirical research or to be widely used in practice (for example as debt covenants, for credit scoring, etc.). We try to capture all relevant aspects of a firm's operations and we combine the ratios in five categories as proposed by Altman and Sabato (2007, pp. 332-357): profitability, leverage, coverage, liquidity and operating performance.

Profitability ratios considered are return on assets (*P_ROA*), return on sales (*P_ROS*), profit margin (*P_PM*) and EBITDA to total assets (*P_EBITDATA*). For leverage we use total debt to equity (*LEV_TDEQ*), equity ratio (*LEV_EQR*), financial debt to equity (*LEV_ FDEQ*) and short-term debt to equity (*LEV_STDEQ*). In the category of coverage ratios, we consider solvency ratio (*COV_SR*), net financial debt to EBITDA (*COV_NFDEBITDA*), cash flow coverage ratio (*COV_CFD*) and asset coverage ratio (*COV_ACR*). The liquidity group of ratios is comprised of quick ratio (*LIQ_QR*), cash to total assets ratio (*LIQ_CASHTA*), cash ratio (*LIQ_CASHR*) and net working capital ratio (*LIQ_NWC*). Operating performance is represented by equity turnover (*OP_EQTURN*), total assets turnover (*OP_TATURN*), operating ratio (*OP_OPR*) and size (*OP_SIZE*). The definition of the variables considered above are presented in Appendix 1.1.

When deciding on which ratios to include in the predictive model, we use the rationale of Mramor and Valentinčič (2003, p. 751) and select one ratio out of each group which has the highest bivariate correlation with the dependent variable, however, under the condition that it is not highly correlated with any of the selected ratios from other groups, to avoid problems with multicollinearity (we are conservative and consider a Pearson coefficient with a value higher/lower than +/- 0.4 as strong correlation). High correlations among independent variables can lead to unreliable and unstable estimates of regression coefficients, because it can increase their variance and make them highly sensitive to minor changes in the model. Furthermore, models based on logistic regression are highly sensitive to the problem of multicollinearity (Balcaen & Ooghe, 2006, p. 69).

The results of the correlation analysis are presented in Table 2.4. All explanatory variables show the expected correlation directions towards the dependent *BLOCK_T+1*, though on a lower scale. If we look at the correlations between the explanatory variables, we can see that some of them are rather high*: P_ROA* and *P_EBITDATA* (with a correlation coefficient of 0.928), *P_PM* and *P_ROS* (with a correlation coefficient of 0.918), *P_PM* and *OP_OPR* (with a correlation coefficient of -0.849), *P_ROS* and *OP_OPR* (with a correlation coefficient of 0.919), *LEV_TDEQ* and *LEV_FDEQ* (with a correlation coefficient of 0.751), *LEV_TDEQ* and *LEV_STDEQ* (with a correlation coefficient of 0.910), *LEV_EQR* and *LIQ_NWC* (with a correlation coefficient of 0.841), *COV_SR* and *COV_CFD* (with a correlation coefficient of 0.958), *COV_ACR* and *LIQ_QR* (with a correlation coefficient of 0.737). Strong correlations among independent variables are a consequence of using the same denominator in their calculations.

When choosing variables for the model, we start with the one that shows the highest bivariate correlation with the dependent variable and that is *LIQ_CASHTA*, which is highly correlated only with its liquidity ratio counterpart *LIQ_CASHR* which does not enter the model. The next variable posing highest correlation with the dependent variable is *LEV_EQR*. Since *LEV_EQR* poses strong correlations with *P_ROA* and *P_EBITDATA*, the variables with the highest bivariate correlations from the profitability group of ratios, we choose the next best correlation from this group and that is *P_PM*. Continuing this logic, we select 5 ratios to construct the predictive model: *P_PM*, *LEV_EQR*, *COV_SR*, *LIQ_CASHTA* and *OP_TATURN*.

2.3.4 Statistical methodology

As a general approach, we opt for the binary logistic regression model, which is a suitable method for predicting a binary dependent variable. Logistic regression is a classification modelling technique that estimates the probability that a dichotomous outcome will occur given the values of explanatory variables. While Balcaen and Ooghe (2006, p. 81) conclude that there is no superior modelling method for predicting business failure, we believe that logistic regression has several advantages. First of all, logistic regression necessitates far less restrictive assumptions than other predominant methods, such as multiple discriminant analysis, which requires that the independent variables are normally distributed and that the samples of defaulted and non-defaulted firms are of the same size. Other requirements are that the outcome is discrete and that the sample size is large with no outliers, conditions which are easily satisfied by our study sample. Furthermore, the regression coefficients produced by logistic regression explain the importance or significance of each of the explanatory variables in yielding the calculated probability. Finally, we believe that logistic regression has practical advantages due to its relative simplicity of use.

Table 2.4. Correlation matrix

	BLOCK_T+1D	*BLOCK_T*	*BLOCK_T-1*	*P_ROA*	*P_PM*	*P_ROS*	*P_EBITDATA*	*LEV_TDEQ*	*LEV_EQR*	*LEV_FDEQ*	*LEV_STDEQ*	*COV_SR*
BLOCK_T+1D	1	0.446**	0.316**	-0.075**	-0.055**	-0.045**	-0.076**	0.044**	-0.128**	0.029**	0.036**	-0.085**
BLOCK_T	0.446**	1	0.477**	-0.107**	-0.105**	-0.088**	-0.100**	0.023**	-0.161**	0.007**	0.021**	-0.095**
BLOCK_T-1	0.316**	0.477**	1	-0.058**	-0.083**	-0.068**	-0.052**	0.011**	-0.132**	0.001	0.009**	-0.065**
P_ROA	-0.075**	-0.107**	-0.058**	1	0.472**	0.461**	0.928**	0.081**	0.497**	0.050**	0.084**	0.507**
P_PM	-0.055**	-0.105**	-0.083**	0.472**	1	0.918**	0.436**	0.078**	0.257**	0.060**	0.073**	0.293**
P_ROS	-0.045**	-0.088**	-0.068**	0.461**	0.918**	1	0.476**	0.077**	0.240**	0.066**	0.067**	0.291**
P_EBITDATA	-0.076**	-0.100**	-0.052**	0.928**	0.436**	0.476**	1	0.059**	0.452**	0.043**	0.056**	0.534**
LEV_TDEQ	0.044**	0.023**	0.011**	0.081**	0.078**	0.077**	0.059**	1	-0.035**	0.751**	0.910**	-0.081**
LEV_EQR	-0.128**	-0.161**	-0.132**	0.497**	0.257**	0.240**	0.452**	-0.035**	1	-0.039**	-0.017**	0.325**
LEV_FDEQ	0.029**	0.007**	0.001	0.050**	0.060**	0.066**	0.043**	0.751**	-0.039**	1	0.570**	-0.064**
LEV_STDEQ	0.036**	0.021**	0.009**	0.084**	0.073**	0.067**	0.056**	0.910**	-0.017**	0.570**	1	-0.075**
COV_SR	-0.085**	-0.095**	-0.065**	0.507**	0.293**	0.291**	0.534**	-0.081**	0.325**	-0.064**	-0.075**	1
COV_NFDEBITDA	0.028**	0.015**	0.010**	0.018**	0.062**	0.080**	0.018**	0.117**	-0.039**	0.193**	0.075**	-0.047**
COV_CFD	-0.076**	-0.084**	-0.059**	0.484**	0.272**	0.307**	0.558**	-0.079**	0.308**	-0.060**	-0.074**	0.958**
COV_ACR	-0.066**	-0.072**	-0.057**	0.094**	0.055**	0.042**	0.076**	-0.107**	0.341**	-0.074**	-0.106**	0.423**
LIQ_QR	-0.057**	-0.064**	-0.052**	0.104**	0.068**	0.055**	0.080**	-0.098**	0.302**	-0.070**	-0.105**	0.381**
LIQ_CASHTA	-0.158**	-0.155**	-0.124**	0.076**	0.062**	0.051**	0.064**	-0.100**	0.119**	-0.115**	-0.072**	0.162**
LIQ_CASHR	-0.109**	-0.107**	-0.084**	0.102**	0.063**	0.059**	0.095**	-0.092**	0.249**	-0.067**	-0.095**	0.363**
LIQ_NWC	-0.107**	-0.137**	-0.115**	0.466**	0.247**	0.232**	0.400**	-0.007**	0.841**	-0.028**	0-.004*	0.278**
OP_EQTURN	-0.018**	-0.043**	-0.043**	0.110**	0.083**	0.078**	0.096**	0.641**	-0.006**	0.363**	0.669**	-0.050**
OP_TATURN	-0.080**	-0.099**	-0.096**	-0.022**	0.130**	0.118**	0.007**	-0.060**	-0.100**	-0.112**	-0.017**	0.022**
OP_OPR	0.044**	0.084**	0.065**	-0.422**	-0.849**	-0.919**	-0.434**	-0.061**	-0.223**	-0.046**	-0.054**	-0.268**
OP_SIZE	-0.028**	-0.021**	-0.004*	0.182**	0.095**	0.121**	0.182**	0.192**	0.067**	0.205**	0.144**	0.013**

(Table continues)

Table 2.4 (Continued)

	COV_NFDEBITDA	*COV_CFD*	*COV_ACR*	*LIQ_QR*	*LIQ_CASHTA*	*LIQ_CASHR*	*LIQ_NWC*	*OP_EQTURN*	*OP_TATURN*	*OP_OPR*	*OP_SIZE*
BLOCK_T+1$_D$	0.028**	-0.076**	-0.066**	-0.057**	-0.158**	-0.109**	-0.107**	-0.018**	-0.080**	0.044**	-0.028**
BLOCK_T	0.015**	-0.084**	-0.072**	-0.064**	-0.155**	-0.107**	-0.137**	-0.043**	-0.099**	0.084**	-0.021**
BLOCK_T-1	0.010**	-0.059**	-0.057**	-0.052**	-0.124**	-0.084**	-0.115**	-0.043**	-0.096**	0.065**	-0.004*
P_ROA	0.018**	0.484**	0.094**	0.104**	0.076**	0.102**	0.466**	0.110**	-0.022**	-0.422**	0.182**
P_PM	0.062**	0.272**	0.055**	0.068**	0.062**	0.063**	0.247**	0.083**	0.130**	-0.849**	0.095**
P_ROS	0.080**	0.307**	0.042**	0.055**	0.051**	0.059**	0.232**	0.078**	0.118**	-0.919**	0.121**
P_EBITDATA	0.018**	0.558**	0.076**	0.080**	0.064**	0.095**	0.400**	0.096**	0.007**	-0.434**	0.182**
LEV_TDEQ	0.117**	-0.079**	-0.107**	-0.098**	-0.100**	-0.092**	-0.007**	0.641**	-0.060**	-0.061**	0.192**
LEV_EQR	-0.039**	0.308**	0.341**	0.302**	0.119**	0.249**	0.841**	-0.006**	-0.100**	-0.223**	0.067**
LEV_FDEQ	0.193**	-0.060**	-0.074**	-0.070**	-0.115**	-0.067**	-0.028**	0.363**	-0.112**	-0.046**	0.205**
LEV_STDEQ	0.075**	-0.074**	-0.106**	-0.105**	-0.072**	-0.095**	-0.004*	0.669**	-0.017**	-0.054**	0.144**
COV_SR	-0.047**	0.958**	0.423**	0.381**	0.162**	0.363**	0.278**	-0.050**	0.022**	-0.268**	0.013**
COV_NFDEBITDA	1	-0.044**	-0.051**	-0.059**	-0.181**	-0.111**	-0.050**	0.031**	-0.070**	-0.066**	0.138**
COV_CFD	-0.044**	1	0.379**	0.349**	0.164**	0.350**	0.269**	-0.048**	0.031**	-0.283**	0.017**
COV_ACR	-0.051**	0.379**	1	0.737**	0.067**	0.444**	0.280**	-0.112**	-0.123**	-0.036**	-0.065**
LIQ_QR	-0.059**	0.349**	0.737**	1	0.155**	0.536**	0.375**	-0.096**	-0.083**	-0.053**	-0.139**
LIQ_CASHTA	-0.181**	0.164**	0.067**	0.155**	1	0.575**	0.207**	-0.017**	0.181**	-0.053**	-0.298**
LIQ_CASHR	-0.111**	0.350**	0.444**	0.536**	0.575**	1	0.287**	-0.079**	-0.017**	-0.056**	-0.152**
LIQ_NWC	-0.050**	0.269**	0.280**	0.375**	0.207**	0.287**	1	0.044**	-0.032**	-0.216**	0.017**
OP_EQTURN	0.031**	-0.048**	-0.112**	-0.096**	-0.017**	-0.079**	0.044**	1	0.347**	-0.084**	0.095**
OP_TATURN	-0.070**	0.031**	-0.123**	-0.083**	0.181**	-0.017**	-0.032**	0.347**	1	-0.141**	-0.200**
OP_OPR	-0.066**	-0.283**	-0.036**	-0.053**	-0.053**	-0.056**	-0.216**	-0.084**	-0.141**	1	-0.096**
OP_SIZE	0.138**	0.017**	-0.065**	-0.139**	-0.298**	-0.152**	0.017**	0.095**	-0.200**	-0.096**	1
N	234,873										
Note. $_D$ Denotes dependent variable. ** Denotes significant at 1%. * Denotes significant at 5% (2-tailed).											

Source: Own work.

On the other hand, the standard binary logistic regression builds on the assumption that observations are independent and thus does not consider any clustering effects. If this requirement is not satisfied, the standard logistic regression may produce biased standard errors or inefficient coefficient estimates (Wilson & Lorenz, 2015, p. 37). Since our analysis rests on a longitudinal panel data set, where repeated measurements (financial ratios) are recorded from the same firms in the course of several years, there is a potentially clustered nature of our data, thus the regression assumption of independence can be violated. To account for the cluster effect, we perform binary logistic regression with clustered standard errors using the SPSS Complex samples feature (Huang, 2016, p. 178).

The logistic regression calculates the probability of an event occurring and takes the following general form:

$$\log\left(\frac{p}{p-1}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots + \beta_i X_i \quad (1)$$

Where p is the probability of an event occurring, (p/(p-1)) is the odds ratio, X_1, X_2,…,X_i are the predictors, β_0 is the intercept, β_1, β_2,…, β_i are the regression coefficients. The odds ratio represents the ratio of the probability of an event occurring (Y=1) and the probability of an event not occurring (Y≠1), i.e. the odds ratio is calculated as:

$$\left(\frac{p}{p-1}\right) = \frac{p(Y=1)}{1-p(Y=1)} \quad (2)$$

To test our hypotheses, we use three different logit models. The first model is based only on financial ratios as predictor variables, so the regression function is as follows:

$$\log\left(\frac{p}{p-1}\right) = \beta_0 + \beta_1 P\_PM_{(t)i} + \beta_2 LEV\_EQR_{(t)i} + \beta_3 COV\_SR_{(t)i} + \beta_4 LIQ\_CASHTA_{(t)i} + \beta_5 OP\_TATURN_{(t)i} \quad (3)$$

In the second model, we include information about account blocks incurred one year prior to the prediction period, so the regression function takes the form:

$$\log\left(\frac{p}{p-1}\right) = \beta_0 + \beta_1 P\_PM_{(t)i} + \beta_2 LEV\_EQR_{(t)i} + \beta_3 COV\_SR_{(t)i} + \beta_4 LIQ\_CASHTA_{(t)i} + \beta_5 OP\_TATURN_{(t)i} + \beta_6 BLOCK_{(t)i} \quad (4)$$

In the third model, we add information on account blocks two years prior to the prediction period, so the regression equation is:

$$\log\left(\frac{p}{p-1}\right) = \beta_0 + \beta_1 P\_PM_{(t)i} + \beta_2 LEV\_EQR_{(t)i} + \beta_3 COV\_SR_{(t)i} + \beta_4 LIQ\_CASHTA_{(t)i} + \beta_5 OP\_TATURN_{(t)i} + \beta_6 BLOCK_{(t)i} + \beta_7 BLOCK_{(t-1)i} \quad (5)$$

where *p* is the probability of an account block occurring in period t+1, (p/(p-1)) is the odds ratio, *i* represents the firm, β_0 is the constant, β_i (i = 1,...,7) are the regression coefficients, *P_PM, LEV_EQR, COV_SR, LIQ_CASHTA, OP_TATURN, BLOCK* are the predictor variables measured at time t or t-1.

One potential concern related to the models including previous account blocks is the use of lagged dependent variables. In our models, we assume that the block experienced in period t+1 is a function of the predictor variables in period t. If we follow the same logic, the variable $BLOCK_t$ should be a function of the predictors in period t-1, while the variable $BLOCK_{t-1}$ a function of the predictors in period t-2. Such relations could be a cause of multicollinearity and may result in overestimation in the regression coefficients of the lagged variables and underestimation of the coefficients of the ratio predictors (Menard, 2010, p. 268). This means that the predictions produced by previous account block variables may overestimate the actual values, while the predictions of financial ratio variables may underestimate the actual values. Since the overestimation yields lower cost than the underestimation, we accept this possible methodology limitation.

2.3.5 Errors in classification

We can make two types of errors when we try to predict whether a firm will experience liquidity problems with one of the three models presented above. The first type of error, known as Type I error, is the case when we predict that the firm will not have liquidity problems in period t+1, while in reality it will. The second type of error or Type II error is the case when we foresee that a firm will incur liquidity problems in year t+1, while in reality it will not. From the creditor's perspective, the costs of these two error types are very different. Misclassifying a firm that subsequently will experience cash shortages could cost the creditor the whole loan amount, while misclassifying a firm that subsequently will not experience a cash shortage causes opportunity cost of not lending to that firm (Agarwal & Taffler, 2008, p. 1544). Therefore, Type I errors are costlier to creditors than Type II errors.

On the other hand, from the firm's point of view, the cost of a Type II error would be higher. The firm could suffer from reputation damage as it would be labelled as incapable of returning the amount borrowed or even worse, it could actually face liquidity problems as a result of not obtaining funds from the borrower and thus "become a self-fulfilling prophesy" (Zavgren, 1985, p. 41).

The logistic regression function yields probabilities that a firm will or will not be classified in a certain group given a defined cut-off point above which a firm would be categorized in

one group and below which in another group, accordingly. Hence, the creditor can set different cut-off points for classifying firms depending on his risk appetite.

2.4 Empirical results

The results of the logistic regression analysis are shown in Table 2.5. The basic assumption that we aim to verify in the first model is that financial ratios contain helpful information based on which the future liquidity status of an SME can be predicted. So, we would expect high percentage of correctly classified firms in the model based only on financial ratios. Further, we hypothesize that data on previous account blocks convey significant additional information compared to financial ratios that improves the predictive ability of the model. That is why, we would expect a substantial decline in both Type I and Type II errors and an increase in the overall accuracy percentage in the models including previous account blocks.

The most striking observation to emerge from the model comparison is that there are significant differences in Type I and Type II errors produced by each model, while the overall predictive ability is somewhat similar. Namely, the overall percentage of correctly classified firms by the model based only on financial ratios is 87.9%, whereas adding account blocks from the previous year improves the model by 1.1 percentage point to 89%. Interestingly, the overall percentage of correctly classified SMEs remains almost on the same level at 88.8% when account blocks from two years prior to the predicted period are added.

When we delve into the errors in classification, we observe that adding information on account blocks significantly reduces Type I errors, while Type II errors slightly increase. Specifically, we notice a substantial drop of 39.5 percentage points from 99.5% to 60% in Type I errors between the first and second model, while the third model brings a lesser drop of 26.2 percentage points to 73.3%. On the other hand, while financial ratios produce a negligible 0.2% of Type II errors, models with account blocks generate slightly worse results of 4.3% and 2.7% respectively. These findings suggest that previous account blocks contain significant information over and above the information conveyed by financial ratios and they indeed improve the predictive power of financial ratio models. This is however more valid for more recent data on account blocks, i.e. for one year prior to the prediction period, a finding consistent with the results of Mramor and Valentinčič for very small private firms in Slovenia (2003, p. 757). A possible explanation is that firms that experienced cash shortages two years prior to the prediction period, have recovered the next year and remained financially stable also the following year.

Furthermore, the results imply that financial ratios have only limited predictive power, since they perform worse in classifying SMEs on average, a potentially disappointing finding for creditors who generally rely on them in assessing future liquidity. What we would expect, if financial ratios provided significant information about future liquidity of SMEs, is that they

would be statistically and economically significant and of the expected sign. However, if we turn to the results in Table 2.5 we notice a rather ambiguous situation. Even though all variables are statistically significant in all three models, one of them (*P_PM*) bears an opposite sign to the one expected. For this coefficient we would expect a negative sign, since *P_PM* is a measure of a firm's profitability relative to its revenues. The higher it is, the better, because more revenues get translated into profit. Therefore, higher profitability should be associated with lower likelihood of an account block, contrary to our results – the coefficients of the variable *P_PM* imply that a one-unit increase in profitability margin in period t increases the odds for an account block one year later by 7%, 16% and 17%, respectively. Also, the economic significance of the regression coefficients is relatively low for most of the ratio variables. For example, an increase in the ratio *OP_TATURN* in the current year decreases the odds for an account block the following year by 14%, 8% and 7%, according to the three models. One exception is the variable *LIQ_CASHTA*, whose coefficients imply that a one-unit increase in the ratio of cash to total assets in year t decreases the odds for experiencing an account block the next year by 99%, 97% and 96%, respectively.

What stands out in Table 2.5 is the considerably higher explanatory power provided by the variable *BLOCK* compared to the financial ratios. Model 2 implies that if a firm has had an account block one year prior to the prediction period, it would be 11.8 times more likely to experience an account block a year later compared to a firm without an account block, all else equal. Model 3 suggests that a firm with an account block in the previous year is 8.7 times more likely to experience cash shortages compared to a firm without an account block and having account block two years prior to the prediction period increases the odds for another one two years later by 2.4, all else equal. Even if we account for the possible overstatement of the regression coefficients of the *BLOCK* predictors, being lagged dependent variables, the relative difference in their explanatory power compared to the financial ratio variables is still significant.

All in all, the results of our research emphasise the importance of data on previous account blocks, while they bring into question the predictive ability of financial ratios. Taken together, these findings suggest that if some kind of historical liquidity indicator is publicly available, then potential creditors of SMEs should integrate it in their credit scoring models (based on financial ratios) to achieve better predictive accuracy. Relying merely on financial ratios helps identify only those firms that will not incur cash shortages, so there are only limited gains. This is contrary to our expectations based on significant disparity among financial ratios of SMEs that incur account blocks and of those that don't.

Table 2.5. Clustered standard errors logistic regression results

	Model 1			Model 2			Model 3		
	B	S.E	Exp(B)	B	S.E	Exp(B)	B	S.E	Exp(B)
P_PM	0.06424*** (5.016)	0.01281	1.06635	0.14725*** (9.607)	0.01533	1.15864	0.15362*** (9.753)	0.01575	1.16605
LEV_EQR	-0.46465*** (-34.386)	0.01351	0.62836	-0.28947*** (-23.562)	0.01229	0.74866	-0.26165*** (-21.387)	0.01223	0.76978
COV_SR	-0.33021*** (-15.783)	0.02092	0.71877	-0.24998*** (-12.710)	0.01967	0.77882	-0.26340*** (-13.220)	0.01992	0.76844
LIQ_CASHTA	-5.13095*** (-32.725)	0.15679	0.00591	-3.40221*** (-29.409)	0.11568	0.03330	-3.30052*** (-29.383)	0.11233	0.03686
OP_TATURN	-0.15521*** (-19.278)	0.00805	0.85624	-0.08461*** (-12.457)	0.00679	0.91887	-0.06766*** (-10.190)	0.00664	0.93458
BLOCK_T				2.46826*** (131.004)	0.01884	11.80192	2.16063*** (112.574)	0.01919	8.67658
BLOCK_T-1							0.88641*** (35.854)	0.02472	2.42639
Constant	-1.23126*** (-78.374)	0.01571	0.29193	-1.99777*** (-132.224)	0.01511	0.13564	-2.07629*** (-139.063)	0.01493	0.12539
Nagelkerke R^2	0.101			0.273			0.285		
N	234,873								
Type I error	28,116 (99.5%)			16,936 (60.0%)			20,704 (73.3%)		
Type II error	396 (0.2%)			8,942 (4.3%)			5,641 (2.7%)		
Blocked correct	131 (0.5%)			11,311 (40.0%)			7,543 (26.7%)		
Not blocked correct	206,230 (99.8%)			197,684 (95.7%)			200,985 (97.3%)		
Overall percentage correct	206,361 (87.9%)			208,995 (89.0%)			208,528 (88.8%)		

Note: The table reports results of the logistic regressions based on three sets of predictor variables. The dependent variable is a dummy variable set to 1 if the firm recorded an account block in period t+1. Model 1 is based on financial ratios only, Model 2 includes information on account blocks 1 year prior to the prediction period and Model 3 includes information on account blocks 2 years prior to the prediction period. An unbalanced sample of 234,873 firm-wise observations is used. B represents the regression coefficient. T-statistics are in parentheses. S.E. is the standard error of the estimated coefficients. Exp(B) is the odds ratio for the predictors.
*** Denotes significant at 1%.

Source: Own work.

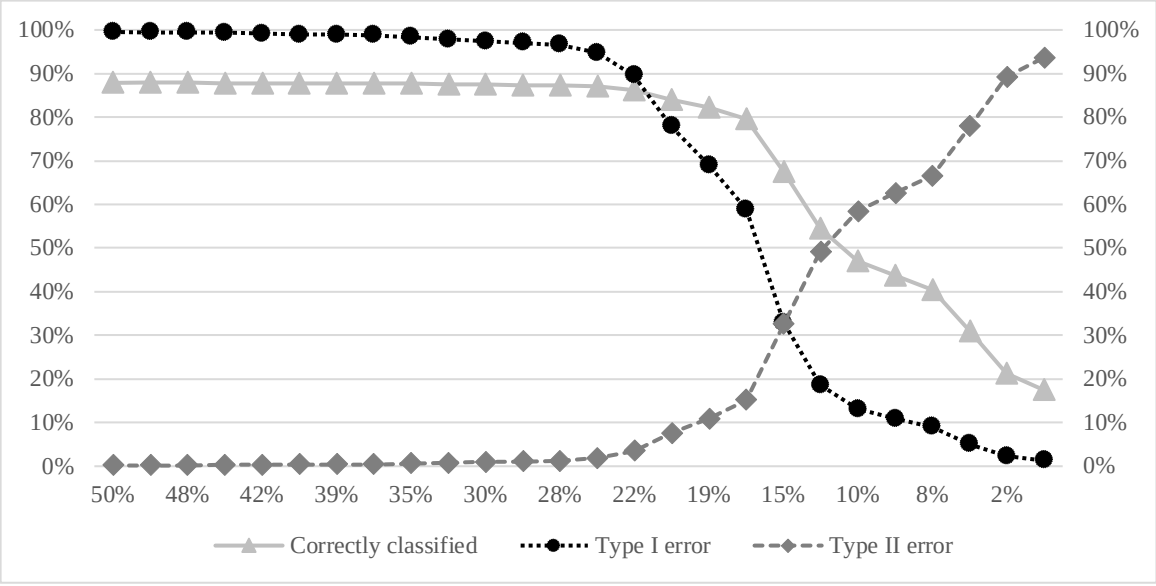
2.4.1 Sensitivity of logit estimates to cut-off points

Our analysis so far assumed equal costs of Type I and Type II errors, thus our models maximized the total number of correctly classified SMEs and minimized the total number of errors. This is achieved by setting the cut-off probability for SME classification to 50%. However, from the creditor's point of view, Type I errors are more expensive. Therefore, we assume that it would be of the creditor's interest to reduce the number of Type I errors at the expense of higher number of Type II errors. Considering the creditor's risk appetite and the relative difference between the costs of these types of errors, they can opt to substantially reduce the number of Type I errors without jeopardizing the overall accuracy.

In the following three figures, we show the movement of Type I and Type II errors based on different cut-off points in classification, which could be used as a basis for selecting the desired level of model accuracy considering the error costs.

Figure 2.1 shows the model based on financial ratios only. We can see that the decline in Type I errors is much less sensitive to changes in higher cut-off probabilities, but the drop becomes significant at lower cut-off probabilities. For example, if we move the cut-off point from 50% to 30%, the Type I error decreases from 99.5% to 97.4%, while overall correctness declines from 87.9% to 87.5%. On the other hand, lowering the cut-off point from 30% to 15%, reduces Type I errors by 64.5 percentage points, but it also reduces the overall accuracy by 20 percentage points and increases Type II errors by 31.6 percentage points from negligible 1% to 32.5%. So, when we reduce the number of Type I errors, we also increasingly reduce the overall accuracy of the model, but still at a lesser extent.

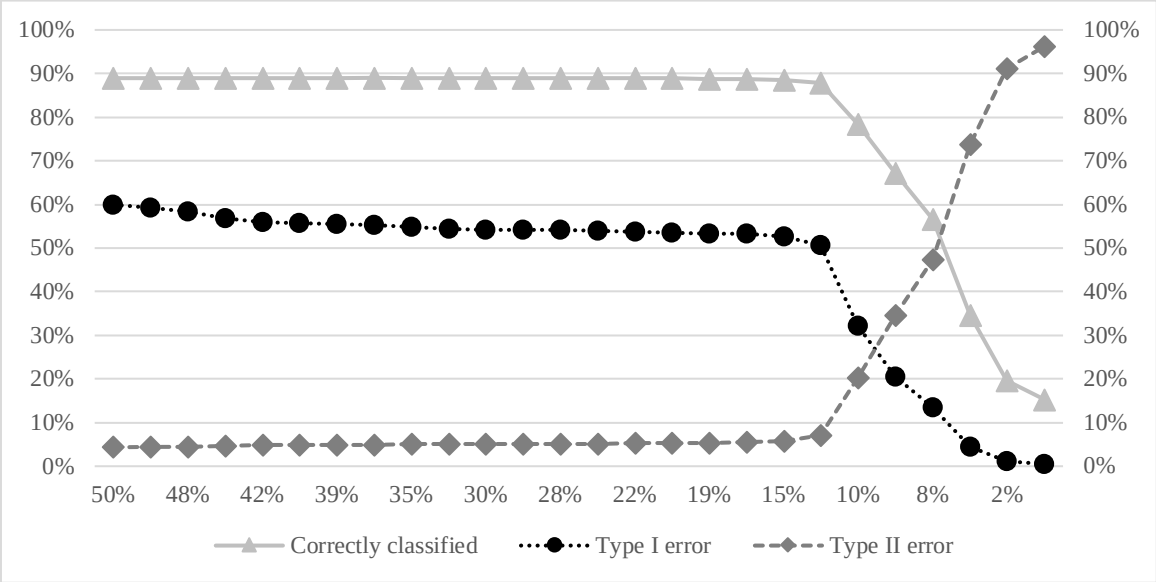
Figure 2.1. Type I and II errors and correctly classified firms by Model 1



Source: Own work.

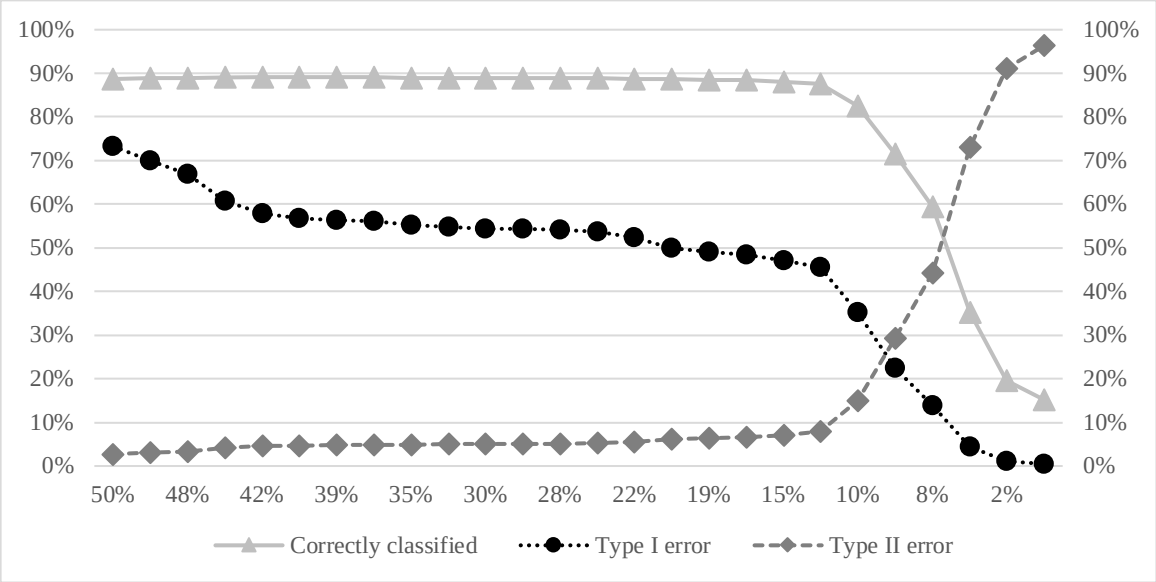
As shown in Figure 2.2 and 2.3, the models become much less sensitive to different cut-off probabilities and Type I error is substantially lower when information on previous account blocks is added. The same cut-off point movement in Model 2, from 50% to 30%, results in a 5.7 percentage points reduction in Type I errors, while overall accuracy stays at 89%. Shifting the cut-off probability to 15% results in just 1.6 percentage points reduction in Type I errors and 0.4 percentage points reduction in overall accuracy. Therefore, the sacrifice of overall accuracy to achieve a reduction in Type I error is substantially lower in models which include historical information on previous cash shortages.

Figure 2.2. Type I and II errors and correctly classified firms by Model 2



Source: Own work.

Figure 2.3. Type I and II errors and correctly classified firms by Model 3



Source: Own work.

2.5 Robustness checks

In order to evaluate the robustness of our results, we conduct two types of additional analysis: (i) validation test using the out-of-sample-period prediction method; (ii) alternative model specifications.

2.5.1 Validation of the logit model

Validation tests are used to evaluate the forecasting performance of classification models in failure prediction on a new set of firms (Charitou, Neophytou & Charalambous, 2004, p. 487). One such test is the out-of-sample-period test, which means that part of the data is used to estimate the model (analysis sample) and the other part (validation sample) is used to validate the results (Modina & Pietrovito, 2014, p. 1550). This provides a way to see how good our models are at predicting firms with liquidity problems for new data, as we can apply the models to what is practically unobserved data. For that purpose, we split the initial sample into two subsamples. The first subsample encompasses the period between 2007 and 2010 and is used to estimate three prediction models, specified according to the same methodology as explained above. The validation sample includes the years 2011 and 2012.

Table 2.6 presents the validation results of the out-of-sample-period prediction test. Panel A reports results obtained by applying clustered standard errors logistic regression models (Model 1, 2 and 3) to the analysis sample. The estimated prediction models based on the analysis sample almost replicate the results of the initial models applied to the whole sample, both in terms of statistical parameters and classification accuracy. Using these models, we predict values for the out-of-sample-period between 2011 and 2012. From the comparison shown in Panel B of Table 2.6, we can see that the forecast validation test yields classification results practically identical to the estimated models. The percentage of correctly classified firms during the estimation period with the model based only on financial ratios amounts to 88.9%, which is only slightly better than the 86% of correctly classified firms with the out-of-sample prediction. Bringing information on previous liquidity problems improves the overall classification accuracy to approximately 90% in both estimated models, while applying them to new data produces overall accuracy of approximately 87%. As in the previous findings, the Type I error rates are much higher than the Type II error rates. The lowest Type I error rate is produced by Model 2, which fails to correctly classify approximately 61% of the firms with liquidity problems regardless whether it is applied on the analysis or the validation sample.

To summarize, the forecast validation test further corroborates our initial conclusion that models built only on financial ratios can yield relatively high classification results when used to predict firms that will not incur cash shortages in the near future. However, they miss to identify those firms that will face liquidity problems. Adding information on previous cash shortages reduces the Type I error, however not to such extent that would enable high

reliability of the models. Creditors using either models based solely on financial ratios or combined models, would be faced with the possible risks and costs related to granting a loan or trade credit to a firm which is incapable of (full) repayment.

2.5.2 Alternative model specifications

Our main models aim to predict the occurrence of a transaction account block, which is used as a proxy for a liquidity shock. In these models we relate a liquidity measure expressed in days to financial ratios measured on annual basis. To account for the possible temporal discrepancy, we consider an alternative proxy for a liquidity issue – the change in net operating working capital ($\Delta NOWC$). Net operating working capital is an important indication of the liquidity and solvency of a firm and is inversely related to financial distress (Hill, Kelly & Highfield, 2010, p. 798). We define net operating working capital as the sum of cash, account receivables and inventories net of trade payables and accrued expenses. The change in net operating working capital is calculated as NOWC in period t+1 minus NOWC in period t. A positive $\Delta NOWC$ means that the change in current liabilities has increased more than the change in current assets, thus the liquidity of the firm deteriorates. We define the dependent variable as a dummy variable set to 1 when $\Delta NOWC$ is positive and 0 otherwise.

We follow the same procedure for sample formation and variable selection as in the initial models, however we do not present the tabulated results for the interest of brevity. They are available from the authors upon request. The bivariate Pearson correlation results are somewhat counterintuitive. They show even lower association between the dependent and explanatory variables compared to the primary models and the majority of them do not follow the expected relation direction. All profitability variables (*P_ROA, P_PM, P_ROS, P_EBITDATA*) are positively correlated with the positive change in net operating working capital with statistically significant coefficients, even though we would expect higher profitability to be associated with an improving liquidity position. Two of the leverage ratios (*LEV_TDEQ*, *LEV_STDEQ*) are not statistically significant and the other two (*LEV_EQR, LEV_FDEQ*) show signs opposite to the ones expected. The situation is similar with the coverage group of ratios, where the correlation coefficient of *COV_NFDEBITDA* is not statistically significant, while the rest (*COV_SR, COV_CFD, COV_ACR*) show positive correlation, when negative is expected. Only the liquidity group of ratios (*LIQ_QR, LIQ_CASHTA, LIQ_CASHR, LIQ_NWC*) have correlation coefficients which are statistically significant and of the logical direction. Finally, the operating ratios (*OP_EQTURN, OP_TATURN, OP_OPR, OP_SIZE*) pose opposite correlation directions, even though their Pearson coefficients are statistically significant. The aforementioned implies that $\Delta NOWC$ might not be a good approximation for the liquidity position of a firm. The ratios entering the models are the same as the initial ones: *P_PM, LEV_EQR, COV_SR, LIQ_CASHTA* and *OP_TATURN*.

Table 2.6. Out-of-sample-period forecast test validation results

Panel A: Clustered standard error logistic regression results, analysis sample 2007-2010									
	Model 1			Model 2			Model 3		
	B	Std. Error	Exp(B)	B	Std. Error	Exp(B)	B	Std. Error	Exp(B)
P_PM	0.08714*** (5.173)	0.01685	1.09105	0.15823*** (7.650)	0.02068	1.17143	0.16109*** (7.528)	0.02140	1.17479
LEV_EQR	-0.51303*** (-29.859)	0.01718	0.59868	-0.32502*** (-20.114)	0.01616	0.72251	-0.29953*** (-18.490)	0.01620	0.74116
COV_SR	-0.38494*** (-14.448)	0.02664	0.68049	-0.29724*** (-11.458)	0.02594	0.74286	-0.30964*** (-11.732)	0.02639	0.73371
LIQ_CASHTA	-5.10057*** (-25.216)	0.20228	0.00609	-3.39405*** (-22.400)	0.15152	0.03357	-3.31297*** (-22.551)	0.14691	0.03641
OP_TATURN	-0.19039*** (-17.921)	0.01062	0.82663	-0.10961*** (-11.928)	0.00919	0.89618	-0.09251*** (-10.263)	0.00901	0.91164
BLOCK_T				2.55515*** (105.956)	0.02412	12.87321	2.24411*** (89.767)	0.02500	9.43199
BLOCK_T-1							0.90284*** (27.306)	0.03306	2.46661
Constant	-1.27297*** (-65.200)	0.01952	0.28000	-2.05025*** (-105.962)	0.01935	0.12870	-2.12380*** (-110.460)	0.01923	0.11958
Nagelkerke R^2	0.103			0.277			0.288		
N	151,415								

Panel B: Comparative validation test results, validation sample 2011-2012						
	Analysis sample	Validation sample	Analysis sample	Validation sample	Analysis sample	Validation sample
Type I error	16,599 (99.6%)	11,499 (99.3%)	10,132 (60.8%)	7,034 (60.7%)	12,076 (72.5%)	8,320 (71.8%)
Type II error	238 (0.2%)	190 (0.3%)	5,150 (3.8%)	3,645 (5.1%)	3,424 (2.5%)	2,477 (3.4%)
Blocked correct	67 (0.4%)	82 (0.7%)	6,534 (39.2%)	4,547 (39.3%)	4,590 (27.5%)	3,261 (28.2%)
Not blocked correct	134,511 (99.8%)	71,687 (99.7%)	129,599 (96.2%)	68,232 (94.9%)	131,325 (97.5%)	69,400 (96.6%)
Overall percentage correct	134,578 (88.9%)	71,769 (86.0%)	136,133 (89.9%)	72,779 (87.2%)	135,915 (89.8%)	72,661 (87.1%)
N	151,415	83,458	151,415	83,458	151,415	83,458

Note: Panel A reports results of the logistic regressions based on three sets of predictor variables for the period 2007-2010. The dependent variable is a dummy variable set to 1 if the firm recorded an account block in period t+1. Model 1 is based on financial ratios only, Model 2 includes information on account blocks 1 year prior to the prediction period and Model 3 includes information on account blocks 2 years prior to the prediction period. An unbalanced sample of 151,415 firm-wise observations is used. B represents the regression coefficient. T-statistics are in parentheses. S.E. is the standard error of the estimated coefficients. Exp(B) is the odds ratio for the predictors. Panel B reports the out-of-sample-period classification results versus classification results of estimated prediction models. *** Denotes significant at 1%.

Source: Own work.

We apply the same model construction and methodology as in the original analysis, whereby we test a model built only on financial ratios and models which additionally include *BLOCK_T* and *BLOCK_T-1* as solvency control variables. We present the results of the clustered standard errors logistic regression in table 2.7.

What is striking about the figures in this table is the relatively low overall accuracy of the models, which succeed to correctly classify just over half of the firms (53.9% - 54.2%). While all three models produce substantial Type II errors, ranging from 76.8% to 82.3%, the Type I errors also remain fairly high, ranging from 13.7% to 18.1%. Interestingly, adding historical information on previously experienced liquidity issues provides only negligible improvement in overall accuracy of 0.3 percentage points, while the percentage of correctly classified firms with an adverse change in net operating working capital falls by approximately 4 percentage points.

As a general observation, all three models produce very low goodness of fit measures and contradictory regression coefficients. The coefficient of the variable *P_PM* is statistically insignificant in all of the models. The coefficients of *LEV_EQR, COV_SR* and *OP_TATURN* are positive, implying that lower leverage, higher solvency and operating efficiency are associated with higher odds for experiencing an adverse change in liquidity, which is contrary to what is expected. Furthermore, their economic significance is quite low. For example, Model 1 implies that a one-unit increase in *LEV_EQR, COV_SR* or *OP_TATURN* increases the odds for an adverse change in NOWC by 13%, 7% or 7% respectively, all else equal. The only ratio with a logical and economically significant coefficient in all three models is *LIQ_CASHTA*, where a one-unit increase decreases the odds for an adverse change in NOWC by 58%, 53% and 53% respectively, all else equal. Further contradictory results are the negative regression coefficients for the variables *BLOCK_T* and *BLOCK_T-1* in Model 2 and 3. These results suggest that a firm which has experienced an account block in the previous year or the year before is less likely to face liquidity issues in the year ahead.

In summary, these results show that using the change in net operating working capital does not improve the predictive power of any of the failure prediction models devised in this study. A creditor who relies on such models, would significantly reduce the costs of Type I errors on one side, but on the other, he would also significantly reduce the chance to earn interest on a loan or trade credit, given that most creditworthy firms would be classified as ones with liquidity problems.

Table 2.7. Clustered standard errors logistic regression results, ΔNOWC dependent variable

	Model 1			Model 2			Model 3		
	B	S.E	Exp(B)	B	S.E	Exp(B)	B	S.E	Exp(B)
P_PM	0.01162 (1.125)	0.01033	1.01169	0.00604 (0.585)	0.01032	1.00606	0.00555 (0.537)	0.01032	1.00556
LEV_EQR	0.12135*** (12.712)	0.00955	1.12902	0.10308*** (10.737)	0.00960	1.10858	0.10066*** (10.472)	0.00961	1.10590
COV_SR	0.06900*** (8.883)	0.00777	1.07144	0.06797*** (8.755)	0.00776	1.07033	0.06825*** (8.789)	0.00776	1.07063
LIQ_CASHTA	-0.70953*** (-28.411)	0.02497	0.49188	-0.75199*** (-29.828)	0.02521	0.47143	-0.75634*** (-29.971)	0.02524	0.46938
OP_TATURN	0.06621*** (19.735)	0.00336	1.06846	0.06195*** (18.434)	0.00336	1.06391	0.06122*** (18.199)	0.00336	1.06313
BLOCK_T				-0.23557*** (-15.728)	0.01498	0.79012	-0.20160*** (-11.758)	0.01715	0.81742
BLOCK_T-1							-0.08651*** (-4.266)	0.02028	0.91713
Constant	0.04375*** (5.701)	0.00767	1.04472	0.08308*** (10.286)	0.00808	1.08663	0.08781*** (10.786)	0.00814	1.09178
Nagelkerke R^2	0.008			0.009			0.009		
N	218,418								
Type I error	15,810 (13.7%)			20,862 (18.1%)			20,602 (17.9%)		
Type II error	84,841 (82.3%)			79,164 (76.8%)			79,361 (76.9%)		
Positive Δ*NOWC* correct	99,465 (86.3%)			94,413 (81.9%)			94,673 (82.1%)		
Negative Δ*NOWC* correct	18,302 (17.7%)			23,979 (23.2%)			23,782 (23.1%)		
Overall percentage correct	117,767 (53.9%)			118,392 (54.2%)			118,455 (54.2%)		

Note. The table reports results of the logistic regressions based on three sets of predictor variables. The dependent variable is a dummy variable set to 1 if the firm recorded a positive change in NOWC in period t+1. Model 1 is based on financial ratios only, Model 2 includes information on account blocks 1 year prior to the prediction period and Model 3 includes information on account blocks 2 years prior to the prediction period. An unbalanced sample of 218,418 firm-wise observations is used. B represents the regression coefficient. T-statistics are in parentheses. S.E. is the standard error of the estimated coefficients. Exp(B) is the odds ratio for the predictors.
*** Denotes significant at 1%.

Source: Own work.

Next, we turn to the possible influence of industry membership on the financial behaviour of firms, as established by previous research. Data from several studies find strong support for the effect that industry has on the capital structure of SMEs, showing that industry influences the total level and the maturity composition of debt (Michaelas, Chittenden & Poutziouris, 1999, p. 123; Hall, Hutchinson & Michaelas, 2000, p. 310; Johnsen & McMahon, 2005, p. 176). Furthermore, previous research has established that financial structures, as well as bankruptcy criteria and vulnerability differ among industries, therefore it is necessary to devise bankruptcy models for each industry separately to achieve better predicting accuracy (Tanaka, Higashide, Kinkyo & Hamori, 2019, pp. 2017–2034). In our analysis so far, we considered the whole sample of Slovenian SMEs, which can average out the effect of the cross-industry differences in financial behaviour. That is why, we perform additional tests focusing on each of the four largest groups of SMEs according to industries. We conduct a subsample analysis by focusing on the largest four industry groups in our sample: (i) wholesale and retail trade, transportation and storage, accommodation and food service activities (Industry 1); (ii) professional, scientific, technical, administrative and support service activities (Industry 2); (iii) manufacturing, mining and quarrying and other industrial activities (Industry 3) and (iv) construction (Industry 4). We perform clustered standard errors logistic regression for each industry with the same variable combinations as the original three models.

In general, the results are consistent with the initial findings, where some of the regression coefficients are not statistically significant or bear a contradicting sign, which is contrary to our expectations about the information financial ratios provide in forecasting liquidity shortages. For the sake of brevity, we present only the results of the model with the highest predictive power (Model 2) in Table 2.8, while the rest is provided in Appendices 1.2 and 1.3. As can be seen from the table, the coefficient of the variable *P_PM* bears an opposite sign in all industry groups. In the fourth industry group the coefficient of the variable *COV_SR* is not statistically significant. The economic significance of some of the financial ratios considerably varies across industries. For example, an increase of one unit in the ratio *LEV_EQR* decreases the odds for an account block the next year by 17% for the firms in the construction industry, whereas the odds decrease in the services industry amounts to 31%, all else equal. In a way, the differences in statistical and economic significance between ratios among different industries could be considered as an indication that there are indeed different factors that influence the financial situation of firms belonging to different industries.

When we turn to the forecasting accuracy of the models, we see that the industry models produce comparable results to the ones obtained with the models applied to the whole sample. The overall correctness ranges from 79.7% to 92.1%, Type I errors from 53.6% to 64% and Type II errors from 2.7% to 10%. We conclude that even if we control for industries, it is difficult to predict firms that will incur cash shortages, whereas firms that will not face liquidity problems can be identified with high accuracy.

Table 2.8. Model 2 clustered standard errors logistic regression results for 4 industry groups

	Industry 1			Industry 2			Industry 3			Industry 4		
	B	S.E.	Exp(B)	B	S.E.	Exp(B)	B	S.E.	Exp(B)	B	S.E.	Exp(B)
P_PM	0.14066*** (5.411)	0.02599	1.15104	0.14943*** (4.232)	0.03531	1.16117	0.13678*** (3.008)	0.04548	1.14658	0.25570*** (6.642)	0.03849	1.29137
LEV_EQR	-0.29348*** (-15.640)	0.01876	0.74567	-0.36726*** (-12.363)	0.02971	0.69263	-0.34567*** (-9.283)	0.03724	0.70775	-0.19052*** (-5.520)	0.03451	0.82653
COV_SR	-0.17783*** (-4.801)	0.03704	0.83708	-0.30668*** (-7.591)	0.04040	0.73589	-0.26559*** (-4.404)	0.06031	0.76675	-0.03639 (-0.823)	0.04422	0.96427
LIQ_CASHTA	-2.27141*** (-14.266)	0.15922	0.10317	-4.72121*** (-16.037)	0.29439	0.00890	-4.26372*** (-10.119)	0.42138	0.01407	-2.76964*** (-12.170)	0.22758	0.06268
OP_TATURN	-0.12935*** (-11.794)	0.01097	0.87867	-0.09321*** (-5.648)	0.01650	0.91101	-0.05648** (-2.518)	0.02243	0.94509	-0.04485*** (-2.889)	0.01552	0.95614
BLOCK_T	2.45289*** (80.458)	0.03049	11.62188	2.58477*** (57.139)	0.04524	13.26019	2.68590*** (55.217)	0.04864	14.67144	1.84050*** (44.364)	0.04149	6.29969
Constant	-2.02251*** (-80.698)	0.02506	0.13232	-2.09926*** (-60.060)	0.03495	0.12255	-2.10806*** (-49.341)	0.04272	0.12147	-1.41246*** (-38.759)	0.03644	0.24354
Nagelkerke R^2	0.249			0.292			0.308			0.217		
N	84,918			56,753			35,715			24,632		
Type I error	6,505 (63.3%)			3,096 (64.0%)			2,366 (53.6%)			3,101 (55.9%)		
Type II error	3,158 (4.2%)			1,394 (2.7%)			1,430 (4.6%)			1,900 (10.0%)		
Blocked correct	3,771 (36.7%)			1,739 (36.0%)			2,048 (46.4%)			2,448 (44.1%)		
Not blocked correct	71,484 (95.8%)			50,524 (97.3%)			29,871 (95.4%)			17,183 (90.0%)		
Overall percentage correct	75,255 (88.6%)			52,263 (92.1%)			31,919 (89.4%)			19,631 (79.7%)		

Note: The table reports results of the logistic regressions based on Model 2, which includes financial ratios and information on account blocks 1 year prior to the prediction period. Logistic regression is performed for each of the four group of industries: (i) wholesale and retail trade, transportation and storage, accommodation and food service activities (Industry 1); (ii) professional, scientific, technical, administrative and support service activities (Industry 2); (iii) manufacturing, mining and quarrying and other industrial activities (Industry 3) and (iv) construction (Industry 4). B represents the regression coefficient. T-statistics are in parentheses. S.E. is the standard error of the estimated coefficients. Exp(B) is the odds ratio for the predictors.
** Denotes significant at 5%. *** Denotes significant at 1%.

Source: Own work.

As already mentioned, having the account block at time t+1 as the dependent variable and account block at time t and t-1 as independent variables can create an issue of bias, the latter being lagged dependent variables. Therefore, we address this possible issue by looking at the block variable from a transitioning perspective. We categorize firms that are blocked for two consecutive years, in year t and t-1, as firms that are more likely to have long term liquidity issues, i.e. firms that are more likely to fall into solvency category. Firms that are blocked in either t or t-1 are categorized as firms that are more likely to have only temporary liquidity issues. Assuming these are two different groups of firms, we look into them separately by introducing a dummy variable in all three models to control for the firms presumed to have solvency issues.

As evident from the results in Table 2.9, controlling for firms with account blocks experienced for two previous consecutive years, considerably reduces Type I error in Models 1 and 3, where these percentages drop from 99.5% to 80.6% and from 73.3% to 60.1%, respectively. Model 2 produces almost identical results as in the initial analysis. All three models predict with high accuracy those firms that will not experience an account block in the near future. The overall correctness of all models is quite similar to the primary analysis (ranging from 88.7% to 89%). Even though Models 1 and 3 yield improved accuracy in predicting firms that get blocked in the next period (19.4% vs. initial 0.5% in Model 1 and 39.9% vs. initial 26.7% in Model 2), these percentages do not bring out any more confidence in the models and do not minimize the credit risk faced by potential lenders, since the portion of incorrectly classified firms with liquidity problems still remains high.

Table 2.9. Clustered standard errors logistic regression results, consecutive block control variable

	Model 1			Model 2			Model 3		
	B	S.E.	Exp(B)	B	S.E.	Exp(B)	B	S.E.	Exp(B)
P_PM	0.09406*** (6.556)	0.01435	1.09862	0.14754*** (9.579)	0.01540	1.15898	0.15789*** (10.382)	0.01521	1.17104
LEV_EQR	-0.38761*** (-31.138)	0.01245	0.67868	-0.28691*** (-23.392)	0.01227	0.75058	-0.23798*** (-19.068)	0.01248	0.78822
COV_SR	-0.32205*** (-15.518)	0.02075	0.72466	-0.25355*** (-12.867)	0.01971	0.77604	-0.25456*** (-12.849)	0.01981	0.77526
LIQ_CASHTA	-4.38251*** (-31.733)	0.13810	0.01249	-3.39684*** (-29.474)	0.11525	0.03348	-3.15466*** (-28.561)	0.11045	0.04265
OP_TATURN	-0.10919*** (-14.882)	0.00734	0.89656	-0.08137*** (-12.024)	0.00677	0.92186	-0.06443*** (-9.779)	0.00659	0.93760
BLOCK_T&T-1	2.21930*** (85.435)	0.02598	9.20089	0.27199*** (9.541)	0.02850	1.31258	-1.45532*** (-34.561)	0.04211	0.23333
BLOCK_T				2.35484*** (110.888)	0.02124	10.53648	2.48771*** (117.889)	0.02110	12.03372
BLOCK_T-1							1.73325*** (55.671)	0.03113	5.65901
Constant	-1.54448*** (-102.544)	0.01506	0.21342	-2.00269*** (-132.403)	0.01513	0.13497	-2.16479*** (-141.175)	0.01533	0.11477
Nagelkerke R^2	0.177			0.274			0.293		
N	238,873								
Type I error	22,775 (80.6%)			17,167 (60.8%)			16,984 (60.1%)		
Type II error	3,766 (1.8%)			8,572 (4.1%)			8,776 (4.2%)		
Blocked correct	5,472 (19.4%)			11,080 (39.2%)			11,263 (39.9%)		
Not blocked correct	202,860 (98.2%)			198,054 (95.9%)			197,850 (95.8%)		
Overall percentage correct	208,332 (88.7%)			209,134 (89.0%)			209,113 (89.0%)		

Note: The table reports results of the logistic regressions based on three sets of predictor variables, including a control dummy variable for firms with solvency issues, equal to one if a firm has experienced an account block in both t and t-1, and zero otherwise. The dependent variable is a dummy variable set to 1 if the firm recorded an account block in period t+1. Model 1 is based on financial ratios only, Model 2 includes information on account blocks 1 year prior to the prediction period and Model 3 includes information on account blocks 2 years prior to the prediction period. An unbalanced sample of 234,873 firm-wise observations is used. B represents the regression coefficient. T-statistics are in parentheses. S.E. is the standard error of the estimated coefficients. Exp(B) is the odds ratio for the predictors. *** Denotes significant at 1%.

Source: Own work.

2.6 Conclusion

The purpose of this study was to examine the predictive power of financial ratios and whether it is possible to devise a model for forecasting short-term liquidity of small and medium sized enterprises. Short-term liquidity is an important aspect of the financial soundness of firms, as it can lead to bankruptcy even though it is mostly only temporary. Therefore, forecasting the short-term liquidity position of a firm is particularly interesting for creditors, since it might generate costs to them. That is why there is a demand for this research, especially since the literature has not dealt broadly with this topic so far.

We performed clustered standard errors logit analysis on a large sample of Slovenian SMEs to develop three models: the first model was based on financial ratios only, the second and third models were based on a combination of financial ratios and information on transaction account blocks experienced one and two years prior to the prediction period, respectively. The panel data consisted of 234,873 firm-year observations corresponding to 60,602 firms in the period between 2007 and 2012. All three models produced very high percentages of correctly classified firms, ranging from 87.9% to 89%, a result comparable to the results obtained for very small private Slovenian firms (Mramor & Valentinčič, 2003, p. 763). Nevertheless, the high percentages are a consequence of the high accuracy in classifying firms that do not experience transaction account blocks. Only 0.2% - 4.3% of firms that do not incur an account block are predicted to have liquidity problems.

On the other hand, it is very hard to predict firms that will incur liquidity problems. Namely, the percentage of firms that are predicted not to have liquidity problems, but in fact do, ranges from 60% to 99.5%. Models including information on previous account blocks bring about substantial reduction in Type I errors, however they still remain significant. These results are robust to different empirical techniques. This is rather unfavourable, because these types of errors are more expensive to creditors.

Taken together, the results suggest that both financial ratios and information on previous account blocks do a very good job in predicting firms that will not incur liquidity problems, but they miss to identify those firms that will experience cash shortages. The outcome of our research also highlights the improvement in forecasting that is achieved by adding data on previous liquidity problems, in our case account blocks. Therefore, if some kind of historical credit record data is available, then it should be included in the model to achieve better predictive accuracy, because relying solely on financial ratios yields only limited gains in predicting cash shortages.

Banks and other creditors use the information provided in financial statements to evaluate the riskiness and business performance of a firm in order to make resource allocation decisions (Flood, 2019, p. 14). Our models built on financial ratios derived from SME financial statements perform very poorly in predicting the incidence of transaction account

blocks. The finding that financial statements are not relevant in discerning firms which would encounter liquidity shortages in the short term is the main contribution of our research. This way, we provide caution to external users to limit their reliance on financial ratio data when making credit decisions. Furthermore, by focusing on predicting short-term liquidity issues, we allow our models to consider other indications of financial distress than the prevailing bankruptcy prediction. Even though bankruptcy is the worst-case scenario for a firm or a creditor, short-term liquidity problems can have significant negative financial consequences for both sides. Next, our research expands the scarce literature on failure prediction in small and medium sized firms, a sector of great importance for the economy in general. Also, this is the first study that attempts to devise a failure prediction model for the SME group of firms in Slovenia, where they represent a major part of its economy. Finally, our models provide a solid basis for identifying firms which are financially stable.

We recognize some limitations in the present study in spite its academic and practical contribution. One limitation concerns the methodology. The use of lagged dependent variable as explanatory variable can cause bias in the estimation of the regression coefficients, in the sense that financial ratio variables show underestimated coefficients, whereas historical account block variables show overestimated coefficients. Nevertheless, the poor performance of the model based only on financial ratios rejects our main hypothesis that financial ratios are useful for predicting short-term liquidity problems, so our main conclusion about the limited relevance of financial ratio information remains unaffected. Another limitation is related to the geographical specificity of our data. The empirical investigation is based on a large sample of Slovenian SMEs and credit record data available only in Slovenia. In order to be able to apply the findings of our research to SMEs in other countries, a comparison of their characteristics and credit record data needs to be conducted. A possible direction for further research is to include different credit record data or financial ratios for two or more years. Furthermore, it would be valuable to try to evaluate the costs of Type I and Type II errors.

3 WRITE-OFFS AS PREDICTORS OF FUTURE PROFITABILITY IN PRIVATE FIRMS

3.1 Introduction

This study examines asset write-offs in private firms and their relation to future profitability. Write-offs are intended to communicate information about the true economic performance of a firm to outside stakeholders. Accounting rules prescribe realization of write-offs when the value of an asset has been impaired, thus they should be a signal of lower cash flows expected from it (Elliot & Shaw, 1988, p. 100; Kosi & Valentinčič, 2013, p. 3). However, write-offs have also been recognized as an accounting instrument used to achieve manipulation of earnings (eg. Zucca & Campbell; 1992, pp. 30-41; Riedl, 2004, pp. 823-852). Managers often engage in earnings management practices by using judgement when preparing financial reports and taking advantage of the asymmetric information between insiders and stakeholders in order to misrepresent the underlying performance of the firm to outside parties (Healy & Whalen, 1999, p. 368). Since write-offs are subject to discretion by the financial statement preparers and they can be recorded with the intent to influence earnings by shifting future expenses forward, they can easily be employed as an earnings management tool.

The primary motivation for this study is to provide insight into the realization of asset write-offs by Slovenian private firms and whether they are implemented in accordance with financial reporting standards. It is of particular interest whether write-offs are associated with decreasing future earnings as envisaged by accounting rules and whether their disclosures provide relevant information to external users of financial statements about the future profitability of the preparer. The second motivation for this study is to test for the possible effect of the recent financial crisis on accounting choices of Slovenian SMEs effectuated through asset write-offs. We note that for the purpose of this study we use the term private firms as equivalent to small and medium sized firms.

Financial reporting of private firms is particularly interesting because of their importance to the economy (Ball & Shivakumar, 2005, p. 84). However, despite being considered the backbone of the economy, only a small portion of empirical research focuses on the accounting choices of private firms. According to the latest statistics, 99.8% of all enterprises (or 24.5 million) in the non-financial business sector of the 28 EU member states in the year 2017 were SMEs providing two thirds of total employment (66.4%) and more than half (56.8%) of the sector's value added (European Commission, 2018). When it comes to write-offs – an important attribute of financial reporting choices – the majority of literature deals with large publicly quoted firms (Zucca & Campbell, 1992, pp. 30-41; Riedl, 2004, pp. 823-852; Francis, Hanna & Vincent, 1996, pp. 117-134; Elliot & Shaw, 1988, pp. 91-119), whereas only few studies have dealt with small and medium sized firms (Garrod, Kosi &

Valentinčič, 2008, pp. 1-24; Kosi & Valentinčič, 2013, pp. 1-34; Szczesny & Valentinčič, 2013, pp. 285-317). Bar-Yosef, D'Augusta and Prencipe (2019, p. 2) assume two main reasons for the lack of accounting research on private companies: (i) the low demand for accounting information, stemming from the smaller number of outside stakeholders and (ii) data unavailability.

Nevertheless, in addition to their substantial contribution to the economy, the investigation of SMEs should be of great concern because they are different compared to larger firms in many respects (Gaganis, Pasiouras & Voulgari, 2019, p. 78). Private firms operate under different governance, financing, management and compensation frameworks compared to public companies (Ball & Shivakumar, 2005, p. 95). While the ownership of public firms is divided among thousands of shareholders, management and ownership often coincide in private firms. As a result, private firms do not encounter agency problems between owners and managers (García-Teruel & Martínez-Solano, 2008, p. 130; Garrod et al., 2008, p. 3; Kosi & Valentinčič, 2013, p. 12; Szczesny & Valentinčič, 2013, p. 286). Furthermore, SMEs have limited access to external finance (Beck & Demirgüç-Kunt, 2006, p. 2931), which is why the second most important source of agency issues – between owners and creditors – is also absent. It is interesting to study the accounting choices of firms in a setting where major agency issues are presumably non-existent. In such circumstances, where no motivation to alter the perception of outside stakeholders exists, it is expected that firms would adhere to accounting principles when preparing their financial statements.

In our case specifically, we assume that SMEs record write-offs as prescribed by accounting rules and as such they signal deteriorating future performance to external users of financial statements. Our analysis focuses on a large sample of small and medium sized enterprises operating in Slovenia in the period between 2006-2013. The analysis of SMEs allows us to concentrate on the most important sector in the EU economy in general and in Slovenia in particular. Indeed, as reported in the 2018 SBA Fact Sheet (European Commission, 2018) it is estimated that in Slovenia alone SMEs constituted 99.8% of all non-financial business entities, accounting for ca. 73% of employment and providing 65% of the value added in the local non-financial sector in 2018. We find evidence that realised asset impairments are reflective of accounting prescriptions, however they are also employed as an earnings management tool. Our findings reveal significant and negative association between write-offs and future changes in operating profitability, which excludes any impairment effects, thus they are indicative of negative changes in core operating performance. However, we also find a positive or insignificant association between write-offs and net income, which integrates the accounting effects of asset write offs. Such results imply that write-offs are used to manipulate bottom line earnings. While the results are mostly consistent across asset types, they also show some indication that fixed asset write-offs are less likely to be used for discretionary purposes. The results are not affected by controls for size, leverage, liquidity, industry membership or financial crisis. All in all, our findings suggest that write-offs are noisy predictors of future profitability.

This chapter contributes to the existing literature on asset write-offs in several ways. The extensive literature evaluating asset impairments as accounting practices mostly deals with their realization in large quoted firms. These firms face various agency problems from different sources, thus the incentive to manipulate accounting numbers is more emphasized compared to small private companies, where only small or no agency issues exist. With that, we are able to focus directly on the accounting choices of financial statement preparers who are simultaneously the firm owners and managers, which is considered as major distinction from current research. This study further contributes to the existing literature by evaluating the implementation of the accounting standard prescribing asset write-offs during the period of financial crisis. The period of financial crisis was characterized by significant economic uncertainty and its possible effect on write-offs has not been largely addressed in the literature, especially not in the setting of small private firms. Furthermore, by concentrating on SMEs in Slovenia we contribute to the existing literature on accounting practices of SMEs in this country, where no research has dealt with this important economic sector thus far. We also see practical implications in the recommendation to external users that the information on asset impairments disclosed in financial statements does not provide a reliable basis for making predictions about the profitability of SMEs.

The remaining part of this chapter proceeds as follows. Section 3.2 provides theoretical foundations and develops the empirical hypothesis. Section 3.3 describes the data set and the methodology. Section 3.4 discusses the results, section 3.5 presents additional robustness tests, while section 3.6 concludes.

3.2 Literature review and hypothesis development

3.2.1 Reasons and implications of asset write offs

Write-offs are intended as a means of conveying information about the true financial performance of a firm to outside stakeholders. According to accounting rules, asset write-offs should be recorded when the value of an asset has been impaired and they should signal expectations of declining future cash flows to be generated from it (Elliot & Shaw, 1988, p. 100; Kosi & Valentinčič, 2013, p. 3). When write-offs are disclosed according to accounting prescriptions, i.e. to reveal the true economic (under)performance of an asset, we say that they are recorded for operating reasons. Since they represent an admission by the firm that its asset will not be making as much future profit as it was initially expected (Tergesen, 2003, p. 131), a negative correlation should exist between current period write-offs and subsequent changes in earnings (Szczesny & Valentinčič, 2013, p. 309).

However, write-offs also make room for discretion by financial statement preparers, in that they can decide on the timing and magnitude of write-offs to be recorded (Elliot & Shaw, 1988, p. 92). In other words, they can be applied as an earnings management tool. Earnings

management is usually achieved by timing reported economic events with the intent to move income through time (Degeorge, Patel & Zeckhauser, 1999, p. 2). Since write-offs can be used as an instrument to bring future expenses forward, they can influence reported earnings and misrepresent the true financial performance of the firm to achieve personal economic benefits of the financial statement preparers (Szczesny & Valentinčič, 2013, p. 292). Such write-offs are categorized as discretionary or opportunistic. If write-offs are primarily used as an earnings management tool to bring future expenses forward, then future expenses will be lower and earnings higher. In that case a positive relation between current period write-offs and future profitability should exist (Szczesny & Valentinčič, 2013, p. 309).

Current research has identified several discretionary motives for asset write offs in private firms. One is the tax minimization motive whereby private firms minimize the present value of corporate tax by writing assets off and thus moving future expenses forward (Garrod et al., 2008, p. 21). Another possible motive is preserving future debt capacity. Indebted firms with sufficient earnings might be motivated to write assets off today in order to increase the probability of sufficient earnings ratios tomorrow. Similarly, firms can reduce earnings in times of large profits by shifting future expenses forward and thus create reserves for dividend pay outs in the future (Szczesny & Valentinčič, 2013, p. 313).

Nevertheless, when deciding on whether to engage in discretion over accounting numbers, managers weigh the benefits against the possible repercussions of such action. For example, minimizing the present value of future tax obligations can attract regulatory attention and lead to a tax audit. If the results of the audit are negative, then the firm could face additional costs in the form of penalties (Garrod, Ratej Pirkovic & Valentinčič, 2007, p. 5). As with upward revaluations, we can expect also other costs associated with undertaking an asset write-off, such as appraiser fees, opportunity and direct costs of managers' time spent in reviewing the financial data and discussing it with auditors, as well as book-keeping costs (Brown, Izan & Loh, 1992, p. 37).

3.2.2 Empirical studies on asset write offs

Several studies have dealt with earnings management effectuated through asset write-offs, however most of the literature focuses on large publicly listed firms. The first authors to identify discretionary asset write-offs were Zucca and Campbell (1992, pp. 30-41), who analysed a sample of 67 U.S. publicly listed firms in the period 1981 to 1983 and concluded that they engage in two patterns of earnings management by recognizing asset write-downs: "big bath" and income smoothing. Riedl (2004, pp. 823-852) also finds evidence of "big bath" behaviour resulting from opportunistic reporting by managers more so than reflecting economic factors. He compared the quality of reporting asset write-offs before and after the issuance of the Statement of Financial Accounting Standards No. 121 "Accounting for the Impairment of Long-Lived Assets" on a sample of 1,035 listed firms in the period 1992-1998 and discovered a lower association between asset write-offs and firms' underlying

economics after the adoption of the standard, suggesting it provides more room for discretion. Similarly, in the setting of Australian quoted firms in the period between 2000 and 2012, Bond, Govendir, Wells and Cahan (2016, pp. 259–288) study the implementation of regulation prescribing asset impairments and whether they can be considered operating. Even though they find some evidence that write-offs are recorded according to regulatory requirements, the majority of firms postpone their recognition, even though some indicator of impairment is present. The transition to IFRS brought about a certain increase in the recognition of write-offs, however the majority of firms still did not realise them despite the presence of impairment indicators.

Francis et al. (1996, pp. 117-134) study the determinants that drive managements' decisions to record a write-off on a sample of 674 write-off announcements from Compustat firms in the years 1989-1992. They postulate that there are two factors that influence the decision to write off: earnings manipulation, by taking advantage of the discretion provided by accounting rules, and signalling actual asset impairment due to deteriorating firm performance, market developments or changed strategies. The results of their research indicate that both factors play an important role in recognizing asset write-offs taken as a whole, however they differ when analysing write-offs by type. Namely, management incentives have low or no influence on inventory and property, plant and equipment write-offs, however they play a substantial role in writing off other, more discretionary items such as goodwill and restructuring charges. Siggelkow and Zülch (2013, pp. 737-754) investigate the factors that influence the write-off decisions in 165 German listed firms in the period between 2004 and 2010 to find support for both operating and discretionary motives. They report a strong relation between write-offs and declining firm performance, which is in accordance with regulatory requirements. They also reveal an indication for income smoothing by detecting high association between write-off probability and unexpected high earnings.

When it comes to write-offs in the setting of small and medium-sized enterprises, there has been only a limited body of research that has paid attention to the possible earnings management problem. Garrod et al. (2008, pp. 1-24) analyse the determinants of write-off decisions and their magnitude on a large sample of small private firms in Slovenia, an environment with high alignment between financial and tax reporting. They find evidence of earnings management in the form of tax minimization at more profitable firms, which are more likely to write off and write off more. The finding that the probability for write-offs increases, but their magnitude decreases with firm size, implies that larger firms are compelled to comply with regulatory standards more quickly and easily.

Kosi and Valentinčič (2013, pp. 1-34) focus on one specific incentive in the financial reporting process, that is, the tax minimization incentive in a setting of Slovenian small private firms, which evidence a shift in tax legislation where asset write-offs cease to be tax deductible. They show that realizing tax benefits is a relevant factor in the financial reporting

process for private firms together with other non-tax benefits. They also conclude that earnings quality improves after the adverse tax change. In a similar setting of German SMEs, Szczesny and Valentinčič, (2013, pp. 285-317) also find evidence of tax minimization incentives at more profitable firms. In addition, they reveal that more profitable but financially indebted firms decrease earnings via write-offs in periods when these are relatively high, thus increasing the probability for preserving an adequate future debt coverage and dividend pay-out ratio.

The outburst of the financial crisis has led to an increased interest in its effect on earnings management. Nevertheless, existing research does not provide conclusive results about the direction of the relationship between earnings quality and recession (Trombetta & Imperatore, 2014, p. 206). A study focusing on listed firms in five EU countries with weak fiscal sustainability (Spain, Greece, Ireland, Italy and Portugal) indicates that, in general, earnings quality improved during the crisis, however it decreased in cases where earnings management incentives were already present (Kousenidis, Ladas & Negakis, 2013, pp. 351–362). The finding about reduced earnings management during the crisis period was further corroborated by Filip and Raffournier (2014, pp. 455-478), Arthur, Tang and Lin (2015, pp. 1-15) and Cimini (2015, pp. 302-317) on a sample of European listed firms. On a global scale however, Persakis and Iatridis (2015, pp. 1-35) present conflicting results. They examine earnings quality in publicly listed firms in 18 largest advanced world economies and find a significant decrease in earnings quality in the crisis period, which is more emphasized in countries with weaker shareholder protection and legal enforcement systems. Trombetta and Imperatore (2014, pp. 205–232) detect a non-monotonic relationship between financial crises and earnings management among U.S. listed companies, where firms decrease their earnings management practices in periods of moderate crisis, however they increase them when the crisis becomes severe. Campa (2019, pp. 457–471) compares earnings management practices of French listed and private firms during the period of the financial crisis to determine that both groups engage in income-increasing earnings manipulation realized through real activity manipulation rather than through discretionary accruals. Nevertheless, earnings manipulation is more extensive among public firms, especially if they are more indebted. When it comes to the relation between asset impairment and financial crisis specifically, Gunn, Khurana and Stein (2018, pp. 3–39) find that U.S. listed firms who practiced conservative financial reporting strategy before the crisis, meaning they realized timely asset impairments, continued to do so in the period of crisis as well. Such reporting practices provided benefits to these firms, as they were able to obtain more debt financing in the crisis period.

3.2.3 Hypotheses development

Slovenian Accounting Standards, adopted in 2006 and valid until 2016, prescribe write-offs of current and fixed assets if the asset's recoverable amount falls below its carrying amount, which is in accordance with International Accounting Standards (IAS 36). Carrying amount

is the value at which an asset is recorded in the balance sheet, while recoverable amount is the higher of fair value or value in use. Fair value is defined as the market price that would be achieved if the asset was sold and value in use is the present value of the future cash flows expected to be generated from an asset. As long as write-offs require the estimation of future cash flows, it is reasonable to assume that their disclosure communicates relevant information about future earnings (Vanza, Wells & Wright, 2018, p. 25). Since asset impairments are prescribed to signal decreasing future profitability, current period write-offs should be related to negative changes in future earnings.

The purpose of financial reporting is to provide informational grounds for making resource allocation decisions by the users of financial statements. Some of the main users of financial statements are investors (existing and potential), lenders and other creditors, as well as the government (Flood, 2019, p. 14; Porter & Norton, 2017, p. 12). These users need financial reports to evaluate the performance of the business, to assess the riskiness of the business with regard to investment or credit decisions, to determine whether profits can be allocated and to determine the amount of tax to be paid by a firm (European Commission, 2008). These are the parties with whom firms establish the main agency relationships and thus represent potential sources of agency problems. Therefore, firms would be inclined to use accounting policies to misrepresent the underlying performance of the firm to these users. However, the situation is different in small and medium firms.

Small and medium sized firms are characterised by concentrated ownership structure, where often ownership and management coincide. As a result, agency problems between owners and managers are lower or non-existent (Bar-Yosef, D'Augusta & Prencipe, 2019, p. 31; García-Teruel & Martínez-Solano, 2008, p. 130; Garrod et al., 2008, p. 3; Kosi & Valentinčič, 2013, p. 12; Szczesny & Valentinčič, 2013, p. 286). In the absence of agency problems, the need of resolving possible information asymmetries between owners and managers with financial statements is excluded (Garrod et al., 2008, p. 3). In other words, the incentive to alter investors' perception about the true economic performance of the firm by exercising earnings management is not present.

Another characteristic of SMEs is the small presence of external financial debt, since their access to external finance is limited (Beck, Demirgüç-Kunt & Maksimovic, 2005, p. 171). As we show below, the firms in our sample finance on average only 18.4% of total assets with financial debt. Therefore, the second possible source of agency problems – between owners and lenders – is also absent. In that case, the need to misrepresent financial numbers to lenders through earnings management practices is also absent, especially because the information asymmetry towards lenders is mostly resolved through different channels other than financial statement data, such as maintaining long-term relationships, pledging collateral or individual contracting (Bar-Yosef, D'Augusta & Prencipe, 2019, p. 25; Berger & Udell, 1995, p. 351; Garrod et al., 2008, p. 3).

Since private firms are less reliant on external sources of finance and are thus less inclined to convey their business performance information through financial reporting, the principal reason for preparing accounting information remain the tax authorities (Bar-Yosef, D'Augusta & Prencipe, 2019, p. 52). However, according to the Corporate Income Tax Act 2 (Official Gazette of the Republic of Slovenia, 40/2004, 2004 and subsequent amendments) asset write-offs are not recognized as a tax-deductible expense in Slovenia (except in certain cases of receivables write-off, such as bankruptcy proceedings, compulsory settlement, uncollectible accounts receivables, cost unjustifiable collection or legal proceedings). Therefore, firms cannot influence the present value of tax obligations by shifting future expenses forward using discretion over recognition of asset write-offs. Consequently, the third major potential source of agency issues in the form of tax authorities is also absent in our setting of small and medium sized firms in Slovenia.

Considering all of the above, the main focus of this chapter is on whether there is evidence that Slovenian small and medium sized firms realise asset impairments in accordance with regulatory requirements, i.e. for operating reasons. That means that write-offs are disclosed to signal expectations of declining future earnings. Hence, the main hypothesis is that there is a negative association between current period write-offs and future changes in profitability:

H1: Current period asset write-offs (fixed assets, current assets and fixed and/or current assets write-offs) are negatively related to future changes in earnings of small and medium sized firms.

The negative association should persist no matter whether earnings performance is measured at the operating or bottom line level. This brings us to the related assumption that the information on asset impairments is relevant for making judgements about the future profitability of SMEs by financial statement users.

Another concern of this study is whether the recent financial crisis had any effect on the accounting choices of SMEs effectuated through recognition of asset impairments. Even though the financial crisis is not the main focus of this study, the data set that we have at our disposal and stretches throughout the years before and during the crisis, provides us with a unique possibility to study its likely effect on the quality of financial statements of SMEs.

The crisis caused high uncertainty about the value and profitability of firms' assets, thus most managers were forced to reconsider their expectations about future cash flows and make downward adjustments (Gunn et al., 2018, p. 4). During the financial crisis and the inherent crunch in debt financing, creditors preferred firms with lower information risk. Empirical research shows that higher informational transparency during economic downturn increases the availability of credit (Balakrishnan, Watts & Zuo, 2016, pp. 513–542). The crisis disproportionally affected small and medium sized firms, in that they faced more

severe reduction in bank credit supply, mostly due to their informational opacity (Demirgüc-Kunt, Peria & Tressel, 2020, p. 2). In that sense, firms can benefit from timely recognition of asset impairments during the crisis period by increased availability in bank credit and more favourable borrowing conditions (Balakrishnan, Watts & Zuo, 2016, p. 515; Zhang, 2008, p. 51). On the other hand, firms might experience potential disadvantages of write-offs during the crisis, in the form of increased probability of debt covenant violations as they reduce earnings and book values (Zhang, 2008, p. 51). Considering the more severe financial constraints faced by SMEs, even if they are not extensive users of external debt as are the firms in our sample, we expect them to continue recording operating asset write-offs also during the period of the crisis to signal quality in the preparation of financial statements to external users. Therefore, the final hypothesis that we try to verify in this chapter is that during the crisis years a negative relation between current period write-offs and future changes in earnings persists. If, on the contrary, SMEs primarily used asset impairments to report opportunistically during the crisis period, we would expect to observe a positive or an insignificant association between current period write-offs and future changes in earnings.

H2: Current period asset write-offs (fixed assets, current assets and fixed and/or current assets write-offs) remain negatively related to future changes in earnings of small and medium sized firms in the period of financial crisis.

3.3 Research design

3.3.1 Method and variable description

The primary concern of this chapter is whether there is evidence that SMEs realise asset write-offs as required by accounting regulation and whether write-offs reflect negative changes in future earnings. To verify the research hypotheses, we analyse the relation between current period asset write-offs and subsequent changes in earnings. Since write-offs are prescribed to reflect declining expectations about future cash flows, we expect a negative relation between current period write-offs and future earnings changes. On the contrary, if impairments are realized for reasons other than signalling the true economic performance of the firm, i.e. if they are used primarily as an earnings management tool to bring future expenses forward, then expenses will be lower and earnings higher in the forthcoming period. In that case, we would expect a positive or insignificant association between current write-offs and future profitability. Supposing that write-offs are indeed used as prescribed by accounting standards, we postulate that external users of financial reports can make assumptions about the future profitability of SMEs based on the information on asset impairments disclosed in financial statements.

To test the first hypothesis, we formulate the main linear regression models as follows:

$$\left.\begin{matrix}\Delta ADJ\_OP_{t+1} \\ \Delta NI_{t+1}\end{matrix}\right\} = \beta_0 + \beta_1 \left\{\begin{matrix}FA\_WO_t \\ CA\_WO_t \\ FACA\_WO_t\end{matrix}\right. + \varepsilon_t \quad (1)$$

Where ΔADJ_OP and ΔNI are two measures for changes in future profitability at time t+1, β_0 is a constant, β_1 is the regression coefficient, *FA_WO*, *CA_WO* and *FACA_WO* are the variables expressing fixed asset write offs, current asset write-offs and fixed- and/or current asset write offs at time t, ε is the error term.

Following the logic of Szczesny and Valentinčič (2013, p. 297), we examine these relationships separately for SMEs that write off fixed assets only, SMEs that write off current assets only and SMEs that write fixed- and/or current assets, because of the difference in costs associated with assets of different life spans. Fixed asset write-offs are associated with higher costs due to their stricter regulation and longer duration.

We consider two measures as dependent variables to capture future earnings changes - the change in adjusted operating profit (ΔADJ_OP) and change in net income (ΔNI). The change in the profitability measures is calculated by deducting current period (t) income from next period (t+1) income. We adjust operating profit by adding back write-off expenses to operating profit before tax, to exclude their effects on the income generated from core business operations, thus ΔADJ_OP is used as a proxy for the underlying profitability of SMEs (Garrod et al., 2008, p. 6). Net income, on the other hand, includes the effect of write-off expenses in addition to interest revenue and expenses, taxes, as well as other income and expenses. Since we assume that SMEs record asset write-offs primarily for operating reasons, we expect the negative relation between current period write-offs to persist no matter which profitability measure is used. If SMEs engage in income manipulation through asset impairments, contrary to our expectations, then the consequences of such actions would be felt in the bottom line profitability, hence it should demonstrate positive or insignificant association with current period write-offs.

The independent variables are defined as fixed asset write-offs (*FA_WO*), current asset write-offs (*CA_WO*) and fixed and current asset write-offs (*FACA_WO*). Write-offs are separately disclosed in the income statement. An impairment loss of a fixed asset is recognized as a write-off operating expense associated with fixed assets (Slovenian Institute of Auditors, 2006, p. 34). Write-offs of inventories of work in progress, finished goods and merchandise are recognized as a write-off operating expense associated with current assets, whereas the write-offs of inventories of raw and other materials and small tools are recorded within cost of materials (Slovenian Institute of Auditors, 2006, p. 65). Receivables are written off when their book value exceeds their collectible amount and the impairment is recognized under operating expense associated with current assets (Slovenian Institute of Auditors, 2006, p. 73).

All variables are deflated by book value of current period total assets and are presented in ratio form. This provides comparability and an indication of the economic significance of the variables (Szczesny & Valentinčič, 2013, 299). Namely, if a large firm records a small write-off, then its proportion to total assets would be relatively low and thus probably not economically significant. On the contrary, if a small firm books a large write-off, then its share in total assets would be relatively high and it would consequently be an economically significant case.

A range of firm-specific characteristics affect the profitability of the firm as well, hence we additionally introduce several control variables. Prior research documents that firm size (*SIZE*), leverage (*FIN_DEBT*), liquidity (*CASH*) and industry have significant effects on firm's profitability. García-Teruel and Martínez-Solano (2007, p.174) document positive association between size and SME profitability, which is the case for large corporations as well (Hall & Weiss, 1967, p. 329). We use the natural logarithm of the book value of assets as a proxy for firm size. Leverage is assumed to have a negative effect on SME profitability in accordance with the agency problems related to debt (Martínez-Sola, García-Teruel & Martínez-Solano, 2014, p. 574). Creditors might require higher returns because of the informational opacity of SMEs and the consequential information asymmetry, resulting in a negative effect on profitability (Pettit & Singer, 1985, p. 55). Leverage is represented by the ratio of financial debt to assets. Liquidity is expected to have a positive influence on SME profitability, because higher amount of internal finance increases the possibility for good investment opportunities and reduces the risk of financial distress (Honjo & Harada, 2006, p. 291; Nunes, Serrasqueiro & Leitão, 2010, p. 1332). Cash to total assets is a proxy measure for the liquidity of an SME. Industry has an important effect on profitability, arising from differences such as market structure, competition and regulation (Schmalensee, 1985, p. 349; McGahan & Porter, 1997, p. 24; Cherchye & Verriest, 2016, p. 843). We include industry dummies defined at "high-level SNA/ISIC aggregation".

We reformulate the primary model to include control variables as follows:

$$\left.\begin{matrix}\Delta ADJ\_OP_{t+1}\\ \Delta NI_{t+1}\end{matrix}\right\} = \beta_0 + \beta_1 \left\{\begin{matrix}FA\_WO_t\\ CA\_WO_t\\ FACA\_WO_t\end{matrix}\right. + \beta_2 SIZE_t + \beta_3 FIN\_DEBT_t + \beta_4 CASH_t + \text{Industry dummies} + \varepsilon_t \quad (2)$$

Where ΔADJ_OP and ΔNI are the dependent variables, β_0 is a constant, $\beta_{1,2,3,4}$ are the regression coefficients, *FA_WO*, *CA_WO* and *FACA_WO* are the explanatory variables, *SIZE*, *FIN_DEBT*, *CASH* and industry dummies are the control variables, ε is the error term.

While the primary concern of this chapter is the relation between write-offs and future profitability, we recognise that the results may be sensitive to particular time periods,

specifically the financial crisis. A dummy variable is introduced in the model including control variables to evaluate the sensitivity of our results to the financial crisis. By definition "an economy is in recession when quarterly GDP growth rates are negative for two successive quarters" (Statistical Office of the Republic of Slovenia, 2016). According to that, the crisis began in the fourth quarter of 2008 in Slovenia and lasted until 2013, after which GDP resumed to growth (Statistical Office of the Republic of Slovenia, 2016). Therefore, in our analysis, we consider the period 2009-2013 as recession and enter a dummy variable equal to one for these years and zero otherwise. The model takes the following form:

$$\left.\begin{matrix}\Delta ADJ\_OP_{t+1} \\ \Delta NI_{t+1}\end{matrix}\right\} = \beta_0 + \beta_1 \left\{\begin{matrix}FA\_WO_t \\ CA\_WO_t \\ FACA\_WO_t\end{matrix}\right. + \beta_2 SIZE_t + \beta_3 FIN\_DEBT_t + \beta_4 CASH_t + \text{Industry dummies} + \text{Recession dummies} + \varepsilon_t \quad (3)$$

Where ΔADJ_OP and ΔNI are the dependent variables, β_0 is a constant, $\beta_{1,2,3,4}$ are the regression coefficients, *FA_WO*, *CA_WO* and *FACA_WO* are the explanatory variables, *SIZE*, *FIN_DEBT*, *CASH*, industry and recession dummies are the control variables, ε is the error term.

3.3.2 Sample formation

We start with the whole population of non-financial small and medium sized firms operating in Slovenia in the period between 2006-2013 that submitted financial reports to the Agency of the Republic of Slovenia for Public Legal Records and Related Services (AJPES). AJPES is a central database, which publishes accounting and financial information on all business entities based on the territory of the Republic of Slovenia, derived from their annual reports and other corporate data, according to Article 58 of the Firms Act (Official Gazette of the RS, 65/2009, and subsequent amendments) and Article 71 of the Payment Transactions Act (Official Gazette of the RS, 110/2006, and subsequent amendments). Submitting financial statements to the Agency is mandatory by law for all firms operating in Slovenia.

SMEs are determined as defined by EU law: EU recommendation 2003/361. More specifically, SME is a firm that meets the following main criteria: a) has less than 250 employees; b) realizes an annual turnover of less than or equal to €50 million; and c) its balance sheet assets are worth less than or equal to €43 million. Given the predominance of private firms and their significant economic value in the Slovenian (and European) business sector, investigation of their financial behaviour is particularly interesting.

We set our research in the period between the years 2006 and 2013 in order to be able to examine the effects of the financial crisis on earnings management practices of Slovenian SMEs. Even though data was available for the years before 2006, it was excluded from the

analysis in order to achieve consistency and comparability among the financial statements across the years, because Slovenia revised its accounting standards effective from January 1st 2006. With this revision, among others, write-offs ceased to be a tax-deductible expense. We define the dependent variable as the next period income less current period income, while the independent variables as current period write-offs. Therefore, the latest available data for the explanatory variables are the 2012 financials.

Based on several selection criteria a part of the initial dataset was eliminated. First, firm-year observations with missing values were eliminated. Further, to minimize the effects of outliers we dropped 1% of the extreme top and bottom values of the continuous variables (*ADJ_OP*, *Δ_ADJ_OP*, *%_Loss*, *NI*, *Δ_NI*) and the top 1% of the variables bounded at zero (*FA_WO*, *CA_WO*, *FACA_WO*). Finally, we excluded firms with negative owner's equity to avoid considering inactive firms. This procedure yielded an unbalanced panel of 61,692 unique firms with an average of 4.3 years per firm, resulting in an aggregate sample of 264,554 firm-year observations. There are 24,419 (9.2%) observations with fixed asset write-offs, 43,992 (16.6%) observations with current asset write-offs and 57,630 (21.8%) observations with either fixed or current asset write-offs or both. Table 3.1 describes the sample construction.

Table 3.1. Sample formation

	Firm-year observations	SMEs
Initial sample of non-financial SMEs 2006-2012	363,751	76,180
- Observations with missing data	37,906	
- Observations with outliers	17,719	
- Observations with negative equity	43,572	
Final sample of non-financial SMEs 2006-2012	264,554	61,692

Source: Own work.

To achieve simplicity in industry classification, we use the "high-level SNA/ISIC aggregation", which aggregates the International Standard Industrial Classification of all Economic Activities of the United Nations (ISIC) and the European Classification of Economic Activities (NACE) sections into 10 industry categories (Eurostat, 2008). There are 36% firms involved in wholesale and retail trade, transportation and storage, accommodation and food service activities, 26% involved in professional, scientific, technical, administrative and support service activities, 15% involved in manufacturing, mining and quarrying and other industrial activities, 9% involved in construction and the rest are dispersed.

3.4 Empirical results

3.4.1 Descriptive statistics

Table 3.2 shows some of the main characteristics of the SMEs in our sample. Panel A provides their basic description, while panel B tests for the mean difference between writing-off and non-writing-off firms. From the data in Panel A we can see that the sample SMEs show weak operating efficiency with median (operating) return on assets of (3%) 1.7%. The variables depicting asset write-offs (*FA_WO*, *CA_WO* and *FACA_WO*) are highly positively skewed, because the major part of firms does not record write-offs, but there are some large cases. The sample is made up of small entities considering that the mean and median firms have an asset base of approximately €108 and €99 thousand respectively and they employ an average of about 6 people. It is evident that these firms are highly indebted given that the median firm finances 55.2% of its total assets with debt, however only a small portion (median 5.8%) is borrowed from financial institutions, consistent with the possible absence of agency problems between firm owners and external lenders. Finally, the liquidity among these firms is rather low, since the median firm holds only 4.2% of assets in cash.

Panel B in Table 3.2 provides basic descriptive statistics and tests for the mean differences between writing off and non-writing off SMEs according to type of asset, assuming independent samples in *t*-testing. Firms write off 0.7% of total assets on average when they write off fixed assets, while this percentage slightly increases to 1.2% when they write off either current or both types of assets. As a general observation, the two groups are significantly different among each other according to all variables. On average, writing off SMEs are larger and more profitable, a finding consistent with the results of Garrod et al. (2008, p. 22) who show that operating profit and firm size is positively associated with the decision to write off. On the other hand, firms that write off assets are more indebted, both in terms of total and financial debt, and have less cash than non-writing off firms. Szczesny and Valentinčič (2013, p. 313) find that more profitable but more indebted firms record discretionary asset write-offs in the current period in order to secure debt capacity in the future. On the other hand, the share of losses in adjusted operating profit is higher among writing off firms, suggesting that asset impairments are indeed recorded for operating reasons.

In addition to the *t*-test, we also perform a Mann-Whitney U Test to examine the mean differences between SMEs that write off and SMEs that do not write off assets according to asset type, since all of the variables, except for *SIZE* do not follow a normal distribution. This test is suitable for comparison of means of two independent samples when the assumption of a normally distributed population is not satisfied (Black, 2016, p. 678). Table 3.3 shows the results for the groups of SMEs that write-off fixed assets and those that do not, whereas the other two comparisons are shown in Appendix 2.1 and 2.2. The Mann Whitney U Test confirms the findings of the previous test on all accounts, except that in this

test the two groups of SMEs are not statistically different according to the variable *Δ_NI*. This is valid for all three write-off categories: *FA_WO*, *CA_WO* and *FACA_WO*.

Table 3.2. Descriptive statistics

Panel A: Firm-level descriptive statistics									
	Mean	Std. Deviation	Minimum	25th Percentile	Median	75th Percentile	Maximum	Skewness	N
ADJ_OP	0.04340	0.14202	-0.77258	-0.00377	0.03010	0.09021	0.66209	-0.05690	264,554
% loss	0.24019	0.53609	0.00000	0.00000	0.00000	0.00000	5.23611	3.24611	264,554
NI	0.03092	0.12090	-0.72958	0.00056	0.01724	0.06687	0.54151	-0.41069	264,554
FA_WO	0.00069	0.00413	0.00000	0.00000	0.00000	0.00000	0.05635	8.40807	264,554
CA_WO	0.00195	0.00836	0.00000	0.00000	0.00000	0.00000	0.09226	6.19404	264,554
FACA_WO	0.00264	0.00942	0.00000	0.00000	0.00000	0.00000	0.13760	5.19310	264,554
SIZE	11.58689	1.93803	1.79176	10.14194	11.50244	12.89241	17.57328	0.23210	264,554
DEBT	0.52051	0.29796	0.00000	0.26984	0.55244	0.77869	1.00000	-0.21913	264,554
FIN_DEBT	0.18397	0.24313	0.00000	0.00000	0.05786	0.31433	1.00000	1.31921	264,554
CASH	0.13788	0.21576	0.00000	0.00582	0.04232	0.16835	1.00000	2.27848	264,554
EMP	5.91978	17.03052	0.00000	0.00000	1.20000	4.10000	249.97000	6.92761	264,554

Panel B: Descriptive statistics of writing off vs non-writing off SMEs															
	Write off FA		Do not write off FA			Write off CA		Do not write off CA			Write off FA/CA		Do not write off FA/CA		
	Mean	SD	Mean	SD	t-value	Mean	SD	Mean	SD	t-value	Mean	SD	Mean	SD	t-value
ADJ_OP	0.06442	0.11322	0.04126	0.14446	29.611***	0.06833	0.11763	0.03843	0.14589	46.649***	0.06696	0.11846	0.03684	0.14725	51.036***
Δ_ADJ_OP$_D$	-0.01985	0.13358	-0.02571	0.19892	6.192***	-0.02138	0.13716	-0.02593	0.20323	5.804***	-0.02174	0.14059	-0.02612	0.20621	5.918***
% loss	0.19627	0.59971	0.24465	0.52899	-12.135***	0.18749	0.58305	0.25070	0.52559	-21.095***	0.18746	0.57820	0.25487	0.52281	-25.261***
NI	0.03854	0.09476	0.03014	0.12323	12.784***	0.04143	0.09941	0.02882	0.12464	23.199***	0.04094	0.09973	0.02813	0.12603	25.652***
Δ_NI$_D$	-0.02356	0.13768	-0.03088	0.19033	7.607***	-0.02229	0.13873	-0.03179	0.19414	12.179***	-0.02336	0.14169	-0.03212	0.19666	11.972***
FA_WO	0.00742	0.01162	0.00000	0.00000	99.839***	0.00114	0.00492	0.00059	0.00395	22.132***	0.00314	0.00840	0.00000	0.00000	89.831***
CA_WO	0.00426	0.01095	0.00172	0.00801	35.389***	0.01174	0.01748	0.00000	0.00000	140.831***	0.00896	0.01607	0.00000	0.00000	133.870***
FACA_WO	0.01168	0.01547	0.00172	0.00801	99.328***	0.01288	0.01815	0.00059	0.00395	141.338***	0.01210	0.01711	0.00000	0.00000	169.850***
SIZE	13.48660	1.80261	11.39371	1.84477	172.477***	13.10137	1.82753	11.28482	1.81390	190.597***	13.04092	1.79212	11.18193	1.77615	220.660***
DEBT	0.58202	0.25751	0.51426	0.30106	38.525***	0.55561	0.25645	0.51352	0.30508	30.404***	0.56520	0.25906	0.50807	0.30676	44.897***
FIN_DEBT	0.25124	0.23195	0.17713	0.24320	47.354***	0.22155	0.22480	0.17647	0.24594	37.784***	0.22838	0.22918	0.17160	0.24545	51.780***
CASH	0.07326	0.12346	0.14445	0.22196	-78.170***	0.08899	0.13957	0.14763	0.22667	-71.330***	0.08800	0.13909	0.15177	0.23074	-82.806***
EMP	23.58628	38.86990	4.12329	11.44267	77.903***	17.42645	32.86590	3.62472	10.03855	87.271***	16.11097	30.85438	3.08145	8.28857	100.373***
N	24,419		240,135			43,992		220,562			57,630		206,924		

Note. Some of the variables are provided for descriptive purposes only and are not included in any of the models in this chapter. Panel A: Statistics are provided for pooled data 2006-2012. ***ADJ_OP*** is operating profit before taxes plus write-off expense divided by total assets. ***% loss*** is bottom line loss expressed as a percentage of adjusted operating profit. ***NI*** is net income scaled by total assets. ***FA_WO***, ***CA_WO***, ***FACA_WO*** are variables expressing fixed asset write-offs, current asset write-offs and fixed and/or current asset write-offs as ratios of total assets. ***SIZE*** is the natural logarithm of total assets. ***DEBT*** is the ratio of total debt (short- and long-term) to total assets. ***FIN_DEBT*** is the ratio of financial debt (short- and long-term) to total assets. ***CASH*** is the ratio of cash to total assets. ***EMP*** is the average number of employees based on hours worked. Panel B: ***Δ_ADJ_OP*** is the change in scaled adjusted operating profit from year t to year t+1. ***Δ_NI*** is the change in scaled net income from year t to year t+1.
$_D$ Denotes dependent variable. *** Denotes significant at 1%.

Source: Own work.

Table 3.3. Mann-Whitney U Test for SMEs that write off and do not write off fixed assets

Variable	FA_WO	N	Mean Rank	Z
ADJ_OP	No	240,135	130,230.77	-43.227***
	Yes	24,419	152,404.96	
Δ_ADJ_OP$_D$	No	240,135	132,542.85	-5.604***
	Yes	24,419	129,668.09	
% loss	No	240,135	133,258.35	-28.229***
	Yes	24,419	122,631.90	
NI	No	240,135	131,399.80	-18.537***
	Yes	24,419	140,908.74	
Δ_NI$_D$	No	240,135	132,276.65	-0.018
	Yes	24,419	132,285.89	
FA_WO	No	240,135	120,068.00	-513.544***
	Yes	24,419	252,345.00	
CA_WO	No	240,135	128,612.07	-119.381***
	Yes	24,419	168,323.13	
FACA_WO	No	240,135	121,663.11	-310.433***
	Yes	24,419	236,658.80	
SIZE	No	240,135	125,216.81	-149.123***
	Yes	24,419	201,711.88	
DEBT	No	240,135	130,783.39	-31.556***
	Yes	24,419	146,970.44	
FIN_DEBT	No	240,135	129,152.75	-68.372***
	Yes	24,419	163,006.09	
CASH	No	240,135	134,247.13	-41.607***
	Yes	24,419	112,908.30	
EMP	No	240,135	125,234.89	-150.369***
	Yes	24,419	201,534.07	

Note. Some of the variables are provided for descriptive purposes only and are not included in any of the models in this chapter.
ADJ_OP is operating profit before taxes plus write-off expense divided by total assets. ***Δ_ADJ_OP*** is the change in scaled adjusted operating profit from year t to year t+1. ***% loss*** is bottom line loss expressed as a percentage of adjusted operating profit. ***NI*** is net income scaled by total assets. ***Δ_NI*** is the change in scaled net income from year t to year t+1. ***FA_WO***, ***CA_WO***, ***FACA_WO*** are variables expressing fixed asset write-offs, current asset write-offs and fixed and/or current asset write-offs as ratios of total assets. ***SIZE*** is the natural logarithm of total assets. ***DEBT*** is the ratio of total debt (short- and long-term) to total assets. ***FIN_DEBT*** is the ratio of financial debt (short- and long-term) to total assets. ***CASH*** is the ratio of cash to total assets. ***EMP*** is the average number of employees based on hours worked.
$_D$ Denotes dependent variable. *** Denotes significant at 1%.

Source: Own work.

Table 3.4 reports Pearson correlations between the dependent, explanatory, control and additional variables. With regard to our analysis, we highlight the following observations. All write-off variables are negatively correlated with future changes in operating profit but

positively correlated with future changes in net income, implying possible coexistence of both operating and discretionary motives for asset write offs. All correlations are statistically significant at p = 0.01 level, except for the bivariate correlation coefficient between *FA_WO* and *Δ_NI*. *SIZE* is significantly positively correlated with both performance measures represented by *ADJ_OP* and *NI* and with changes in future profitability (*Δ_ADJ_OP* and *Δ_NI*), consistent with the findings of García-Teruel and Martínez-Solano (2007, p.174). Leverage is negatively associated with both profitability measures, implying that SMEs could be facing agency costs of debt. However, the results that *FIN_DEBT* is positively correlated with future changes in profitability is contradictory, indicating that increase in leverage is related to positive changes in future profitability. The findings are similar when it comes to liquidity, where *CASH* is positively associated with *ADJ_OP* and *NI*, but negatively correlated with future changes in earnings. As a final note, the correlation coefficients between the dependent and explanatory variables are not particularly strong. A small number of the correlations between the independent variables are quite strong, however, any multicollinearity is not likely to invalidate our conclusions, since these highly correlated variables are not used simultaneously in our models.

Table 3.4. Correlation matrix

	ADJ_OP	*Δ_ADJ_OP$_D$*	*% loss*	*NI*	*Δ_NI$_D$*	*FA_WO*	*CA_WO*	*FACA_WO*	*SIZE*	*DEBT*	*FIN_DEBT*	*CASH*	*EMP*
ADJ_OP	1												
Δ_ADJ_OP$_D$	-0.338**	1											
% loss	-0.417**	0.121**	1										
NI	0.921**	-0.312**	-0.483**	1									
Δ_NI$_D$	-0.258**	0.885**	0.124**	-0.305**	1								
FA_WO	0.033**	-0.008**	-0.001	0.001	0.002	1							
CA_WO	0.071**	-0.018**	0.007**	0.010**	0.008**	0.025**	1						
FACA_WO	0.078**	-0.019**	0.006**	0.010**	0.008**	0.461**	0.899**	1					
SIZE	0.126**	0.037**	-0.143**	0.106**	0.035**	0.085**	0.117**	0.141**	1				
DEBT	-0.046**	0.045**	-0.047**	-0.079**	0.034**	0.046**	0.014**	0.033**	0.341**	1			
FIN_DEBT	-0.068**	0.056**	0.036**	-0.099**	0.047**	0.040**	-0.001	0.017**	0.377**	0.568**	1		
CASH	0.059**	-0.051**	0.030**	0.068**	-0.038**	-0.040**	-0.036**	-0.050**	-0.331**	-0.291**	-0.275**	1	
EMP	0.038**	0.016**	-0.042**	0.022**	0.015**	0.047**	0.106**	0.114**	0.447**	0.074**	0.077**	-0.117**	1
N	264,554												

Note. Some of the variables are provided for descriptive purposes only and are not included in any of the models in this chapter.
The table shows Pearson's bivariate correlation coefficients. ***ADJ_OP*** is operating profit before taxes plus write-off expense divided by total assets. ***Δ_ADJ_OP*** is the change in scaled adjusted operating profit from year t to year t+1. ***% loss*** is bottom line loss expressed as a percentage of adjusted operating profit. ***NI*** is net income scaled by total assets. ***Δ_NI*** is the change in scaled net income from year t to year t+1. ***FA_WO***, ***CA_WO***, ***FACA_WO*** are variables expressing fixed asset write-offs, current asset write-offs and fixed and/or current asset write-offs as ratios of total assets. ***SIZE*** is the natural logarithm of total assets. ***DEBT*** is the ratio of total debt (short- and long-term) to total assets. ***FIN_DEBT*** is the ratio of financial debt (short- and long-term) to total assets. ***CASH*** is the ratio of cash to total assets. ***EMP*** is the average number of employees based on hours worked.
$_D$ Denotes dependent variable. ** Denotes correlation significant at 1% (2-tailed).

Source: Own work.

3.4.2 Regression results

To examine the relation between current period asset impairments and future changes in earnings we start with the base model presented in equation 1 and then we repeat the analysis by additionally incorporating the control variables as specified in equation 2. We perform six linear regressions on the pooled 2006-2013 data, such that the regressions are run separately for each type of asset write-off as explanatory variable combined with either Δ_ADJ_OP or Δ_NI as the dependent variable. In our analysis, we deal with a longitudinal panel data set, where repeated measurements are recorded from the same firms in the course of several years, hence there is a potentially clustered nature of our data. In such cases, the model errors for a given firm in different years can be correlated. Failure to account for the within-cluster error correlation can result in small standard errors and consequently narrow confidence intervals, too large *t*-statistics and misleadingly low *p*-values (Cameron & Miller, 2015, p. 318). Hence, it can lead to biased conclusions regarding the regression coefficients. To account for the cluster effect, we perform linear regression with clustered standard errors using the SPSS Complex samples feature (Huang, 2016, p. 178).

Since we obtain differing results from the analyses run with and without controls, we report both sets of results, as recommended by Becker (2005, p. 286). The results of the base model linear regressions are presented in Table 3.5. The first three columns show the results for Δ_ADJ_OP as dependent variable and the next three columns for Δ_NI as dependent variable. The *t*-statistics are provided in parentheses. We find that all estimated β coefficients are statistically significantly different from zero, except for the coefficient of *FA_WO* when regressed with Δ_NI as the dependent variable. Nevertheless, the coefficients show contradicting signs. When the relation between current period write-offs and future changes in operating profit is analysed, which is cleared from any effect of a write-off decision, each explanatory variable is signed as hypothesized. Such results imply that write-offs are indeed negatively associated with future profitability developments. Consequently, we can assume that the SMEs in our sample disclose asset impairments in accordance with accounting rules and thus signal diminishing future profitability. However, when current period write-offs are regressed with future changes in bottom line profitability, the independent variables show positive signs, contrary to what is hypothesized. Furthermore, the coefficient for *FA_WO* is statistically insignificant. Δ_NI is a profitability measure which integrates the consequences of any write-off decisions. Therefore, the finding that write-offs are positively or insignificantly related to Δ_NI, implies that the SMEs in our sample exercise the option to use write-offs to manage earnings. In other words, these results suggest that our sample SMEs record asset impairments for reasons other than signalling falling expectations about future cash flows, thus we detect evidence of discretionary practices as well. Nevertheless, the economic significance of the explanatory variables is quite low. For example, a one-unit increase in *CA_WO*, which seems to have the highest impact on future changes in earnings, results in an average 0.406 decrease in the dependent variable Δ_ADJ_OP and an average 0.183 increase in the dependent variable Δ_NI, respectively.

In general, therefore, it seems that SMEs in Slovenia record asset write-offs for both operating and discretionary reasons. These results match those observed by Szczesny and Valentinčič (2013, p. 310) in German SMEs, where both motives for write-offs are detected. The existence of one motive does not exclude the presence of the other, as one firm can decide to write off an asset for operating reasons in one period or segment and for opportunistic in another (Szczesny & Valentinčič, 2013, p. 309). Therefore, the results imply that accounting data on asset write-offs cannot be considered a reliable predictor of future profitability.

Table 3.5. Clustered standard errors linear regression analyses on pooled 2006-2013 data

	Coefficients for models (*t*-values in parentheses)					
	$\Delta\_ADJ\_OP_D$			Δ_NI_D		
FA_WO	-0.35988*** (-4.462)			0.10714 (1.333)		
CA_WO		-0.40645*** (-10.235)			0.18310*** (4.475)	
FACA_WO			-0.38951*** (-10.984)			0.16489*** (4.567)
Constant	-0.02492*** (-73.641)	-0.02438*** (-70.044)	-0.02414*** (-68.124)	-0.03028*** (-89.431)	-0.03057*** (-88.127)	-0.03064*** (-86.938)
R^2	0.00006	0.00031	0.00036	0.00001	0.00007	0.00007
N	264,554	264,554	264,554	264,554	264,554	264,554

Note. The table shows results of six clustered standard error linear regression analyses performed for each combination of the dependent and explanatory variables. ***Δ_ADJ_OP*** is the change in adjusted operating profit from year t to year t+1. ***Δ_NI*** is the change in net income from year t to year t+1. ***FA_WO***, ***CA_WO***, ***FACA_WO*** are variables expressing fixed asset write-offs, current asset write-offs and fixed and/or current asset write-offs. Variables are deflated by total assets.
$_D$ Denotes dependent variable. ***Denotes significant at 1%.

Source: Own work.

Next, we re-run our initial analysis to include control variables. The results are generally consistent with the initial findings, in that we find indications of both operating and discretionary reasons for recording asset impairments. The relation between write-offs and *Δ_ADJ_OP* is statistically significant and negative, providing evidence that write-offs indeed signalize deteriorating profitability and that SMEs disclose them as required by accounting regulation. Including control variables increases the negative effect of write-offs on future changes in adjusted operating profit. From the first three columns of Table 3.6, we can see that the highest economic significance is shown by the variable *FA_WO*, whose one-unit increase causes an average decrease of 0.542 in *Δ_ADJ_OP*. This finding is in accordance with Kosi and Valentinčič (2013, p. 22) who suggest that fixed asset write-offs are more likely to be recorded for operating reasons than as an earnings management tool, since they are related to higher costs. When we refer to the second three columns of Table 3.6, showing the results of the regression analysis using *Δ_NI* as the proxy for future changes in earnings, we see that including control variables reduces the statistical and economic

significance of the write-off variables. The variable *FA_WO* shows negative association with the dependent variable, however it is statistically insignificant. On the other hand, *CA_WO* and *FACA_WO* are statistically significant at the levels of p=0.01 and p=0.05 respectively, but have positive effect on future changes in net income. The statistical insignificance and the positive relation between current period write-offs and future changes in net income indicates that also discretionary reasons are present in the decision to record asset impairments by the SMEs in our sample.

Table 3.6. Clustered standard errors linear regression analyses on pooled 2006-2013 data with control variables

	Coefficients for models (*t*-values in parentheses)					
	$\Delta\_ADJ\_OP_D$			Δ_NI_D		
FA_WO	-0.54242*** (-6.745)			-0.04591 (-0.572)		
CA_WO		-0.47879*** (-12.042)			0.12028*** (2.928)	
FACA_WO			-0.48536*** (-13.642)			0.08634** (2.376)
SIZE	0.00097*** (4.755)	0.00116*** (5.673)	0.00125*** (6.080)	0.00121*** (5.850)	0.00113*** (5.443)	0.00114*** (5.454)
FIN_DEBT	0.03372*** (25.011)	0.03279*** (24.249)	0.03284*** (24.297)	0.02631*** (19.282)	0.02652*** (19.404)	0.02645*** (19.353)
CASH	-0.03393*** (-13.828)	-0.03392*** (-13.826)	-0.03403*** (-13.873)	-0.02239*** (-9.631)	-0.02235*** (-9.615)	-0.02234*** (-9.609)
I_2	0.00073 (0.217)	0.00123 (0.364)	0.00102 (0.300)	0.00234 (0.679)	0.00230 (0.667)	0.00236 (0.683)
I_3	-0.02199*** (-6.110)	-0.02177*** (-6.046)	-0.02193*** (-6.087)	-0.02308*** (-6.318)	-0.02307*** (-6.317)	-0.02304*** (-6.308)
I_4	-0.00166 (-0.494)	-0.00115 (-0.341)	-0.00130 (-0.387)	-0.00153 (-0.448)	-0.00160 (-0.468)	-0.00155 (-0.453)
I_5	-0.00178 (-0.488)	-0.00118 (-0.323)	-0.00132 (-0.361)	-0.00111 (-0.301)	-0.00121 (-0.327)	-0.00115 (-0.312)
I_6	0.00384 (0.750)	0.00393 (0.768)	0.00354 (0.693)	-0.00434 (-0.807)	-0.00422 (-0.785)	-0.00418 (-0.776)
I_7	-0.00132 (-0.347)	-0.00119 (-0.314)	-0.00152 (-0.400)	-0.00175 (-0.448)	-0.00166 (-0.425)	-0.00162 (-0.414)
I_8	0.00006 (0.017)	0.00064 (0.190)	0.00045 (0.134)	-0.00061 (-0.178)	-0.00069 (-0.200)	-0.00063 (-0.182)
I_9	0.00771 (1.947)	0.00783** (1.975)	0.00770 (1.943)	0.00837** (2.100)	0.00839** (2.104)	0.00841** (2.109)
I_{10}	-0.01249*** (-2.951)	-0.01204*** (-2.843)	-0.01220*** (-2.879)	-0.01298*** (-3.057)	-0.01303*** (-3.070)	-0.01298*** (-3.059)
Constant	-0.03505*** (-8.364)	-0.03704*** (-8.826)	-0.03751*** (-8.932)	-0.04340*** (-10.195)	-0.04274*** (-10.030)	-0.04283*** (-10.050)
R^2	0.006	0.006	0.006	0.004	0.004	0.004
N	264,554	264,554	264,554	264,554	264,554	264,554

Note. The table shows results of six clustered standard error linear regression analyses performed for each combination of the dependent and explanatory variables, including control variables. ***Δ_ADJ_OP*** is the change in adjusted operating profit from year t to year t+1 deflated by total assets. ***Δ_NI*** is the change in net income from year t to year t+1 deflated by total assets. ***FA_WO***, ***CA_WO***, ***FACA_WO*** are variables expressing fixed asset write-offs, current asset write-offs and fixed and/or current asset write-offs deflated by total assets. ***SIZE*** is the natural logarithm of total assets. ***FIN_DEBT*** is the ratio of financial debt (short- and long-term) to total assets. ***CASH*** is the ratio of cash to total assets. $I_{2,3,...10}$ are industry dummies according to the "high-level SNA/ISIC aggregation".
D Denotes dependent variable. *** Denotes significant at 1%. ** Denotes significant at 5%.

Source: Own work.

Regarding the control variables, *SIZE*, *FIN_DEBT* and *CASH* are statistically significant. Out of the dummy variables only the industry dummies for the construction industry and other service activities are significant in all 6 regressions, while the industry dummy for public administration and defence, education, human health and social work activities is significant in four out of the six regressions. *SIZE* has a positive effect on future earnings, which is in line with our expectations, while leverage and liquidity have contrary effects to what is hypothesized.

To test for the effects of the recent financial crisis on the accounting choices of Slovenian SMEs, we run an additional set of linear regression analysis where we include a time dummy variable for the years considered as recession in Slovenia. The results in Table 3.7 imply that controlling for the effect of the financial crisis does not affect the results qualitatively.

The write-off variables are significantly negatively related to future changes in adjusted operating profit, whereas their relation to future changes in net income becomes statistically insignificant or positive. The signs of the write-off variables are contradicting when regressed with *Δ_NI*, as was the case in the previous analysis. *FA_WO* shows negative, albeit insignificant relation with *Δ_NI*, while *CA_WO* and *FACA_WO* show positive association. In all six cases, the FC dummy is positive and statistically significant, suggesting positive influence on future profitability, contrary to logical expectations. The inclusion of a FC dummy has a negligible effect on the size of the write-off variables' coefficients and no effect on their statistical significance. Therefore, we find evidence of SMEs using write-offs for both operating and discretionary reasons even when controlled for the effect of the financial crisis and we reject the hypothesis that SMEs record primarily operating asset write-offs during the crisis period to signal quality in the preparation of financial statements.

We can conclude that, given that asset impairments are used not only to signal declining future cash flows from an asset, but also as a means to manage earnings, they are merely noisy predictors of future profitability. Write-offs are a good indication of negative changes in operating profitability, however their relation to bottom line profitability is misleading. Therefore, external users should be careful when making inferences about the future profitability of a firm based on the information on asset write-offs conveyed in financial statements.

Table 3.7. Clustered standard errors linear regression analyses on pooled 2006-2013 data controlling for financial crisis

	Coefficients for models (*t*-values in parentheses)					
	$\Delta\_ADJ\_OP_D$			Δ_NI_D		
FA_WO	-0.53167*** (-6.617)			-0.04092 (-0.50980)		
CA_WO		-0.48130*** (-12.120)			0.11913*** (2.901)	
FACA_WO			-0.48523*** (-13.654)			0.08640** (2.378)
SIZE	0.00073*** (3.516)	0.00092*** (4.434)	0.00100*** (4.839)	0.00109*** (5.245)	0.00102*** (4.854)	0.00102*** (4.861)
FIN_DEBT	0.03392*** (25.169)	0.03299*** (24.407)	0.03304*** (24.457)	0.02640*** (19.359)	0.02661*** (19.480)	0.02654*** (19.430)
CASH	-0.03469*** (-14.136)	-0.03470*** (-14.139)	-0.03481*** (-14.184)	-0.02275*** (-9.779)	-0.02271*** (-9.763)	-0.02270*** (-9.758)
I_2	0.00049 (0.144)	0.00098 (0.289)	0.00076 (0.225)	0.00223 (0.647)	0.00218 (0.634)	0.00224 (0.650)
I_3	-0.02403*** (-6.665)	-0.02383*** (-6.608)	-0.02398*** (-6.645)	-0.02402*** (-6.568)	-0.02402*** (-6.568)	-0.02399*** (-6.559)
I_4	-0.00184 (-0.550)	-0.00134 (-0.399)	-0.00149 (-0.445)	-0.00162 (-0.474)	-0.00168 (-0.494)	-0.00163 (-0.479)
I_5	-0.00255 (-0.699)	-0.00196 (-0.537)	-0.00210 (-0.575)	-0.00147 (-0.399)	-0.00157 (-0.425)	-0.00151 (-0.410)
I_6	0.00285 (0.557)	0.00291 (0.570)	0.00254 (0.497)	-0.00480 (-0.893)	-0.00468 (-0.871)	-0.00464 (-0.863)
I_7	-0.00329 (-0.865)	-0.00320 (-0.840)	-0.00351 (-0.923)	-0.00267 (-0.682)	-0.00258 (-0.659)	-0.00254 (-0.649)
I_8	-0.00026 (-0.077)	0.00032 (0.094)	0.00013 (0.038)	-0.00076 (-0.221)	-0.00084 (-0.243)	-0.00078 (-0.226)
I_9	0.00649 (1.638)	0.00659 (1.662)	0.00647 (1.632)	0.00780 (1.958)	0.00782 (1.962)	0.00784** (1.966)
I_{10}	-0.01289*** (-3.048)	-0.01245*** (-2.942)	-0.01261*** (-2.978)	-0.01316*** (-3.104)	-0.01322*** (-3.117)	-0.01317*** (-3.106)
FC	0.00788*** (11.126)	0.00798*** (11.263)	0.00793*** (11.196)	0.00366*** (5.326)	0.00365*** (5.316)	0.00367*** (5.333)
Constant	-0.03635*** (-8.688)	-0.03837*** (-9.160)	-0.03882*** (-9.261)	-0.04400*** (-10.356)	-0.04335*** (-10.193)	-0.04344*** (-10.211)
R^2	0.006	0.006	0.007	0.004	0.004	0.004
N	264,554	264,554	264,554	264,554	264,554	264,554

Note. The table shows results of six clustered standard error linear regression analyses performed for each combination of the dependent and explanatory variables, including control variables. ***Δ_ADJ_OP*** is the change in adjusted operating profit from year t to year t+1 deflated by total assets. ***Δ_NI*** is the change in net income from year t to year t+1 deflated by total assets. ***FA_WO, CA_WO, FACA_WO*** are variables expressing fixed asset write-offs, current asset write-offs and fixed and/or current asset write-offs deflated by total assets. ***SIZE*** is the natural logarithm of total assets. ***FIN_DEBT*** is the ratio of financial debt (short- and long-term) to total assets. ***CASH*** is the ratio of cash to total assets. $I_{2.3....10}$ are industry dummies according to the "high-level SNA/ISIC aggregation". ***FC*** is a dummy variable representing financial crisis.
D Denotes dependent variable. *** Denotes significant at 1%. ** Denotes significant at 5%.

Source: Own work.

3.5 Robustness and additional tests

We perform a series of additional tests and sensitivity analysis to further explore the write-off decisions of the SMEs in our sample and to evaluate the robustness of our results.

First of all, we address the possible omitted variable problem, since we are not able to discern all relevant known and unknown factors that influence the future changes in profitability. Such errors in model specification can lead to biased estimated coefficients (Greene, 2002, p. 148). One way of dealing with this problem is to apply reverse regression, where the dependent variable assumes the role of a predictor and is regressed against the explanatory variables (Vanhonacker & Day, 1987, p. 255). In our case, we switch the roles of the variables representing future changes in profitability and the write-off variables. Since now the dependent variable is a type of asset write-off, which either takes on a positive value where write-offs indeed occur or a value of zero when no write-off is recorded, we deal with a censored sample. Therefore, we apply the Tobit regression as the appropriate analytical method (Kosi & Valentinčič, 2013, p. 17). When we apply reverse regression to the model specified in equation 2, it takes on the following specification:

$$\left.\begin{matrix} FA\_WO_t \\ CA\_WO_t \\ FACA\_WO_t \end{matrix}\right\} = \beta_0 + \beta_1 \left\{\begin{matrix} \Delta ADJ\_OP_{t+1} \\ \Delta NI_{t+1} \end{matrix}\right. + \beta_2 SIZE_t + \beta_3 FIN\_DEBT_t + \beta_4 CASH_t + \text{Industry dummies} + \varepsilon_t \quad (4)$$

Where *FA_WO*, *CA_WO* and *FACA_WO* are the dependent variables, β_0 is a constant, $\beta_{1,2,3,4}$ are the regression coefficients, ΔADJ_OP and ΔNI are the explanatory variables, *SIZE*, *FIN_DEBT*, *CASH* and industry dummies are the control variables, ε_t is the error term.

We present the results in Table 3.8. The coefficient estimates of Δ_ADJ_OP are significantly negative when regressed against all types of asset impairments, thus confirming the negative relation between write-offs and future changes in profitability. The coefficient estimate of Δ_NI is negative but statistically insignificant when regressed against *FA_WO*, implying that fixed asset write-offs are more likely to be recorded for operating reasons. When regressed against *CA_WO* and *FACA_WO* the regression coefficients of Δ_NI become positive and significant at p=0.01 and p=0.05 level respectively, once again providing evidence that the SMEs in our sample recognize write-offs for discretionary reasons as well. Thus, the results obtained by estimating the Tobit reverse regressions generally confirm the main findings presented above. We obtain consistent results when we perform reverse regression including the control variable for the financial crisis, however we do not present the results here to preserve concision.

Table 3.8. Reverse regression analyses with write-offs as dependent variables

	Coefficients for models (*p*-values in parentheses)					
	FA_WO_D	CA_WO_D	$FACO\_WO_D$	FA_WO_D	CA_WO_D	$FACO\_WO_D$
Δ_ADJ_OP	-0.00262*** (0.000)	-0.00419*** (0.000)	-0.00456*** (0.000)			
Δ_NI				-0.00045 (0.32196)	0.00185*** (0.00027)	0.00104** (0.01837)
SIZE	0.00476*** (0.000)	0.00658*** (0.000)	0.00641*** (0.000)	0.00476*** (0.000)	0.00657*** (0.000)	0.00639*** (0.000)
FIN_DEBT	-0.00158*** (0.000)	-0.01057*** (0.000)	-0.00750*** (0.000)	-0.00164*** (0.000)	-0.01074*** (0.000)	-0.00766*** (0.000)
CASH	-0.00484*** (0.000)	-0.00368*** (0.000)	-0.00487*** (0.000)	-0.00472*** (0.000)	-0.00344*** (0.000)	-0.00463*** (0.000)
I_2	-0.00283*** (0.00013)	0.00331*** 0.00060)	0.00146 (0.08032)	-0.00282*** (0.00013)	0.00332*** (0.00057)	0.00148 (0.07728)
I_3	-0.00359*** (0.000)	-0.00322*** (0.00119)	-0.00287*** (0.00083)	-0.00354*** (0.000)	-0.00307*** (0.00199)	-0.00273*** (0.00147)
I_4	-0.00269*** (0.00023)	0.00414*** (0.00001)	0.00238*** (0.00401)	-0.00268*** (0.00023)	0.00417*** (0.00001)	0.00241*** (0.00367)
I_5	-0.00183** (0.01934)	0.00594*** (0.000)	0.00405*** (0.000)	-0.00182** (0.01963)	0.00596*** (0.000)	0.00407*** (0.000)
I_6	-0.01239*** (0.000)	-0.01098*** (0.000)	-0.01251*** (0.000)	-0.01240*** (0.000)	-0.01094*** (0.000)	-0.01247*** (0.000)
I_7	-0.01041*** (0.000)	-0.00641*** (0.000)	-0.00804*** (0.000)	-0.01040*** (0.000)	-0.00639*** (0.000)	-0.00801*** (0.000)
I_8	-0.00317*** (0.00002)	0.00390*** (0.00005)	0.00219*** (0.00849)	-0.00317*** (0.00002)	0.00393*** (0.00004)	0.00221*** (0.00802)
I_9	-0.00142 (0.09702)	-0.00027 (0.80454)	-0.00024 (0.79782)	-0.00143 (0.09550)	-0.00028 (0.79821)	-0.00025 (0.78996)
I_{10}	-0.00189** (0.03073)	0.00390*** (0.00039)	0.00253*** (0.00806)	-0.00186** (0.03308)	0.00398*** (0.00029)	0.00261*** (0.00633)
Constant	-0.08101*** (0.000)	-0.10749*** (0.000)	-0.09806*** (0.000)	-0.08090*** (0.000)	-0.10722*** (0.000)	-0.09780*** (0.000)
Log likelihood	20,107.98	38,362.11	64,774.32	20,091.07	38,331.10	64,718.05
N	264,554	264,554	264,554	264,554	264,554	264,554

Note. The table shows results of six Tobit regression analyses. ***FA_WO, CA_WO, FACA_WO*** are variables expressing fixed asset write-offs, current asset write-offs and fixed and/or current asset write-offs deflated by total assets. ***Δ_ADJ_OP*** is the change in adjusted operating profit from year t to year t+1 deflated by total assets. ***Δ_NI*** is the change in net income from year t to year t+1 deflated by total assets. ***SIZE*** is the natural logarithm of total assets. ***FIN_DEBT*** is the ratio of financial debt (short- and long-term) to total assets. ***CASH*** is the ratio of cash to total assets. $I_{2.3....10}$ are industry dummies according to the "high-level SNA/ISIC aggregation".
D Denotes dependent variable. *** Denotes significant at 1%. ** Denotes significant at 5%.

Source: Own work.

Next, we re-estimate the dependent variables *Δ_ADJ_OP* and *Δ_NI* as the difference between current period earnings and earnings realized further in the future, assuming that the reduced cash flow from the asset materializes in a period longer than one year. So, we re-run the initial linear regressions for the asset write-offs recorded in year 2006 as explanatory variables, but with the dependent variables calculated as the difference between earnings in year 2006 and earnings in year 2008, 2009, 2010 and 2011, respectively. For reasons of brevity, we present the results of the regression analysis specified in equation 2,

however we do not disclose the regression coefficients of the industry dummies. The results disclosed in Table 3.9 mainly confirm those of the initial analysis. In the case when *Δ_ADJ_OP* is employed as the dependent variable, we obtain negative and statistically significant coefficients for all types of asset write-offs and for each Δ of the dependent variable. Since *Δ_ADJ_OP* is a measure of core performance excluding the effects of downward asset revaluations and it shows significant negative relation with previous period write-offs, we can conclude that asset impairments indeed signal diminishing expectations about future (operating) profitability. On the other hand, when we use *Δ_NI* as the dependent variable none of the coefficients of the write-off variables are statistically significant. Therefore, one might conclude that if SMEs have the option to exercise discretion over bottom line profitability by recording asset write-offs, they will resort to this option. The coefficient of *FA_WO* is negative, but statistically insignificant in all four regressions, somewhat implying that fixed asset impairments are less likely to be used to manage earnings. The regression coefficient of *CA_WO* is positive in three out of the four regressions, but is always statistically insignificantly different from zero. Finally, the coefficients of *FACA_WO* are negative in two out of the four regressions, but always statistically insignificant. We obtain consistent results when we run the regressions without the control variables, but we do not present the results here. They are however, available upon request.

Table 3.9. Clustered standard errors linear regression analyses with alternative dependent variables

	Coefficients for models (t-values in parentheses)											
	$\Delta\_ADJ\_OP_{2008\text{-}2006\_D}$			$\Delta\_NI_{2008\text{-}2006\_D}$			$\Delta\_ADJ\_OP_{2009\text{-}2006\_D}$			$\Delta\_NI_{2009\text{-}2006\_D}$		
FA_WO	-0.83973***			-0.14432			-0.97597***			-0.29889		
	(-3.174)			(-0.572)			(-3.160)			(-1.091)		
CA_WO		-0.72379***			0.07250			-0.77700***			0.01382	
		(-4.633)			(0.497)			(-4.922)			(0.092)	
FACA_WO			-0.73906***			0.02009			-0.81114***			-0.06030
			(-5.461)			(0.159)			(-5.773)			(-0.463)
SIZE	0.00109	0.00130	0.00143**	0.00194***	0.00188***	0.00190***	0.00128	0.00100	0.00165**	0.00216***	0.00211***	0.00215***
	(1.536)	(1.815)	(2.002)	(2.869)	(2.763)	(2.787)	(1.581)	(1.847)	(2.037)	(2.772)	(2.691)	(2.747)
FIN_DEBT	0.04117***	0.04029***	0.04026***	0.02542***	0.02551***	0.02545***	0.05710***	0.05600***	0.05609***	0.04305***	0.04306***	0.04297***
	(8.705)	(8.505)	(8.507)	(5.446)	(5.457)	(5.446)	(11.027)	(10.827)	(10.832)	(8.272)	(8.267)	(8.254)
CASH	-0.01963***	-0.01945***	-0.01962***	-0.01114	-0.01110	-0.01110)	-0.03408***	-0.03400***	-0.03407***	-0.01911**	-0.01904**	-0.01905**
	(-2.629)	(-2.605)	(-2.628)	(-1.621)	(-1.616)	(-1.615)	(-4.145)	(-4.121)	(-4.146)	(-2.513)	(-2.503)	(-2.505)
Constant	-0.00382	0.00190	0.00004	-0.01695	-0.01693	-0.01662	0.08762	0.09300	0.09181	0.06778	0.06839	0.06860
	(-0.045)	(0.023)	(0.001)	(-0.218)	(-0.218)	(-0.214)	(0.860)	(0.921)	(0.904)	(0.662)	(0.668)	(0.670)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.005	0.005	0.006	0.004	0.004	0.004	0.008	0.009	0.009	0.006	0.006	0.006
N	33,643	33,643	33,643	33,643	33,643	33,643	32,361	32,361	32,361	32,361	32,361	32,361
	$\Delta\_ADJ\_OP_{2010\text{-}2006\_D}$			$\Delta\_NI_{2010\text{-}2006\_D}$			$\Delta\_ADJ\_OP_{2011\text{-}2006\_D}$			$\Delta\_NI_{2011\text{-}2006\_D}$		
FA_WO	-1.01606***			-0.18227			-1.01707***			-0.25057		
	(-3.361)			(-0.661)			(-2.920)			(-0.732)		
CA_WO		-0.94504***			-0.15599			-0.78892***			0.10331	
		(-5.121)			(-0.844)			(-4.801)			(0.655)	
FACA_WO			-0.94376***			-0.15910			-0.82391***			0.02143
			(-5.905)			(-1.016)			(-5.515)			(0.148)
SIZE	0.00091	0.00121	0.00137	0.00105	0.00110	0.00112	-0.00170	-0.00150	-0.00134	-0.00090	-0.00099	-0.00096
	(1.047)	(1.382)	(1.561)	(1.193)	(1.239)	(1.269)	(-1.872)	(-1.642)	(-1.465)	(-0.945)	(-1.042)	(-1.001)
FIN_DEBT	0.06003***	0.05885***	0.05883***	0.04355***	0.04335***	0.04334***	0.06800***	0.06706***	0.06701***	0.04809***	0.04822***	0.04812***
	(10.805)	(10.589)	(10.590)	(7.484)	(7.446)	(7.445)	(12.218)	(12.033)	(12.025)	(8.291)	(8.303)	(8.283)
CASH	-0.05254***	-0.05233***	-0.05257***	-0.03954***	-0.03950***	-0.03954***	-0.06901***	-0.06879***	-0.06900***	-0.05164***	-0.05157***	-0.05157***
	(-5.819)	(-5.797)	(-5.825)	(-4.620)	(-4.616)	(-4.621)	(-7.109)	(-7.089)	(-7.111)	(-5.651)	(-5.644)	(-5.644)
Constant	0.02958	0.03672	0.03425	0.06105	0.06227	0.06187	0.01197	0.01910	0.01754	0.02395	0.02385	0.02440
	(0.285)	(0.355)	(0.331)	(0.624)	(0.637)	(0.632)	(0.118)	(0.190)	(0.174)	(0.232)	(0.232)	(0.237)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.009	0.010	0.010	0.006	0.007	0.007	0.011	0.012	0.012	0.007	0.007	0.007
N	30,984	30,984	30,984	30,984	30,984	30,984	29,673	29,673	29,673	29,673	29,673	29,673

Note. The table shows results of clustered standard error linear regression analyses performed for each combination of the explanatory variables and dependent variables, calculated as subtraction of income in period t and income in period t+2, t+3, t+4 and t+5, respectively. ***Δ_ADJ_OP*** is the change in adjusted operating profit. ***Δ_NI*** is the change in net income. ***FA_WO***, ***CA_WO***, ***FACA_WO*** are variables expressing fixed asset write-offs, current asset write-offs and fixed and/or current asset write-offs in the year 2006, deflated by total assets. ***SIZE*** is the natural logarithm of total assets. ***FIN_DEBT*** is the ratio of financial debt (short- and long-term) to total assets. ***CASH*** is the ratio of cash to total assets. Industry dummies are included in the models, however their parameters are not shown.
$_D$ Denotes dependent variable. *** Denotes significant at 1%. ** Denotes significant at 5%.

Source: Own work.

In our further analysis, we employ a different measure of future profitability to test the robustness of our results. Since asset impairments are intended to indicate lower future cash flows expected from an asset, we use cash flow as the dependent variable capturing core performance. We use *EBITDA* at time period t+1 as a proxy for cash flow generated one year after the write-offs have been recognized (Fabozzi, 2008, p. 310). To preserve consistency with the initial model we also analyse the relation between current period write offs and future change in cash flow ($\Delta EBITDA$), calculated as the difference between *EBITDA* in period t+1 and *EBITDA* in period t. *EBITDA* is calculated by adding back amortization expense to operating profit. With that, this profitability measure includes the effects of asset write-offs if any, therefore if they are used to manage earnings, it would be shown in a positive or insignificant relationship. If write-offs indeed signified reduced future cash flow, the relationship between current write-offs and future cash flow or change in cash flow would be significant and negative. We apply clustered standard errors linear regression and present the results in Table 3.10.

Both regression analyses imply that write-offs are used for motives other than communicating the underlying economic performance of the firm. When regressed against future *EBITDA*, the estimated coefficients of *FA_WO* and *FACA_WO* are positive and statistically significant, while the coefficient of *CA_WO* is positive but insignificant. When the change in *EBITDA* is used as the dependent variable, the coefficients of all three write-off variables become statistically insignificant and remain positive.

Next, we conduct clustered standard errors linear regression analyses considering only observations with non-zero write-offs. For that purpose, we form three subsamples, constructed out of firm-year observations with fixed asset write-offs only, firm-year observations with current asset write-offs only and firm-year observations with both fixed and/or current asset write-offs. As shown in Table 3.11, these regression analyses produce consistent results and thus corroborate our initial findings that SMEs write off assets for both operating and discretionary reasons. The estimated β coefficients of all three types of asset write-offs show negative and significant relation with Δ_ADJ_OP, however when we employ Δ_NI as the dependent variable the relation becomes positive and statistically insignificant in all three cases of asset types. We obtain consistent results if we run the regressions without control variables (according to equation 1) and if we control for financial crisis (according to equation 3), however we do not present the results here.

Table 3.10. Clustered standard errors linear regression analysis with EBITDAt+1 and ΔEBITDA as dependent variables

	Coefficients for models (*t*-values in parentheses)					
	$EBITDA_{t+1,D}$			$\Delta EBITDA_D$		
FA_WO	0.56006*** (6.000)			1.98461 (1.910)		
CA_WO		0.04532 (0.958)			1.65691 (1.838)	
FACA_WO			0.14362*** (3.384)			1.69793 (1.858)
SIZE	0.01570*** (53.140)	0.01577*** (53.270)	0.01569*** (52.917)	-0.08000 (-1.831)	-0.08065 (-1.831)	-0.08095 (-1.832)
FIN_DEBT	-0.01774*** (-9.384)	-0.01761*** (-9.293)	-0.01745*** (-9.216)	0.22451** (2.329)	0.22758** (2.322)	0.22747** (2.322)
CASH	-0.00118 (-0.413)	-0.00129 (-0.449)	-0.00124 (-0.432)	0.06840 (0.409)	0.06833 (0.408)	0.06869 (0.410)
I_2	0.01822*** (3.422)	0.01794*** (3.374)	0.01796*** (3.376)	0.03356 (1.303)	0.03182 (1.262)	0.03258 (1.280)
I_3	-0.02753*** (-5.026)	-0.02772*** (-5.068)	-0.02768*** (-5.059)	0.05579 (0.567)	0.05502 (0.561)	0.05561 (0.566)
I_4	0.00037 (0.071)	0.00014 (0.028)	0.00013 (0.025)	-0.02235 (-1.354)	-0.02414 (-1.406)	-0.02357 (-1.392)
I_5	0.02356*** (4.122)	0.02335*** (4.089)	0.02331*** (4.081)	0.13759 (0.776)	0.13554 (0.767)	0.13603 (0.769)
I_6	-0.02589*** (-3.416)	-0.02630*** (-3.471)	-0.02612*** (-3.448)	0.00512 (0.204)	0.00469 (0.187)	0.00605 (0.238)
I_7	-0.03929*** (-6.703)	-0.03963*** (-6.768)	-0.03948*** (-6.741)	0.02521 (0.919)	0.02482 (0.909)	0.02596 (0.937)
I_8	0.01976*** (3.731)	0.01949*** (3.685)	0.01948*** (3.683)	-0.05993** (-2.108)	-0.06191** (-2.108)	-0.06123** (-2.110)
I_9	0.07449*** (11.304)	0.07434*** (11.287)	0.07438*** (11.293)	-0.08075** (-2.003)	-0.08122** (-2.004)	-0.08075** (-2.003)
I_{10}	-0.00377 (-0.591)	-0.00400 (-0.627)	-0.00400 (-0.628)	-0.05410 (-0.916)	-0.05574 (-0.934)	-0.05515 (-0.928)
Constant	-0.14062*** (-22.469)	-0.14088*** (-22.525)	-0.14025*** (-22.416)	0.87853 (1.756)	0.88523 (1.757)	0.88692 (1.757)
R^2	0.030	0.027	0.027	0.001	0.001	0.001
N	279,107	279,107	279,107	279,107	279,107	279,107

Note. The table shows results regression analyses with $\boldsymbol{EBITDA_{t+1}}$ and $\Delta\boldsymbol{EBITDA}$ as the dependent variable. ***EBITDA*** is operating profit plus amortization deflated by total assets. ***FA_WO, CA_WO, FACA_WO*** are variables expressing fixed asset write-offs, current asset write-offs and fixed and/or current asset write-offs deflated by total assets. ***SIZE*** is the natural logarithm of total assets. ***FIN_DEBT*** is the ratio of financial debt (short- and long-term) to total assets. ***CASH*** is the ratio of cash to total assets. $I_{2.3....10}$ are industry dummies according to the "high-level SNA/ISIC aggregation".
$_D$ Denotes dependent variable. *** Denotes significant at 1%. ** Denotes significant at 5%.

Source: Own work.

Table 3.11. Clustered standard errors linear regression analyses according to asset type, non-zero write-off observations

	Coefficients for models (*t*-values in parentheses)					
	$\Delta\_ADJ\_OP_D$			Δ_NI_D		
FA_WO	-0.47285*** (-4.625)			0.05711 (0.547)		
CA_WO		-0.53770*** (-10.670)			0.07998 (1.509)	
FACA_WO			-0.51403*** (-11.612)			0.08085 (1.749)
SIZE	0.00416*** (5.608)	0.00417*** (8.217)	0.00466*** (10.103)	0.00417*** (5.290)	0.00346*** (6.284)	0.00416*** (8.322)
FIN_DEBT	0.03015*** (7.936)	0.02395*** (7.886)	0.02667*** (10.121)	0.01412*** (3.507)	0.01810*** (5.362)	0.01865*** (6.470)
CASH	-0.06140*** (-4.998)	-0.04775*** (-6.005)	-0.04967*** (-7.066)	-0.03330*** (-2.869)	-0.02768*** (-3.642)	-0.02673*** (-3.988)
I_2	-0.00578 (-0.804)	-0.00716 (-1.250)	-0.00695 (-1.298)	-0.00554 (-0.968)	-0.00444 (-0.901)	-0.00487 (-1.023)
I_3	-0.02202*** (-2.792)	-0.02073*** (-3.255)	-0.02238*** (-3.833)	-0.03097*** (-4.609)	-0.02807*** (-4.785)	-0.03018*** (-5.564)
I_4	-0.00307 (-0.428)	-0.00949 (-1.664)	-0.00769 (-1.444)	-0.00576 (-1.017)	-0.00760 (-1.555)	-0.00737 (-1.564)
I_5	-0.00075 (-0.092)	-0.00257 (-0.403)	-0.00222 (-0.375)	-0.00534 (-0.750)	-0.00394 (-0.696)	-0.00433 (-0.803)
I_6	0.00361 (0.259)	-0.00946 (-0.747)	-0.00932 (-0.874)	-0.03223 (-1.448)	-0.03947** (-2.442)	-0.02899** (-2.211)
I_7	-0.02097** (-2.311)	-0.00832 (-1.238)	-0.01232** (-1.980)	-0.02041** (-2.452)	-0.00581 (-0.931)	-0.01122 (-1.888)
I_8	0.00102 (0.136)	-0.00705 (-1.194)	-0.00536 (-0.976)	-0.00504 (-0.840)	-0.00836 (-1.641)	-0.00805 (-1.651)
I_9	0.00104 (0.110)	-0.00960 (-1.170)	-0.00706 (-0.980)	0.00348 (0.419)	-0.00624 (-0.815)	-0.00407 (-0.602)
I_{10}	-0.00602 (-0.605)	-0.01436 (-1.648)	-0.01244 (-1.620)	-0.00368 (-0.411)	-0.01359 (-1.583)	-0.01078 (-1.449)
Constant	-0.07383*** (-5.420)	-0.06524*** (-6.800)	-0.07345*** (-8.353)	-0.07673*** (-5.764)	-0.06543*** (-6.862)	-0.07543*** (-8.617)
R^2	0.018	0.018	0.019	0.009	0.007	0.008
N	20,996	38,419	50,155	20,996	38,419	50,155

Note. The table shows results of clustered standard error linear regression analyses performed on subsamples with non-zero write off observations separately for each asset type. ***Δ_ADJ_OP*** is the change in adjusted operating profit from year t to year t+1. ***Δ_NI*** is the change in net income from year t to year t+1. ***FA_WO***, ***CA_WO***, ***FACA_WO*** are variables expressing fixed asset write-offs, current asset write-offs and fixed and/or current asset write-offs deflated by total assets. ***SIZE*** is the natural logarithm of total assets. ***FIN_DEBT*** is the ratio of financial debt (short- and long-term) to total assets. ***CASH*** is the ratio of cash to total assets. $I_{2.3....10}$ are industry dummies according to the "high-level SNA/ISIC aggregation".
$_D$ Denotes dependent variable. *** Denotes significant at 1%. ** Denotes significant at 5%.

Source: Own work.

Lastly, we make an attempt to disentangle one possible motive for recording discretionary asset write-offs and that is the debt repayment capacity. As demonstrated by Szczesny and Valentinčič (2013, p. 306) private firms using higher proportion of financial debt relative to their assets, write off relatively more in order to preserve future debt repayment capability. By writing off more in periods when they are able to do so, firms manipulate future expenses downwards and earnings upwards, securing higher probability of meeting future debt covenants.

To test for the possible presence of the debt repayment capacity motive, we analyse the relation between current period write-offs and future changes in financial debt. If write-offs were used to influence the future debt repayment capability of the firm, we would expect a negative relation between current period write-offs and future changes in financial debt position. By recording asset impairments in the current period, the firm reduces future expenses and increases future earnings, thus reducing the relative proportion of financial debt to total assets. Here, we make an important assumption, that the SMEs in our sample do not enter in new major debt agreements with financial institutions, given that their access to external financing sources is limited. We define the dependent variable *ΔFIN_DEBT* as total financial debt (short- and long-term) in year t+1 less total financial debt in year t, both deflated by total assets from the corresponding year. The independent variables are current period write-offs according to asset type, as in the previous analyses (*FA_WO*, *CA_WO* and *FACA_WO*). We also employ some control variables, identified to have a certain effect on the financial structure of a firm. As previously mentioned, we expect a negative relation between financial debt and profitability as a result of the agency problems related to debt (Martínez-Sola, García-Teruel & Martínez-Solano, 2014, p. 574). Also, *SIZE* is expected to have an inverse relationship with the level of financial debt, mostly due to the informational opacity inherent in smaller firms and the consequential restricted access to external finance (Berger & Udell, 1998, pp. 613-673). Given that leverage and liquidity can be treated as substitutes, we presume an opposite relation between liquidity (*CASH*) and financial debt, as demonstrated by Belghitar and Khan (2013, p. 65) for UK SMEs. Finally, we control for industries as well, since a firm's financial structure is affected by the industry it belongs to (MacKay & Phillips, 2005, pp. 1433–1466).

For the purpose of disentangling the possible debt repayment capacity motive, we formulate the following linear regression model:

$$\Delta FIN\_DEBT_{t+1} = \beta_0 + \beta_1 \begin{Bmatrix} FA\_WO_t \\ CA\_WO_t \\ FACA\_WO_t \end{Bmatrix} + \beta_2 ADJ\_OP_t + \beta_3 SIZE_t + \beta_4 CASH_t + \text{Industry dummies} + \varepsilon_t \quad (5)$$

Where $\Delta FIN_$DEBT is the dependent variable, β_0 is a constant, $\beta_{1,2,3,4}$ are the regression coefficients, *FA_WO*, *CA_WO* and *FACA_WO* are the explanatory variables, *ADJ_OP*, *SIZE*, *CASH* and industry dummies are the control variables, ε is the error term.

The results of the clustered standard errors linear regression analyses are set out in Table 3.12. The data suggests that preserving debt repayment capacity could be considered a possible motive for recording asset write-offs by SMEs, especially in the case of current asset write-offs. All three coefficient estimates for the write-off variables are negative as hypothesized, however the coefficient for fixed asset write-offs is statistically insignificant, confirming once again that these assets are less likely to be written off for discretionary purposes. The coefficients for current asset write-offs and fixed- and/or current asset write-offs are statistically significant at $p = 0.01$ level in addition to being negatively associated with future changes in financial debt. Such results imply that firms might write assets off in current periods, when they can afford to do so, in order to reduce future reported expenses and increase future reported earnings, thereby improving their future debt repayment position.

The results in this study are also robust to alternative variable calculation and sample formation. Namely, our findings do not change qualitatively if we use nominal instead of scaled values for the dependent and explanatory variables. Also, we re-estimate our regressions by including firms with negative equity in our sample, since negative equity is quite common in small firms (Mramor & Valentinčič, 2003, p. 751). This does not affect the results qualitatively, as well.

Table 3.12. Clustered standard errors linear regression analyses for debt repayment capacity motive

	Coefficients for models (*t*-values in parentheses)		
	ΔFIN_DEBT_D		
FA_WO	-0.05107 (-0.763)		
CA_WO		-0.10241*** (-3.712)	
FACA_WO			-0.09157*** (-3.599)
ADJ_OP	0.00621*** (2.602)	0.00654*** (2.735)	0.00657*** (2.749)
SIZE	-0.00464*** (-30.140)	-0.00460*** (-29.744)	-0.00459*** (-29.601)
CASH	0.02167*** (12.573)	0.02167*** (12.575)	0.02164*** (12.557)
I_2	-0.00073 (-0.250)	-0.00067 (-0.234)	-0.00071 (-0.250)
I_3	-0.00455 (-1.564)	-0.00452 (-1.555)	-0.00455 (-1.566)
I_4	-0.00220 (-0.780)	-0.00212 (-0.753)	-0.00215 (-0.765)
I_5	-0.00506 (-1.690)	-0.00496 (-1.656)	-0.00499 (-1.669)
I_6	0.00110 (0.245)	0.00106 (0.236)	0.00100 (0.222)
I_7	-0.00395 (-1.155)	-0.00398 (-1.165)	-0.00403 (-1.178)
I_8	-0.00704** (-2.482)	-0.00695** (-2.452)	-0.00700** (-2.467)
I_9	-0.01738*** (-5.486)	-0.01741*** (-5.493)	-0.01743*** (-5.499)
I_{10}	-0.00547 (-1.659)	-0.00542 (-1.643)	-0.00545 (-1.652)
Constant	0.06511*** (19.342)	0.06472*** (19.210)	0.06469*** (19.197)
R^2	0.006	0.006	0.006
N	261,051	261,051	261,051

Note. The table shows results of three clustered standard error linear regression analyses performed for each combination of the dependent and explanatory variables, including control variables. ***Δ_FIN_DEBT*** is the change in total financial debt (short- and long-term) from year t to year t+1 deflated by total assets. ***FA_WO, CA_WO, FACA_WO*** are variables expressing fixed asset write-offs, current asset write-offs and fixed and/or current asset write-offs deflated by total assets. ***ADJ_OP*** is operating profit adjusted for write-offs, if any. ***SIZE*** is the natural logarithm of total assets. ***CASH*** is the ratio of cash to total assets. $I_{2.3....10}$ are industry dummies according to the "high-level SNA/ISIC aggregation". ***FC*** is a dummy variable representing financial crisis.
$_D$ Denotes dependent variable. *** Denotes significant at 1%. ** Denotes significant at 5%.

Source: Own work.

3.6 Conclusion

In this chapter we investigate the relation between current period write-offs and future changes in profitability in the setting of small and medium sized firms in Slovenia. In presumed absence of agency issues, we hypothesize that SMEs record asset impairments in accordance with accounting prescriptions, that is, to signal deteriorating economic performance. We also address a specific research question about whether and how the financial crisis influences the financial behaviour of these firms in terms of earnings management through asset write-offs. Since SMEs constitute a significant player in the Slovenian economy, the study of their financial behaviour is of particular interest.

We perform a series of clustered standard errors linear regression analyses on an unbalanced panel of 61,692 unique firms and an aggregate sample of 264,554 firm-year observations, to find evidence that the decision to write off assets in Slovenian SMEs is driven both by operating and discretionary reasons. Write-offs maintain significant negative relation to future changes in adjusted operating profitability. Adjusted operating profit does not include any write-off effects, thus they indicate negative changes in core operating performance. On the other hand, we find positive or statistically insignificant relation between current period write-offs and future changes in net income. Since net income incorporates the effects of asset write-offs, the said write-off relation implies that SMEs exercise the option to manage earnings by impairing assets. These findings are mostly consistent across asset types, even though we find some evidence that fixed asset write-offs are less likely to be used for discretionary purposes. Importantly, we find that our results are robust to inclusion of controls. The results hold after controlling for firm characteristics known to explain the variation in profitability and after controlling for the influence of the financial crisis, which does not affect the results qualitatively. Since the empirical results imply that SMEs record asset impairments to signal declining future cash flows as well as to manage earnings, we can conclude that write-offs are noisy predictors of future profitability.

We believe that our study extends current research on several important grounds. First and foremost, we place our analysis in a setting where no agency issues are present between the firm and the major external users of financial statements, which allows us to focus directly on the accounting practices of financial statement preparers who are simultaneously the firm owners and managers. This represents the major distinction from existing literature, which focuses on large publicly listed firms, who face different types of agency problems and are thus more compelled to exercise discretion over accounting numbers through downward asset adjustments. The finding that SMEs still engage in earnings management practices through asset write-offs, despite the absence of major agency issues, proposes caution to external users of financial statements in making assumptions about future profitability based on the information on write-

offs, which is another contribution. By focusing on SMEs, we enrich the scarce literature on accounting practices in private firms and SMEs in particular. We also tackle the effect of the recent financial crisis on the financial reporting behaviour of small and medium sized firms, which has not received much attention in the current literature. Finally, our research is conducted on a large sample of SMEs located on the territory of Slovenia, a country where no previous study has focused on write-offs and earnings management practices in this crucial economic segment.

Despite the academic and practical usefulness of this study, we acknowledge some limitations, which might elicit future research. One such limitation is the country specific data that we use for our analysis. While we operate with a high-quality country-specific data, we fail to achieve generalizability of our results as it is representative of a single country only. In order to be able to apply the findings of our research to SMEs in other countries, a comparison of their characteristics needs to be conducted, since the study could only be generalized to firms similar to those included in our analysis. Even though we detect discretionary financial behaviour among the firms in our study, we only touch the surface in disentangling the concrete motives for such behaviour. In a setting where no major agency issues exist, further research might explore the possible factors that cause opportunistic asset write-offs by SMEs. A possible progression of this work is to analyse (in more depth) the effect of debt or dividend policy of SMEs on the decision to decrease the balance sheet value of an assets, especially since little is known about these fields.

CONCLUSION

The main goal of this doctoral dissertation was to evaluate the information provided by SMEs to external users through financial statements. In the three chapters comprising the dissertation, we focus on different aspects of their usefulness in assessing the liquidity and profitability of small and medium sized firms. Since the principal aim of financial statements is to provide better insight into the financial performance and position of a firm and to enable improved decision making by stakeholders, we tackle topics of interest for lenders/creditors, who provide the main sources of finance to SMEs.

In the first chapter, we deal with assessing the current liquidity position of private firms expressed as cash holdings. We work on a large unbalanced panel data set and apply the Fama-Macbeth method to determine the SME characteristics that influence their decision to keep cash on their accounts. Our model is based on several financial ratios expressing different aspects of a firm's performance, most of which have been acknowledged in previous research. We also identify some additional factors, such as export activities and requirements for mandatory retirement benefit contributions. As SMEs are more financially constrained and have lower access to external finance, we assume that the primary motives driving their cash policies are the transactions and precautionary motive, which is generally confirmed by the results of our research. We posit that SMEs tend to lower their costs related to securing liquidity, utilize their cash substitutes at hand and accumulate cash as a buffer against difficult circumstances. We find that smaller firms have higher cash holdings due to both transactions and precautionary reasons, since there are economies of scale in raising external finance. Precaution is detected in firms with longer cash conversion cycles, higher retirement benefit obligations and short-term debt, which maintain higher cash balances in order to protect themselves against uncertain future events. Whenever there are cash substitutes at disposal, such as other liquid assets and debt, they are used as such confirming the transactions motive. The finding that exporting and more profitable firms hold more cash than others provides support for the speculative motive. These firms have a higher probability of taking advantage of growth or investment projects, so they hold on to their funds in order to be able to seize profitable opportunities when they arise.

The second chapter explores the predictive power of financial ratios in forecasting short-term cash shortages. As a proxy for cash shortage we use the information on transaction account blocks, which can be imposed by the bank when there are insufficient funds to settle a particular obligation of the account holder. We test two types of models, the first is based only on financial ratios and the second is based on a combination of financial ratios and data on previously experienced account blocks. We apply clustered standard error logistic regression method which is suitable for predicting a binary dependent variable from an unbalanced panel data set. While both groups of models generate high accuracy results when predicting firms that will not incur

cash shortages in the near future, they also produce high percentages of Type I error. This means that they predict that a firm will not incur a cash shortage in the near future, when in reality it will. Nevertheless, the model based only on financial ratios is less efficient than the combined models, as the percentage of Type I error significantly drops when information on previous cash shortages is included. This type of error is more expensive to the creditor compared to Type II error (wrongly classifying a firm as one that will incur liquidity shortage), because it may cost him a financial loss in case a loan is granted. The sensitivity of errors to cut-off probabilities is higher in the model built only on financial ratios.

The third chapter deals with asset write-offs and their usefulness in predicting future profitability. We study the relation between current period asset impairments and future changes in earnings to determine whether SMEs adhere to accounting rules prescribing write-offs or they use them as an earnings management tool. The two measures considered as dependent variables to capture future earnings changes, change in adjusted operating profit and change in net income, are correlated to write-offs by asset type (fixed, current or both) in a series of clustered standard error linear regression analyses. The results obtained with each earnings measure are contradicting, implying that Slovenian SMEs record asset impairments for both operating and discretionary reasons. Adjusted operating profit, which is constructed in such a way to exclude the effects of any write-offs, is significantly negatively related to these accounting records, implying that write-offs are disclosed in accordance to regulations. However, net income, which incorporates the effects of write-offs, shows positive or insignificant relationship, suggesting discretion in their disclosure. The findings are generally consistent across asset types and across time. We observe some indication that fixed assets are less likely to be used for discretionary reasons. When we control for the effect of the recent financial crisis, we do not obtain any qualitative change in the results. Therefore, the findings in this chapter suggest that the information on write-offs presented in financial statements is only a noisy predictor of future profitability.

In general, the findings of our research suggest that the accounting information presented by SMEs in their financial statements can be of limited use to external users, since this data only partially facilitates the evaluation of liquidity and profitability of this group of firms. When it comes to liquidity, financial ratios can reliably assist in determining current cash holdings. Also, they do a good job in identifying firms, which will not encounter cash shortages in the near future. However, financial ratios fail to predict those firms that will experience short-term liquidity problems, thus cannot provide reliable basis for resource allocation decision making by creditors. When it comes to profitability, asset write-offs give mixed signals regarding future changes in earnings, rendering such accounting records unreliable for the prediction of expected profitability. These results provide insight into the financial reporting behaviour of SMEs, which we believe is important given their significance for the economy. Financial reporting practices

of SMEs have received little attention in prior research mostly due to the data unavailability for privately owned businesses. Therefore, we contribute to the existing literature by examining high-quality data on a significant but under-researched segment of the economy. Furthermore, by concentrating on SMEs in Slovenia we contribute to the existing literature on accounting practices of SMEs in this country, where no study has dealt with this important economic sector thus far. Finally, the findings in this doctoral dissertation have practical implications, since they provide caution to external users of financial statements on their limited usefulness in predicting short-term liquidity and profitability. Despite the academic and practical usefulness of this dissertation, we acknowledge some limitations, the main one being the country-specific data. The disadvantage of high-quality country-specific data is in fact its lack of generalizability as it is representative of a single country only.

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APPENDICES

Appendix 1: Summary in Slovenian language / Daljši povzetek disertacije v slovenskem jeziku

DENARNA SREDSTVA, DENARNI PRIMANJKLJAJI, ODPISI SREDSTEV TER PREDVIDLJIVOST LIKVIDNOSTI IN DOBIČKONOSNOSTI

Mala in srednje velika podjetja (MSP) imajo ključni gospodarski pomen v EU. Kot je predstavljeno v letnem poročilu Evropske komisije o evropskih MSP 2018/2019, ta podjetja predstavljajo skoraj vse poslovne subjekte (99,8%) v nefinančnem poslovnem sektorju v EU28 in zagotavljajo več kot polovico (56,4%) dodane vrednosti, ustvarjene v tem sektorju. Prav tako predstavljajo pomembno gonilo zaposlovanja, saj skoraj 98 milijonov ljudi dela v malih in srednje velikih podjetjih (Evropska komisija, 2019). Kljub pomembnemu prispevku h gospodarstvu na splošno, MSP pri doseganju rasti in razvojnega potenciala naletijo na različne ovire, med katerimi je omejen dostop do financiranja ena najpomembnejših (Beck in Demirgüc-Kunt, 2006, str. 2942).

Eden ključnih razlogov za ozek vir zunanjega financiranja, ki je na voljo MSP, je njihova informacijska nepreglednost (UNCTAD, 2016). MSP so v primerjavi z javnimi podjetji veliko manj pregledna, saj pogodbe, ki jih sklepajo z zaposlenimi, dobavitelji ali kupci, niso na voljo širši javnosti, niso uvrščene na trgih vrednostnih papirjev, kjer so delnice nenehno vrednotene in veliko njih (predvsem majhna) nima revidiranih računovodskih izkazov (Berger in Udell, 1998, str. 616). Kot rezultat tega imajo ta podjetja težave s predstavljanjem in sporočanjem svoje kakovosti zunanjim agentom, posledično pa se soočajo z višjimi agencijskimi stroški dolga (Pettit in Singer, 1985, str. 55). V tem pogledu lahko prakse računovodskega poročanja MSP igrajo ključno vlogo na njihovi poti do rasti, tako da ublažijo informacijske razlike med zainteresiranimi stranmi. Če bi MSP zagotovila pregledne in zanesljive informacije o svoji finančni uspešnosti, bi imeli posojilodajalci trdno podlago za oceno tveganj posojilojemalca in za sprejemanje utemeljenih odločitev o dodelitvi sredstev (UNCTAD, 2016; Poplave, 2019, str. 14). Dejansko je namen računovodskega poročanja omiliti agencijske konflikte in na ta način zmanjšati s tem povezane stroške z zmanjšanjem asimetrije informacij in omogočanjem sklepanja pogodb med različnimi deležniki podjetja (Minnis in Shroff, 2017; str. 479).

Številne študije so pokazale, da so računovodske informacije pomembne za zasebna podjetja. Allee in Yohn (2009, str. 24) na primer poudarjata boljši dostop do posojil in nižje stroške kapitala kot prednosti, ki jih ameriška mala zasebna podjetja pridobijo iz revidiranih računovodskih izkazov ali poročanja na podlagi nastanka poslovnega dogodka. Minnis (2011, str. 457-506) tudi pojasnjuje, kako overjanje računovodskih izkazov koristi zunanjemu financiranju ameriških zasebnih podjetij, saj imajo podjetja z revidiranimi računovodskimi izkazi nižje obrestne mere. Hope, Thomas in Vyas (2011, str. 951) predstavljajo mednarodne

dokaze o pozitivnem vplivu večje verodostojnosti računovodskega poročanja na zmanjšanje finančnih omejitev, s katerimi se soočajo zasebna podjetja. Chen, Hope, Li in Wang (2011, str. 1283) nadalje ugotavljajo pozitivno povezavo med kakovostjo računovodskih izkazov in učinkovitostjo naložb zasebnih podjetij na razvijajočih se trgih.

Kakovost in uporabnost informacij v računovodskih izkazih sta pomembni in zanimivi vprašanji tako v nacionalnem kot tudi v mednarodnem okviru. Ta doktorska disertacija preučuje uporabnost informacij, razkritih v računovodskih izkazih, za ocenjevanje gospodarske uspešnosti MSP z vidika zunanjega uporabnika. V treh poglavjih raziskujemo, ali lahko posojilodajalci ter upniki zanesljivo ocenijo ali napovedujejo likvidnost in donosnost zasebnih podjetij z uporabo podatkov, predstavljenih v računovodskih izkazih. Dobičkonosnost in likvidnost sta vidika uspešnosti podjetja, ki najbolj zanima zunanje deležnike. Namen analize donosnosti je oceniti, ali menedžerji učinkovito izvajajo poslovno strategijo, in tako daje indikator dolgoročnega preživetja podjetja (Wahlen, Baginski in Bradshaw, 2010, str. 248). Upniki jo dojemajo kot "varnostno mejo" (Gilkar, 2008, str. 2). Likvidnost je pogosto opisana kot življenjska kri podjetij. Nezadostna denarna sredstva za kritje neporavnanih obveznosti lahko povzročijo zamudo ali neplačilo upnikom, ki se v tem primeru soočajo z oportunitetnimi stroški, ker denarja ne morejo vložiti drugam, ali celo z resnejšimi finančnimi posledicami, če posojilojemalec ne more vrniti (celotne) glavnice (Mramor in Valentinčič, 2003, str. 745). Zato bi moralo biti razumevanje, ali računovodsko poročanje zagotavlja verodostojne informacije o likvidnosti in dobičkonosnosti MSP, dragocen prispevek zunanjim uporabnikom.

Preučevanje MSP in njihovega finančnega poročanja je še posebej zanimivo ne samo zaradi njihovega velikega pomena za gospodarstvo, ampak tudi zato, ker se MSP v mnogih pogledih razlikujejo od javnih podjetij in ugotovitve o javnih podjetjih ne veljajo za MSP (Gaganis, Pasiouras in Voulgari, 2019, str. 276). Zasebna podjetja delujejo v različnih okvirih upravljanja, financiranja, vodenja in nadomestil v primerjavi z javnimi podjetji (Ball in Shivakumar, 2005, str. 95). Zasebna podjetja so v tesni lasti in so najpogosteje v lasti vodstva, medtem ko je lastništvo javnih podjetij razdeljeno na tisoče delničarjev. Prav tako so zasebna podjetja manj odvisna od zunanjega financiranja, saj je dostop do njih precej omejen (Beck in Demirgüç-Kunt, 2006, str. 2931). Posledično se ta podjetja srečujejo z nižjo stopnjo agencijskih težav med lastniki in menedžerji ter med lastniki in posojilodajalci (Garrod, Kosi in Valentinčič, 2008, str. 3). V takem okolju, kjer obstaja malo motivacije za spreminjanje dojemanja zainteresiranih strani o ekonomski uspešnosti podjetja z manipulacijo računovodskih številk, pričakujemo, da se MSP držijo računovodskih pravil in pripravijo zanesljiva finančna poročila, na podlagi katerih bi lahko zunanji uporabniki utemeljeno predpostavljali njihovo likvidnost in donosnost.

V tej doktorski disertaciji se osredotočamo na oceno likvidnosti in donosnosti zasebnih podjetij s treh različnih vidikov, opredeljenih kot denarna sredstva, denarni primanjkljaji in

prevrednotenja sredstev zaradi oslabitve. Natančneje, cilj raziskave je zagotoviti dokaze o zanesljivosti računovodskih podatkov pri ocenjevanju denarnega stanja, kratkoročnih likvidnostnih težavah in prihodnji donosnosti malih in srednje velikih podjetij. Za namene te raziskave se izraz zasebno podjetje uporablja kot enakovredno majhnemu in srednjemu podjetju. Uporabljamo definicijo MSP Evropske komisije, ki jih določa kot podjetja z manj kot 250 zaposlenimi ter letnim prometom, ki ne presega 50 milijonov EUR in letno bilančno vsoto, ki ne presega 43 milijonov EUR (Evropska komisija, 2003). Empirična raziskava v vseh treh poglavjih temelji na velikem vzorcu slovenskih malih in srednje velikih podjetij.

V prvem poglavju obravnavamo trenutno likvidnostno stanje zasebnih podjetij, izraženo kot denarna sredstva na njihovih transakcijskih računih. To poglavje je namenjeno oceni dejavnikov, ki vplivajo na trenutni denarni položaj slovenskih MSP. Različni finančni kazalniki, izračunani iz letnih poročil, se uporabljajo za določanje dejavnikov, ki vplivajo na raven denarnih sredstev v slovenskih MSP. Struktura vzorca je neuravnotežen panel. Uporabljamo metodo Fame in MacBetha, ki je ustrezna glede na strukturo podatkov. Večina finančnih kazalnikov, ki gradijo naš model in ki izražajo različne vidike uspešnosti podjetja, je bila zaznana in ugotovljena v prejšnjih raziskavah kot značilna pri določanju višine denarnih sredstev na računih zasebnih podjetij. Nekaj primerov finančnih kazalnikov iz prejšnje literature so: velikost podjetja, denarni tok, možnosti za rast, zadolženost, struktura zapadlosti dolga, odnosi s finančnimi institucijami, neto obratni kapital, cikel pretvorbe gotovine. V naši raziskavi uvajamo tudi določene dodatne dejavnike, kot so izvozne dejavnosti in zahteve za obvezne prispevke za pokojninsko zavarovanje.

Podjetja imajo v svojih bilancah določen znesek denarnih sredstev iz različnih razlogov in namenov. Dva glavna motiva za hranjenje denarnih sredstev, navedena v trenutni literaturi, sta transakcijski motiv in previdnostni motiv. Transakcijski motiv izhaja iz potrebe podjetij po določenem znesku denarnih sredstev, ki je potreben za kritje plačil, povezanih z njihovim vsakodnevnim poslovanjem (Keynes, 1936, str. 91). Z zagotavljanjem denarnih sredstev za te namene se podjetje izogne ali zmanjša transakcijske stroške, povezane s pridobitvijo zunanjih financ. Previdnostni motiv se nanaša na namen podjetja, da se zaščiti pred negotovimi prihodnjimi dogodki. Da bi se zavarovali pred negotovostjo, podjetja si rezervirajo denarna sredstva za prihodnje primere, ki bi zahtevali nenadno porabo v času slabega denarnega toka.

Drug razlog za zadrževanje denarnih sredstev je zagotavljanje fleksibilnosti, torej gre za cilj izkoriščanja nepredvidljivih priložnosti. Temu pravimo spekulativni motiv. Podjetja imajo na svojih računih spekulativna denarna sredstva, da bi v prihodnosti lahko izkoristila priložnosti za ustvarjanje dobička, ki so posledica nihanja cen. Spekulativne denarne bilance podjetju omogočajo, da kadar koli kupi sredstva po privlačnih cenah (Michalski, 2009, str. 52). Morda se sliši podobno kot previdnostni motiv za posedovanje gotovine, saj oba motiva obravnavata

negotovost, vendar obstaja razlika. Previdnostno povpraševanje po denarna sredstva namreč izhaja iz negotovosti v času plačil in prejemkov med sedanjim in prihodnjim nakupom ali prodajo sredstva, medtem ko se spekulativni motiv nanaša na negotovost obrestnih mer (Whalen, 1966, str. 322; Sprenkle, 1969, str. 836).

Dodatni motiv za posedovanje denarnih sredstev, ki sta ga ugotovila Miller in Orr (1966, str. 418), je zahteva po kompenzacijskim saldom. Podjetja morajo namreč imeti na svojih tekočih računih določeno minimalno količino denarnih sredstev, ki ne sme pasti pod vnaprej določeno raven, kot obliko nadomestila banki v zameno za stroške storitev. Natančneje, kompenzacijska stanja so oblika dogovora med poslovno banko in poslovnim komitentom, ko banka odpre kreditno linijo v korist stranke, v zameno pa zahteva, da se na depozitnem računu podjetja vodi povprečno minimalno stanje denarnih sredstev.

Možnost izkoriščanja trgovinskih popustov je lahko dodaten razlog za hranjenje denarnih sredstev. Dobavitelji svojim strankam pogosto ponujajo popuste za predčasno plačilo obveznosti, ki bi jih lahko dosegli, če bi na računu podjetja ležal odvečni denar (Ehrhardt, 2006, str. 583).

Pri postavitvi modela izhajamo iz glavnih značilnosti MSP, opredeljene kot koncentrirana lastniška struktura, finančne omejitve in omejen dostop do zunanjega financiranja. Ob upoštevanju vseh teh karatkeristik, pričakujemo, da se ta podjetja obnašajo preudarno, kar zadeva njihove denarne rezerve tako, da njihovo denarno politiko vodita predsvem transakcijski in previdnostni motiv, kar na splošno potrjujejo tudi rezultati naše raziskave. Trdimo namreč, da MSP običajno znižujejo svoje stroške povezane z zagotavljanjem likvidnosti, uporabljajo denarne nadomestke, ki jih imajo na voljo in denar hranijo kot zaščito pred težkimi okoliščinami.

Ugotovili smo, da imajo manjša podjetja višja denarna sredstva predvsem iz transakcijskih in previdnostnih razlogov, saj pri pridobivanju zunanjih financ obstaja ekonomija obsega. Previdnost je zaznana v podjetjih z daljšimi cikli pretvorbe denarja, z višjimi obveznostmi za pokojninsko zavarovanje in kratkoročnim dolgom, ki ohranjajo višja denarna stanja, zato da se zaščitijo pred negotovimi prihodnjimi dogodki. Kadar so na razpolago denarni nadomestki, kot so druga likvidna sredstva in dolg, se ti kot taki uporabljajo, potrjujoč, da transakcijski motiv igra značilno vlogo pri denarni politiki MSP. Ugotovitev, da imajo izvozna in donosnejša podjetja več gotovine kot ostala, podpira spekulativni motiv. Ta podjetja imajo večjo verjetnost, da bodo izkoristila priložnosti za rast ali naložbene projekte, zato se držijo svojih sredstev, da bi lahko izkoristila donosne priložnosti, ko se pojavijo.

Drugo poglavje se osredotoča na predvidljivost kratkoročne likvidnosti zasebnih podjetij na podlagi informacij iz računovodskih izkazov. V zapletenem postopku ocenjevanja in odločanja o dodeljevanju kreditnih sredstev se posojilodajalci, vlagatelji in prodajalci zanašajo na informacije, posredovane v računovodskih izkazih. Na podlagi teh informacij, upniki razvijajo raznovrstne modele, kjer se finančni kazalniki različno definirajo in kombinirajo, da bi dosegli nekakšno oceno napovedi morebitnega neuspeha. Večina teh modelov je namenjena napovedovanju verjetnosti bankrota velikih podjetij, ki kotirajo na borzi, zato ker podatki o podjetjih, ki ne kotirajo na borzah (kot so MSP) ter drugi znaki finančne stiske običajno niso na voljo.

Vendar pa razdelitev vseh poslovnih subjektov v samo dve široki skupini bankrotiranih in ne-bankrotiranih podjetij ne prepozna drugih simptomov finančne stiske (Baixauli in Módica-Milo, 2010, str. 61). Druge stopnje finančne šibkosti podjetja so lahko tudi upniku škodljive. Na primer kratkoročno pomanjkanje likvidnosti lahko povzroči zamude pri plačilih. Takrat posojilodajalec lahko zamudi potencialni dohodek, ker ne more takoj ponovno vložiti dolgovanih zneskov. Posojilodajalec se bo soočil s še hujšimi finančnimi posledicami, če posojilojemalec ne bo mogel povrniti (polne) glavnice. Vsakokrat, ko banka odobri posojilo ali dobavitelj odobri trgovinski kredit, tvega, da posojilodajalec ne bo pravočasno ali v celoti vrnil zapadlega zneska. Zato je ocenjevanje kratkoročne likvidnosti za upnike bistvenega pomena, saj vsako pomanjkanje denarja povzroča na eni strani oportunitetne stroške, ki izhajajo iz zamud pri plačilih, na drugi pa vsako zamujeno priložnost za odobritev kredita podjetju, ki je sposobno v celoti odplačati, pomeni izgubo potencialnih zasluženih obresti ali celo izgubo kupca (Mramor in Valentinčič, 2003, str. 745).

To poglavje se osredotoča na vlogo, ki jo lahko imajo finančni in ekonomski dejavniki, ki izhajajo iz bilanc stanja in izkazov poslovnega izida v obliki finančnih kazalnikov pri napovedovanju kratkoročne likvidnosti malih in srednje velikih podjetij. S tem skušamo zapolniti pomembno praznino v trenutni literaturi, ki se osredotoča na napovedovanje stečaja v velikih javnih družbah. Čeprav je bankrot najhujša stopnja finančne nezmožnosti, imajo lahko kratkoročne likvidnostne težave pomembne negativne finančne posledice tako za samo podjetje kot za njegove upnike. Natančneje, osredotočamo se na napovedno moč finančnih kazalnikov pri napovedovanju kratkoročnega pomanjkanja denarja.

Cilj je oceniti, ali se lahko zunanji uporabniki zanašajo na finančne kazalnike, da bodo z zadostno natančnostjo napovedovali kratkoročno pomanjkanje denarja. Kot kazalnik za denarni primanjkljaj uporabljamo podatek o blokadi transakcijskih računov. Banka v skladu z Zakonom o izvršbi in zavarovanju (ZIZ-UPB1, 2004) ali z Zakonom o davčnem postopku (ZDavP-1-UPB2, 2006) lahko blokira transakcijski račun, ko na računu ni dovolj sredstev, da bi se poravnala določena obveznost imetnika transakcijskega računa. Ker so informacije o blokadah

transakcijskih računov javno dostopne, slovenski plačilni sistem omogoča sproten vpogled v likvidnostno stanje podjetij. Čeprav so ta nezadostna denarna stanja pogosto le začasna, so lahko znak finančnih težav, lahko tudi kažejo na dolgoročno plačilno nesposobnost ali celo bankrot, vsekakor pa vodijo do zamud pri plačilih upnikom (Mramor in Valentinčič, 2003 , str. 747).

Uporabljamo velik vzorec 60.602 posameznih malih in srednje velikih podjetij, ki zajemajo obdobje šestih let, od leta 2007 do 2012. V naši raziskavi uporabljamo logistično regresijo z ugrozdenimi standardnimi napakami po enotah, ki je ustrezna za napovedovanje binarno odvisne spremenljivke iz vzorca s strukturo neuravnoteženega panela. Cilj je, da napovemo dihotomni rezultat, to je, ali bo podjetje v bližnji prihodnosti doživelo blokado računa ali ne. Preizkušamo dve skupini modelov: ena temelji izključno na finančnih kazalnikih, druga pa na kombinaciji finančnih kazalnikov in zgodovinskih likvidnostnih kazalnikov. Finančni kazalniki, na katerih temeljijo modeli, so bili ugotovljeni kot značilni napovedovalci finančne stiske v predhodnih empiričnih raziskavah in se pogosto uporabljajo v praksi (na primer kot zaveze za dolg, kreditno točkovanje itd.). Poskušamo zajeti vse ustrezne vidike poslovanja podjetja in združujemo kazalnike v petih kategorijah, kot sta predlagala Altman in Sabato (2007, str. 332-357): dobičkonosnost, zadolženost, pokritost, likvidnost in operativna uspešnost.

Ko poskušamo napovedati, ali bo imelo podjetje likvidnostne težave z enim od zgoraj navedenih modelov, lahko naredimo dve vrsti napake. Prva vrsta napake, znana kot napaka tipa I, je primer, ko predvidevamo, da podjetje v obdobju t + 1 ne bo imelo likvidnostnih težav, v resnici pa. Druga vrsta napake ali napaka tipa II je primer, ko predvidevamo, da bo podjetje v letu t + 1 naletelo na likvidnostne težave, v resnici pa ne. Z vidika upnika so stroški teh dveh vrst napak zelo različni. Napačno razvrščanje podjetja, ki bo kasneje imelo pomanjkanje denarnih sredstev, bi upnika lahko stalo celotnega zneska posojila, medtem ko napačno razvrščanje podjetja, ki kasneje ne bo imelo pomanjkanja denarja, povzroči oportunitetne stroške, če temu podjetju ne bo posojal (Agarwal in Taffler, 2008, str. 1544). Zato so napake tipa I upnikom dražje kot napake tipa II.

Po drugi strani pa bi bili s stališča podjetja stroški napake tipa II višji. Podjetje bi lahko utrpelo škodo zaradi ugleda, ker bi bilo označeno kot nesposobno vrniti izposojeni znesek ali še huje, dejansko bi se lahko soočilo z likvidnostnimi težavami, ker ne bi dobilo sredstev od posojilodajalca, in tako "postalo samoizpolnjujoča se prerokba" (Zavgren, 1985, str. 41).

Funkcija logistične regresije omogoča, da se podjetje uvrsti ali ne v določeno skupino glede na določeno mejno vrednost, nad katero bi bilo podjetje uvrščeno v eno skupino in pod katero v drugo skupino. Tako lahko upnik določi različne mejne vrednosti za razvrščanje podjetij, odvisno od njegove nagnjenosti k tveganju.

Medtem ko obe skupini modelov ustvarjata zelo natančne rezultate pri napovedovanju podjetij, ki v bližnji prihodnosti ne bodo imela pomanjkanja denarnih sredstev, prav tako ustvarita visok odstotek napak tipa I. To pomeni, da napovedujejo, da podjetju v bližnji prihodnosti ne bo primanjkovalo denarja, v resnici pa bo. Kljub temu je model, ki temelji le na finančnih kazalnikih, manj učinkovit kot kombinirana modela, saj se odstotek napak tipa I znatno zmanjša, če so vključene informacije o prejšnjih denarnih primanjkljajih. Ta vrsta napake je za upnika dražja v primerjavi z napako tipa II, saj mu lahko v primeru odobritve posojila povzroči finančno izgubo. Občutljivost napak na mejne verjetnosti je večja v modelu, ki temelji le na finančnih kazalnikih.

Tretje poglavje obravnava prevrednotenje sredstev zaradi oslabitve v zasebnih podjetjih in njihovo uporabnost pri napovedovanju prihodnje dobičkonosnosti. Prevrednotenja sredstev zaradi oslabitve so namenjena sporočanju informacij zunanjim zainteresiranim skupinam o resnični gospodarski uspešnosti podjetja. Računovodska pravila predpisujejo evidentiranje prevrednotenj sredstev zaradi oslabitve, kadar je vrednost sredstev oslabljena, zato bi morali biti signal znižanja pričakovanih denarnih tokov (Elliot in Shaw, 1988, str. 100; Kosi in Valentinčič, 2013, str. 3). Vendar pa so bila prevrednotenja sredstev zaradi oslabitve prepoznana tudi kot računovodski inštrument, ki se uporablja za doseganje odločevalske diskrecije pri določanju višine čistega dobička podjetja (npr. Zucca in Campbell; 1992, str. 30-41; Riedl, 2004, str. 823-852). Menedžerji se pogosto poslužujejo praks upravljanja zaslužka tako, da pri pripravi računovodskih poročil uporabljajo presojo in izkoriščajo nesimetrične informacije med notranjimi in zunanjimi deležniki, zato da bi zunanjim strankam napačno predstavili osnovno uspešnost podjetja (Healy in Whalen, 1999, str. 368). Če upoštevamo, da so prevrednotenja sredstev zaradi oslabitve predmet lastne presoje finančnih poročevalcev, ki jih lahko evidentirajo z namenom, da bi vplivali na zaslužek s premikom prihodnjih stroškov v sedanjost, jih je mogoče uporabiti kot orodje za upravljanje dobička.

Osnovna motivacija za to študijo je omogočiti vpogled v beleženje prevrednotenj sredstev zaradi oslabitve v slovenskih zasebnih podjetij in ugotoviti ali se ta izvajajo v skladu s standardi računovodskega poročanja. Zlasti je zanimivo, ali so prevrednotenja sredstev zaradi oslabitve povezana s padajočimi prihodnjimi dobički, kot to predvidevajo računovodska pravila in, ali njihova razkritja zagotavljajo ustrezne informacije zunanjim uporabnikom računovodskih izkazov o prihodnji donosnosti pripravljavca.

Računovodsko poročanje zasebnih podjetij je še posebej zanimivo zaradi njihovega pomena za gospodarstvo (Ball in Shivakumar, 2005, str. 84). Kljub temu, da veljajo za steber gospodarstva, se le majhen del empiričnih raziskav osredotoča na računovodske odločitve zasebnih podjetij. Kljub temu bi morala preiskava računovodskih praks MSP vzbujati velik interes, ker so v

mnogih pogledih različna v primerjavi z večjimi podjetji (Gaganis, Pasiouras in Voulgari, 2019, str. 78).

Namen računovodskega poročanja je zagotoviti informativno osnovo za sprejemanje odločitev o dodelitvi virov sredstev s strani uporabnikov računovodskih izkazov. Nekateri glavni uporabniki računovodskih izkazov so vlagatelji (obstoječi in potencialni), posojilodajalci in drugi upniki ter vlada (Flood, 2019, str. 14; Porter in Norton, 2017, str. 12). To so stranke, s katerimi podjetja vzpostavijo glavne agencijske odnose in tako predstavljajo potencialne vire agencijskih težav. Zato bi bila podjetja nagnjena k uporabi računovodskih praks in strategij, da bi tem uporabnikom napačno predstavila osnovno uspešnost podjetja. Vendar je v majhnih in srednje velikih podjetjih situacija drugačna.

Za mala in srednje velika podjetja je značilna koncentrirana lastniška struktura, kjer lastništvo in upravljanje pogosto sovpadata. Posledično so agencijski problemi med lastniki in menedžerji manjši ali jih sploh ni (Bar-Yosef, D'Augusta in Prencipe, 2019, str. 31; García-Teruel in Martínez-Solano, 2008, str. 130; Garrod et al., 2008, str. 3; Kosi in Valentinčič, 2013, str. 12; Szczesny in Valentinčič, 2013, str. 286). Ker agencijskih težav ni, je potreba po reševanju morebitnih informacijskih asimetrij med lastniki in menedžerji z računovodskimi izkazi izključena (Garrod et al., 2008, str. 3). Z drugimi besedami, spodbuda za manipuliranje dojemanja vlagateljev o resnični gospodarski uspešnosti podjetja z izvajanjem upravljanja dobička ni prisotna.

Druga značilnost MSP je majhna prisotnost zunanjega finančnega dolga, saj je njihov dostop do zunanjih financ omejen (Beck, Demirgüç-Kunt in Maksimović, 2005, str. 171). Kot kaže naša analiza, podjetja iz našega vzorca v povprečju financirajo le 18,4% vseh sredstev s finančnim dolgom, zato tudi ni drugega možnega vira agencijskih težav - med lastniki in posojilodajalci - ni. V tem primeru prav tako ni potrebe po napačnem prikazovanju finančnih številk posojilodajalcem s praksami upravljanja dobička, zlasti ker se asimetrija informacij do posojilodajalcev večinoma rešuje po drugih kanalih, na primer vzdrževanje dolgoročnih odnosov, zastava zavarovanja ali individualno sklepanje pogodb (Bar-Yosef, D'Augusta in Prencipe, 2019, str. 25; Berger in Udell, 1995, str. 351; Garrod et al., 2008, str. 3).

Ker se zasebna podjetja manj zanašajo na zunanje vire financiranja in so zato manj nagnjena k posredovanju informacij o poslovni uspešnosti s finančnim poročanjem, ostajajo davčni organi glavni razlog za pripravo računovodskih informacij (Bar-Yosef, D'Augusta in Prencipe, 2019, str. 52). Vendar pa v skladu z Zakonom o davku od dohodkov pravnih oseb (Uradni list RS, 40/2004, 2004 in nadaljnje spremembe) prevrednotenja sredstev zaradi oslabitve v Sloveniji niso priznana kot davčno priznan odhodek (razen v nekaterih primerih odpisov terjatev, kot so stečajni postopki, prisilna poravnava, neizterljive terjatve, stroškovno neupravičena izterjava ali

sodni postopki). Zato podjetja ne morejo vplivati na sedanjo vrednost davčnih obveznosti tako, da bodoče stroške preusmerijo naprej z lastno presojo glede pripoznavanja prevrednotenj sredstev. Posledično tudi tretji glavni potencialni vir agencijskih težav v obliki davčnih organov ni prisoten v okolju malih in srednje velikih podjetij v Sloveniji.

Glede na vse zgoraj navedeno, predpostavljamo, da MSP evidentirajo prevrednotenja sredstev zaradi oslabitve, kot to predpisujejo računovodska pravila in kot taka nakazujejo slabšanje prihodnjih rezultatov zunanjim uporabnikom računovodskih izkazov. Glavni poudarek tega poglavja je v tem, ali obstajajo dokazi, da slovenska mala in srednje velika podjetja realizirajo prevrednotenja sredstev zaradi oslabitve v skladu z zakonskimi zahtevami, torej iz poslovnih razlogov. To pomeni, da se prevrednotenja sredstev zaradi oslabitve razkrivajo kot pričakovanje upadanja prihodnjih prihodkov.

Naša analiza se osredotoča na velik vzorec 61.692 posameznih malih in srednje velikih podjetij, ki obratujejo v Sloveniji v obdobju 2006–2013. Preučujemo povezavo med prevrednotenja sredstev zaradi oslabitve v trenutnem obdobju in poznejšimi spremembami zaslužka, da ocenimo, ali MSP upoštevajo računovodska pravila glede njihovega razkritja, oziroma jih uporabljajo oportunistično. Ker so prevrednotenja sredstev zaradi oslabitve predpisana, da bi odražala pričakovanja glede upadanja prihodnjih denarnih tokov, pričakujemo statistično značilno in negativno razmerje med prevrednotenji sredstev zaradi oslabitve v trenutnem obdobju in prihodnjimi spremembami dobička.

Nasprotno, če se prevrednotenja sredstev zaradi oslabitve realizirajo iz razlogov, ki ne odražajo resnične gospodarske uspešnosti podjetja, tj. če se uporabljajo predvsem kot orodje za upravljanje dohodka tako da premikajo prihodnje stroške v sedanje obdobje, bodo odhodki v prihodnjem obdobju nižji, dohodki pa višji. V tem primeru bi pričakovali pozitivno ali neznačilno povezavo med trenutnimi prevrednotenji sredstev zaradi oslabitve in prihodnjo donosnostjo. Če predpostavimo, da se prevrednotenja sredstev zaradi oslabitve dejansko uporabljajo v skladu z računovodskimi standardi, predpostavljamo, da lahko zunanji uporabniki računovodskih izkazov na podlagi informacij o oslabitvah sredstev, razkritih v računovodskih izkazih, napovedujejo prihodnjo donosnost MSP.

Kot odvisni spremenljivki, ki predstavljata prihodnje spremembe dohodka, uporabljamo dva kazalnika - spremembo prilagojenega dobička iz poslovanja (ΔADJ_OP) in spremembo čistega dobička (ΔNI). Sprememba v kazalnikih se izračuna tako, da se dohodek tekočega obdobja (t) odšteje od prihodkov naslednjega obdobja (t + 1). Dobiček iz poslovanja prilagodimo tako, da stroške prevrednotenj sredstev zaradi oslabitve prištejemo k dobičku iz poslovanja pred obdavčitvijo, zato da izključimo njihove učinke na dohodek iz osnovnega poslovanja. Tako ΔADJ_OP uporabljamo kot približek donosnosti MSP iz osnovnega poslovanja (Garrod et al.,

2008, str. 6). Po drugi strani, čisti dobiček, poleg prihodkov in odhodkov od obresti, davkov ter drugih prihodkov in odhodkov, vključuje tudi učinek stroškov prevrednotenj. Ker predpostavljamo, da MSP evidentirajo prevrednotenja sredstev zaradi oslabitve predvsem iz operativnih razlogov, pričakujemo, da se bo negativna povezava med prevrednotenji sredstev zaradi oslabitve v tekočem obdobju ohranila ne glede na to, kateri kazalnik donosnosti je uporabljen. Če se MSP v nasprotju z našimi pričakovanji ukvarjajo z uporabo odločevalske diskrecije pri določanju višine čistega dobička podjetja preko oslabitve sredstev, bi se posledice takšnih dejanj čutile v čisti dobičkonosnosti. V tem primeru bi pričakovali, da bodoče spremembe čistega dobička pokažejo pozitivno ali statistično neznačilno povezanost s prevrednotenji sredstev zaradi oslabitve v tekočem obdobju.

Relacijo med prevrednotenji sredstev zaradi oslabitve v tekočem obdobju in prihodnjimi spremembami dohodka analiziramo z linearno regresijo z ugrozdenimi standardnimi napakami po enotah. Kot neodvisne spremenljivke uporabljamo ločeno prevrednotenje fiksnih sredstev zaradi oslabitve, prevrednotenje tekočih sredstev zaradi oslabitve ali oboje skupaj in jih kombiniramo z vsakim kazalnikom bodoče spremembe donosnosti posebej. Rezultati, pridobljeni z različnimi kombinacijami kazalnikov donosnosti in neodvisnih spremenljivk, si nasprotujejo, kar pomeni, da slovenska MSP beležijo oslabitve sredstev tako iz operativnih razlogov kot iz diskrecijskih razlogov. Prilagojeni dobiček iz poslovanja, ki je izračunan tako, da izključuje učinke kakršnih koli prevrednotenj sredstev, je značilno negativno povezan z računovodskimi evidencami o prevrednotenjih sredstev zaradi oslabitve, kar pomeni, da se lete razkrivajo v skladu s predpisi. Vendar čisti dohodek, ki vsebuje učinke prevrednotenj sredstev, kaže pozitivno ali statistično neznačilno razmerje z različnimi prevrednotenji sredstev zaradi oslabitve, kar nakazuje diskrecijsko prakso pri njihovem razkritju. Ugotovitve so časovno in na splošno skladne za vse vrste sredstev. Opažamo nekaj znakov, da je manj verjetno, da bodo prevrednotenja osnovnih sredstev zaradi oslabitve uporabljena iz diskrecijskih razlogov. Ko kontroliramo učinke nedavne finančne krize, ne dobimo nobenih kvalitativnih sprememb v rezultatih. Zato ugotovitve v tem poglavju kažejo, da so informacije o prevrednotenjih sredstev zaradi oslabitve, predstavljene v računovodskih izkazih, le megleni napovednik prihodnje donosnosti.

Glavni cilj te doktorske disertacije je bil oceniti koristnost informacij, ki jih MSP posredujejo zunanjim uporabnikom preko računovodskih izkazov. V treh poglavjih disertacije se osredotočamo na različne vidike njihove učinkovitosti pri ocenjevanju likvidnosti in donosnosti malih in srednje velikih podjetij. Ker je glavni cilj računovodskih izkazov zagotoviti boljši vpogled v finančno uspešnost in položaj podjetja ter omogočiti boljše odločanje zainteresiranih strani, se ukvarjamo s temami, ki zanimajo posojilodajalce/upnike, ki zagotavljajo glavne vire financiranja majhnim in srednje velikim podjetjem.

Rezultati naše empirične analize nakazujejo, da imajo računovodske informacije, ki jih pripravijo MSP, omejeno praktično aplikacijo za zunanje uporabnike za oceno likvidnosti in donosnosti teh podjetij. Kar zadeva likvidnost, lahko finančni kazalniki zanesljivo pomagajo pri določanju trenutnega denarnega stanja. Prav tako dobro prepoznajo podjetja, ki v bližnji prihodnosti ne bodo naletela na denarne primanjkljaje. Vendar finančni kazalniki ne napovedujejo tistih podjetij, ki bodo imela kratkoročne likvidnostne težave, zato upnikom ne morejo zagotoviti zanesljive podlage za odločanje o dodelitvi sredstev. Kar zadeva donosnost, odpisi sredstev dajejo mešane signale glede prihodnjih sprememb dobička, zaradi česar so takšni računovodski zapisi nezanesljivi za napoved pričakovane donosnosti. Rezultati naše raziskave omogočajo vpogled v računovodsko vedenje MSP, kar je po našem mnenju pomembno glede na njihov pomen za gospodarstvo. Prakse računovodskega poročanja MSP so bile v predhodnih raziskavah deležne malo pozornosti, predvsem zaradi pomanjkanja podatkov za podjetja v zasebni lasti. Zato prispevamo k obstoječi literaturi s preučevanjem visokokakovostnih podatkov o pomembnem, a premalo raziskanem segmentu gospodarstva. Poleg tega s fokusom na MSP v Sloveniji prispevamo k obstoječi literaturi o računovodskih praksah MSP v Sloveniji, kjer doslej nobena študija ni obravnavala tega pomembnega gospodarskega sektorja. Končno imajo ugotovitve v tej doktorski disertaciji praktične posledice, saj zunanjim uporabnikom računovodskih izkazov nakazujejo previdnost glede njihove omejene uporabnosti pri napovedovanju kratkoročne likvidnosti in donosnosti v MSP. Kljub akademski in praktični uporabnosti te disertacije prepoznavamo tudi nekatere pomanjkljivosti, glavne pa se nanašajo na omejenenost podatkov na posamezno državo. Pomanjkljivost visokokakovostnih podatkov omejenih na posamezno državo je pravzaprav pomanjkanje splošnosti, saj so reprezentativni samo za eno državo.

Appendix 2.1: Definition of Variables

1. Return on assets (*P_ROA*) is calculated as net income divided by total assets.
2. Return on sales (*P_ROS*) is calculated as EBIT divided by sales.
3. Profit margin (*P_PM*) is calculated as net income divided by net sales.
4. EBITDA to total assets (P_EBITDATA) is EBITDA (operating profit/loss plus depreciation and amortization) over total assets.
5. Total debt to equity (*LEV_TDEQ*) is calculated as total liabilities divided by equity.
6. Financial debt to equity (*LEV_ FDEQ*) is calculated by dividing total financial debt (the sum of long- and short-term financial debt) by equity.
7. Equity ratio (*LEV_EQR*) is calculated as equity over total assets.
8. Short-term debt to equity (*LEV_STDEQ*) is calculated as short-term liabilities divided by equity.
9. Solvency ratio (*COV_SR*) is calculated as the sum of net income and depreciation divided by total liabilities (long- and short-term liabilities).
10. Net financial debt to EBITDA (*COV_NFDEBITDA*) is calculated as total financial debt minus cash over EBITDA.
11. Cash flow coverage ratio (*COV_CFD*) is calculated as EBITDA divided by total liabilities.
12. Asset coverage ratio (*COV_ACR*) is calculated by subtracting the difference between current liabilities and short-term bank debt from the difference between total assets and intangible assets and dividing the result by total liabilities.
13. Quick ratio (*LIQ_QR*) is current assets less inventories divided by current liabilities.
14. Cash to total assets ratio (*LIQ_CASHTA*) is cash over total assets.
15. Cash ratio (*LIQ_CASHR*) is the sum of cash and cash equivalents divided by current liabilities.
16. Net working capital ratio (*LIQ_NWC*) is current assets less current liabilities divided by total assets.
17. Equity turnover (*OP_EQTURN*) is calculated as sales divided by equity.
18. Total assets turnover (*OP_TATURN*) is sales over total assets.
19. Operating ratio (*OP_OPR*) is operating expense divided by sales.
20. Size (*OP_SIZE*) is the natural logarithm of total asset

Appendix 2.2: Model 1 clustered standard error logistic regression results for 4 industry groups

	Industry 1			**Industry 2**			**Industry 3**			**Industry 4**		
	B	S.E.	Exp(B)	B	S.E.	Exp(B)	B	S.E.	Exp(B)	B	S.E.	Exp(B)
P_PM	0.05744*** (2.656)	0.02163	1.05912	0.09654*** (3.066)	0.03149	1.10135	0.01157 (0.320)	0.03611	1.01164	0.17254*** (5.131)	0.03363	1.18832
LEV_EQR	-0.46636*** (-23.183)	0.02012	0.62728	-0.51250*** (-15.808)	0.03242	0.59900	-0.59836*** (-13.145)	0.04552	0.54971	-0.39287*** (-10.449)	0.03760	0.67512
COV_SR	-0.24267*** (-6.053)	0.04009	0.78453	-0.38053*** (-9.311)	0.04087	0.68350	-0.40337*** (-5.401)	0.07469	0.66806	-0.07810 (-1.729)	0.04517	0.92487
LIQ_CASHTA	-3.44606*** (-15.684)	0.21971	0.03187	-6.86556*** (-18.062)	0.38012	0.00104	-6.92123*** (-11.646)	0.59429	0.00099	-4.09900*** (-13.790)	0.29724	0.01659
OP_TATURN	-0.21897*** (-16.344)	0.01340	0.80334	-0.15288*** (-8.237)	0.01856	0.85824	-0.13608*** (-4.887)	0.02785	0.87277	-0.10702*** (-6.013)	0.01780	0.89851
Constant	-1.27328*** (-48.519)	0.02624	0.27991	-1.36119*** (-37.594)	0.03621	0.25635	-1.21919*** (-26.344)	0.04628	0.29547	-0.68600*** (-19.284)	0.03557	0.50359
Nagelkerke R^2	0.075			0.139			0.103			0.073		
N	84,918			56,753			35,715			24,632		
Type I error	10,225 (99.5%)			4,817 (99.6%)			4,364 (98.9%)			5,529 (99.6%)		
Type II error	140 (0.2%)			61 (0.1%)			97 (0.3%)			45 (0.2%)		
Blocked correct	51 (0.5%)			18 (0.4%)			50 (1.1%)			20 (0.4%)		
Not blocked correct	74,502 (99.8%)			51,857 (99.9%)			31,204 (99.7%)			19,038 (99.8%)		
Overall percentage correct	74,553(87.8%)			51,875 (91.4%)			31,254 (87.5%)			19,058 (77.4%)		

Note. The table reports results of the logistic regressions based on Model 1, which includes financial ratios only. Logistic regression is performed for each of the four group of industries: (i) wholesale and retail trade, transportation and storage, accommodation and food service activities (Industry 1); (ii) professional, scientific, technical, administrative and support service activities (Industry 2); (iii) manufacturing, mining and quarrying and other industrial activities (Industry 3) and (iv) construction (Industry 4). B represents the regression coefficient. S.E. is the standard error of the estimated coefficients. Exp(B) is the odds ratio for the predictors.
*** Denotes significant at 1%.

Source: Own work.

Appendix 2.3: Model 3 clustered standard error logistic regression results for 4 industry groups

	Industry 1			**Industry 2**			**Industry 3**			**Industry 4**		
	B	S.E.	Exp(B)	B	S.E.	Exp(B)	B	S.E.	Exp(B)	B	S.E.	Exp(B)
P_PM	0.14300*** (5.347)	0.02674	1.15372	0.15269*** (4.224)	0.03615	1.16496	0.14607*** (3.166)	0.04613	1.15727	0.26847*** (6.930)	0.03874	1.30796
LEV_EQR	-0.26635*** (-14.350)	0.01856	0.76617	-0.34459*** (-11.770)	0.02928	0.70851	-0.30799*** (-8.191)	0.03760	0.73493	-0.15807*** (-4.613)	0.03427	0.85379
COV_SR	-0.19583*** (-5.183)	0.03778	0.82215	-0.31517*** (-7.779)	0.04052	0.72967	-0.28821*** (-4.725)	0.06099	0.74960	-0.05085 (-1.132)	0.04492	0.95042
LIQ_CASHTA	-2.20566*** (-14.378)	0.15341	0.11018	-4.56413*** (-15.866)	0.28768	0.01042	-4.14623*** (-9.983)	0.41532	0.01582	-2.70298*** (-12.171)	0.22209	0.06701
OP_TATURN	-0.10872*** (-10.197)	0.01066	0.89698	-0.07865*** (-4.892)	0.01608	0.92437	-0.03767*** (-1.701)	0.02215	0.96303	-0.03106** (-2.023)	0.01535	0.96942
BLOCK_T	2.14166*** (68.222)	0.03139	8.51354	2.26903*** (48.562)	0.04672	9.67003	2.35127*** (47.352)	0.04966	10.49893	1.62225*** (38.223)	0.04244	5.06449
BLOCK_T-1	0.92119*** (22.985)	0.04008	2.51228	0.94630*** (14.909)	0.06347	2.57616	0.87326*** (13.837)	0.06311	2.39470	0.63497*** (12.367)	0.05134	1.88697
Constant	-2.10877*** (-85.185)	0.02476	0.12139	-2.17343*** (-62.861)	0.03458	0.11379	-2.18738*** (-51.717)	0.04230	0.11221	-1.48474*** (-40.866)	0.03633	0.22656
Nagelkerke R^2	0.261			0.302			0.319			0.226		
N	84,918			56,753			35,715			24,632		
Type I error	7,979 (77.6%)			3,666 (75.8%)			2,698 (61.1%)			3,417 (61.6%)		
Type II error	1,777 (2.4%)			875 (1.7%)			1,110 (3.5%)			1,559 (8.2%)		
Blocked correct	2,297 (22.4%)			1,169 (24.2%)			1,716 (38.9%)			2,132 (38.4%)		
Not blocked correct	72,865 (97.6%)			51,043 (98.3%)			30,191 (96.5%)			17,524 (91.8%)		
Overall percentage correct	75,162 (88.5%)			52,212 (92.0%)			31,907 (89.3%)			19,656 (79.8%)		

Note: The table reports results of the logistic regressions based on Model 3 which includes financial ratios and information on account blocks 1 and 2 years prior to the prediction period. Logistic regression is performed for each of the four group of industries: (i) wholesale and retail trade, transportation and storage, accommodation and food service activities (Industry 1); (ii) professional, scientific, technical, administrative and support service activities (Industry 2); (iii) manufacturing, mining and quarrying and other industrial activities (Industry 3) and (iv) construction (Industry 4). B represents the regression coefficient. S.E. is the standard error of the estimated coefficients. Exp(B) is the odds ratio for the predictors.

** Denotes significant at 5%; *** Denotes significant at 1%.

Source: Own work.

Appendix 3.1: Mann-Whitney U Test for SMEs that write off and do not write off current assets

Variable	CA_WO	N	Mean Rank	Z
ADJ_OP	No	220,562	127,780.92	-67.810***
	Yes	43,992	154,821.96	
Δ_ADJ_OP$_D$	No	220,562	133,072.25	-11.985***
	Yes	43,992	128,292.88	
% loss	No	220,562	134,313.03	-41.830***
	Yes	43,992	122,071.97	
NI	No	220,562	129,880.91	-36.141***
	Yes	43,992	144,293.26	
Δ_NI$_D$	No	220,562	132,231.03	-0.701
	Yes	43,992	132,510.48	
FA_WO	No	220,562	128,352.42	-117.881***
	Yes	43,992	151,956.61	
CA_WO	No	220,562	110,281.50	-511.527***
	Yes	43,992	242,558.50	
FACA_WO	No	220,562	111,527.89	-433.309***
	Yes	43,992	236,309.49	
SIZE	No	220,562	120,916.17	-171.333***
	Yes	43,992	189,239.64	
DEBT	No	220,562	130,767.58	-22.770***
	Yes	43,992	139,847.76	
FIN_DEBT	No	220,562	128,089.62	-65.429***
	Yes	43,992	153,274.22	
CASH	No	220,562	134,329.21	-30.947***
	Yes	43,992	121,990.86	
EMP	No	220,562	121,080.02	-170.710***
	Yes	43,992	188,418.13	

Note. ***ADJ_OP*** is operating profit before taxes plus write-off expense divided by total assets. ***Δ_ADJ_OP*** is the change in scaled adjusted operating profit from year t to year t+1. ***% loss*** is bottom line loss expressed as a percentage of adjusted operating profit. ***NI*** is net income scaled by total assets. ***Δ_NI*** is the change in scaled net income from year t to year t+1. ***FA_WO***, ***CA_WO***, ***FACA_WO*** are variables expressing fixed asset write-offs, current asset write-offs and fixed and/or current asset write-offs as ratios of total assets. ***SIZE*** is the natural logarithm of total assets. ***DEBT*** is the ratio of total debt (short- and long-term) to total assets. ***FIN_DEBT*** is the ratio of financial debt (short- and long-term) to total assets. ***CASH*** is the ratio of cash to total assets. ***EMP*** is the average number of employees based on hours worked.

$_D$ Denotes dependent variable. *** Denotes significant at 1% level.

Source: Own work.

Appendix 3.2: Mann-Whitney U Test for SMEs that write off and do not write off fixed and/or current assets

Variable	FACA_WO	N	Mean Rank	Z
ADJ_OP	No	206,924	126,356.45	-75.564***
	Yes	57,630	153,537.37	
Δ_ADJ_OP$_D$	No	206,924	133,307.05	-13.139***
	Yes	57,630	128,580.85	
ADJ_OP_% loss	No	206,924	135,066.88	-48.509***
	Yes	57,630	122,262.08	
NI	No	206,924	129,208.87	-39.161***
	Yes	57,630	143,295.59	
Δ_NI$_D$	No	206,924	132,266.72	-0.138
	Yes	57,630	132,316.21	
FA_WO	No	206,924	120,068.00	-310.310***
	Yes	57,630	176,116.45	
CA_WO	No	206,924	110,281.50	-432.884***
	Yes	57,630	211,255.47	
FACA_WO	No	206,924	103,462.50	-509.224***
	Yes	57,630	235,739.50	
SIZE	No	206,924	116,821.80	-197.243***
	Yes	57,630	187,772.13	
DEBT	No	206,924	129,426.31	-36.387***
	Yes	57,630	142,514.87	
FIN_DEBT	No	206,924	125,949.97	-83.659***
	Yes	57,630	154,996.89	
CASH	No	206,924	135,450.48	-40.501***
	Yes	57,630	120,884.71	
EMP	No	206,924	117,066.02	-196.251***
	Yes	57,630	186,895.26	

Note. ***ADJ_OP*** is operating profit before taxes plus write-off expense divided by total assets. ***Δ_ADJ_OP*** is the change in scaled adjusted operating profit from year t to year t+1. ***ADJ_OP_% loss*** is bottom line loss expressed as a percentage of adjusted operating profit. ***NI*** is net income scaled by total assets. ***Δ_NI*** is the change in scaled net income from year t to year t+1. ***FA_WO***, ***CA_WO***, ***FACA_WO*** are variables expressing fixed asset write-offs, current asset write-offs and fixed and/or current asset write-offs as ratios of total assets. ***SIZE*** is the natural logarithm of total assets. ***DEBT*** is the ratio of total debt (short- and long-term) to total assets. ***FIN_DEBT*** is the ratio of financial debt (short- and long-term) to total assets. ***CASH*** is the ratio of cash to total assets. ***EMP*** is the average number of employees based on hours worked.

$_D$ Denotes dependent variable. *** Denotes significant at 1% level.

Source: Own work.