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Does Working Capital Management Affect The Profitability of Swedish Hybrid Retail Firms?

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Abstract

This paper investigates the relationship between working capital management and profitability in 100 of the largest limited Swedish hybrid retail firms. Despite the rapid growth of hybrid retailing in recent years, there is limited empirical research on how this business model affects efficiency of working capital management and firm profitability. Using a quantitative research design, we analyze a panel dataset during the 2014–2023 period and estimate four Fixed Effects regression models. Return on Assets (ROA) is used as the primary measure of firm profitability, while the Cash Conversion Cycle (CCC) and its components; Days Inventory Outstanding (DIO), Days Sales Outstanding (DSO), and Days Payables Outstanding (DPO), serve as the key explanatory variables. The results indicate that more efficient working capital management, particularly shorter CCC, DIO, and DPO periods, is significantly associated with higher firm profitability. Although DSO shows a negative relationship with firm profitability, the relationship is not statistically significant, possibly due to industry-specific factors such as high cash sales or the use of accounts receivable factoring. This study fills a research gap by focusing on Swedish hybrid retail firms and contributes to the broader understanding of how working capital practices affect firm profitability in the evolving retail industry. The findings highlight the importance of optimizing working capital management to enhance profitability in Swedish hybrid retailing.

Keywords: Working Capital Management, Firm Profitability, Cash Conversion Cycle, Hybrid Retail, Swedish Retail Firms

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1. Introduction

Working capital, typically defined as the difference between a firm's current assets and current liabilities, is a measure of a firm's liquidity and operational efficiency. It represents the amount of liquid assets a firm has available to pay for its short-term financial obligations (Preve, L.A. & Sarria-Allende, 2010). Deloof (2003), for instance, found that according to the National Bank of Belgium, accounts receivable and inventories constituted a major part of total assets (17% and 10%) of all Belgian financial firms in 1997, whereof accounts payable were found to be a significant balance sheet item as well. Given this, one could expect that working capital management has a significant impact on firm profitability.

In the last decade, e-commerce has been growing rapidly, and revenue in the e-commerce market is expected to further grow at an annual growth rate (CAGR 2024-2029) of 9.49% (Statista, 2024). The growth of online shopping and the e-commerce market temporarily accelerated during the COVID-19 pandemic due to global lockdowns and social distancing measures, and a notable shift in consumer behavior towards online shopping during this period was witnessed (Ngoh & Groening, 2022; Young et al., 2022). Due to the increasing demand for online shopping, more and more traditional retail firms, initially selling their products through physical stores only, have introduced their own online shopping platforms to capture additional sales. Levary & Mathieu (2000) defined this new retail industry sector as hybrid retail; that is, integrating e-commerce and physical stores. They claim hybrid retail to be the optimal strategy for companies navigating today's retail business landscape, which includes both physical stores and online platforms. However, how the hybrid retail model affects working capital management - and, by extension, profitability - remains empirically unexplored.

Several studies have found that working capital needs differ by industry and the level of efficiency in managing working capital varies within sectors (Czerwonka & Jaworski, 2023; Davies & Merin, 2014; Hawawini et al., 1986). This might not seem surprising considering that different business models infer differences in financial dynamics which in turn affects working capital management. For example, firms employing e-commerce often have more complex supply chains and inventory management than traditional retail firms, and require efficient working capital management to release cash needed for the investments (Kortman et al., 2016). Hybrid retail firms share many of the operational advantages and disadvantages of

both traditional retail firms and pure e-commerce firms. Thus, examining hybrid retail firms in the aspect of working capital management offers a relevant and timely perspective on financial management in the modern business landscape.

Many empirical studies confirm a significant negative relationship between the length of the Cash Conversion Cycle (CCC), which is the number of days it takes for a firm to convert resource inputs (inventory, accounts receivables and payables) into cash flows (Richards & Laughlin, 1980), and firm profitability (Deloof, 2003; Czerwonka & Jaworski, 2022; Shin & Soenen, 1998), where the CCC has been used as a measure of a firm's working capital management. With regards to the respective components of the CCC; days inventory outstanding (DIO), days sales outstanding (DSO), and days payables outstanding (DPO), a majority of the studies investigating these components separately found all three to be negatively related to firm profitability (Appendix 1), suggesting that reducing the number of days accounts receivables, accounts payables and inventory outstanding is associated with higher firm profitability. On the other hand, some empirical studies, mainly on emerging markets, have contradictingly found that the CCC and firm profitability are positively related (Aravind, 2016; Kasozi, 2017; Sharma & Kumar, 2011). Contradicting results regarding DIO, DSO and DPO generally come from the same studies performed on emerging markets.

There are also researchers on the topic who emphasize the trade-off theory of working capital management. They claim that the relationship between working capital management and firm profitability is not linear, but invertedly U-shaped, and that therefore there exists an optimal level of working capital for each and every firm at which firm profitability is maximized (Aktas et al., 2015; Deari et al., 2022; Smith, 1980). In these empirical studies, it is emphasized that businesses must consider their individual operational needs, industry conditions, and financial strategy when determining their working capital level in order to maximize working capital management efficiency and profitability.

Except for Yazdanfar & Öhman (2014) who found evidence of a significant negative relationship between the CCC and firm profitability in Swedish SMEs operating in four different industries, there are few studies of Swedish firms. On the other hand, there exist several studies on firms in the traditional retail industry that have found a significant negative relationship between the CCC and firm profitability (Ebben & Johnson, 2011; Jose et al., 1996; Potwana et al., 2022). Furthermore, Louw et al. (2019) found this relationship to be

stronger for retail firms than for firms in other industries. To the best of our knowledge, no empirical studies have yet specifically examined this relationship in hybrid retail firms, either in Sweden or in any other country.

The purpose of this study is to investigate and analyze the relationship between working capital management and firm profitability in Swedish hybrid retail firms. The primary research question of this paper is: *Does working capital management affect the profitability of Swedish hybrid retail firms?* Our main hypothesis is that working capital management efficiency (measured by the CCC) affects firm profitability in Swedish hybrid retail firms and that this relationship is negative, meaning that a shorter CCC is associated with higher firm profitability. Additionally, we hypothesize that there is a negative relationship between the individual components of the CCC and firm profitability of Swedish hybrid retail firms, meaning that shorter DIO, DSO and DPO are associated with higher firm profitability. We base our hypotheses on predominant findings from previous empirical studies on the topic, with special consideration to our choice of industry, sector and national context. Although a negative relationship between DPO and firm profitability may seem counterintuitive, the majority of previous empirical studies confirm this link, explaining it with findings that suggest that less profitable firms wait longer to pay their bills. In other words, firm profitability affects DPO, rather than the other way around.

Given the lack of empirical studies on the relationship between working capital management and firm profitability in the hybrid retail industry and in Swedish firms, there exists a knowledge gap in the research topic. This study aims to fill that gap by creating an understanding about how working capital management impacts firm profitability in Swedish hybrid retail firms. It is especially relevant to examine this relationship in Swedish firms considering Sweden's high degree of technological adoption, accounts receivable factoring, and its stable economy, as well as strong financial and legal systems, all of which may contribute more efficient working capital management (PwC, 2025). Additionally, by examining the individual effects of working capital metrics on firm profitability, we seek to identify what key metrics have the most significant relationship with firm profitability, and whether these relationships are positive or negative. Ultimately, our study will contribute to the existing literature on whether efficient working capital management is associated with higher firm profitability.

The study employs a quantitative research design, following the methodology of Deloof (2003), with slight modifications to suit the specific focus on Swedish hybrid retail firms. To analyze the relationship between working capital management and firm profitability, we utilize four Fixed Effects regression models. The primary dependent variable for firm profitability is Return on Assets (ROA), while the independent variables for working capital management include CCC and its components (DIO, DSO and DPO), each included separately in their respective models. Persistence of earnings, firm size, sales growth and financial leverage are included as control variables. The sample consists of 100 Swedish limited hybrid retail firms, selected for the period 2014-2023. These are the largest firms by revenue as of today that have complete data sets.

The study finds that efficient working capital management - particularly a shorter CCC, along with reduced DIO and DPO - is significantly associated with higher firm profitability in Swedish hybrid retail firms. While DSO shows a negative relationship with firm profitability, its effect is not statistically significant in the main regression using Return on Assets as dependent variable. Sales growth tends to have a positive impact on firm profitability, while higher financial leverage tends to reduce it. Our findings suggest that DSO's weaker significance in the main model may be due to industry-specific factors, such as cash sales and accounts receivable factoring practices common in Swedish hybrid retail. Lastly, reverse causality between the variables cannot be ruled out, particularly concerning DPO, suggesting less profitable firms might delay payments rather than payment delays reducing profitability.

The thesis is structured as follows: Section 2 reviews relevant literature and theory to identify existing knowledge and gaps, and concludes with a presentation of our hypotheses. Section 3 outlines the research design, regression variables and models, and the sample. Section 4 presents the results of the data analysis, including a description of the data and a summary of the results. Section 5 discusses possible explanations of the findings, and their implications. Finally, Section 6 concludes the study with a summary of contributions, limitations, and suggestions for future research.

2. Literature and Theory

This section presents our literature review, outlines the theoretical background, and concludes with our hypotheses. The literature review examines existing research on the relationship between working capital management and firm profitability, highlighting gaps and inconsistencies - some of which may stem from differing research methodologies. The theoretical background provides a framework for interpreting our study through established theories and concepts, and situates it with existing academic work. Finally, we state our hypotheses based on the insights from the literature and theory. We use the abbreviations 'CCC' for Cash Conversion Cycle, and 'DIO', 'DSO', and 'DPO' for Days Inventory Outstanding, Days Sales Outstanding, and Days Payables Outstanding, respectively.

2.1 Literature review

2.1.1 Working Capital Management's Effect on Firm Profitability: Overall

Irrespective of sample selection, several empirical studies have found a negative relationship between CCC and firm profitability. Jose et al. (1996) found that a shorter CCC is associated with higher Return on Assets (ROA) and Return on Equity (ROE) for several industries (retail, manufacturing, service, etc.) over the 1974-1993 period, and that the relationship was statistically significant and not driven by size. Shin and Soenen (1998) investigated firms world-wide over the 1975-1994 period and similarly found a statistically significant negative relationship between working capital management and firm profitability. Deloof (2003) investigated the relationship between CCC and Gross Operating Income (GOI), using a sample of Belgian non-financial firms over the 1992-1996 period. Using a fixed effects model and plain OLS-models, his results showed a highly statistically significant negative relationship between CCC and Gross Operating Income in the OLS estimation. However, the relationship was negative but not statistically significant in the fixed effects estimation. On the other hand, in both estimations, he found statistically significant negative relationships between DIO, DSO and DPO, and Gross Operating Income. The results imply a lower number of days outstanding for accounts receivables and inventories is associated with higher firm profitability. Deloof importantly noted that it cannot be ruled out that the negative relationship between working capital management and firm profitability is to some extent a consequence of profitability affecting working capital management, and not vice versa. In

particular, he argues that the significant negative coefficient for DPO could mean that less profitable firms wait longer to pay their credit bills.

Many subsequent empirical studies on the research topic have followed Deloof's methodology. Applying the same general method, Lazaridis & Tryfonidis (2006) used a sample of firms listed in the Athens Stock Exchange (ASE) over the 2001-2004 period. Overall, their results were consistent with Deloof's. Among them, a statistically significant negative relationship between CCC, DSO, and firm profitability was found. However, they found that higher DPO is associated with higher firm profitability, and that the relationship between DIO and firm profitability was negative but not statistically significant. In a similar study, García‐Teruel & Martínez‐Solano (2007) investigated working capital management's effect on firm profitability using a sample of small-to-medium-sized enterprises (SMEs) over the 1996-2002 period. They found statistically negative relationships between CCC, DSO, DIO, DPO, and Return on Assets. The results did not differ when further controlling for sectoral effects. Additionally, they regressed their equations using instrumental variables to establish whether it is really working capital management that affects firm profitability, and not the other way around. Interestingly, the results were consistent except for the DPO coefficient that lost its significance, which is in line with the reasoning of Deloof (2003).

In a more recent study, Czerwonka & Jaworski & (2022) investigated the relationship between working capital management and firm profitability in firms listed on the Warsaw Stock Exchange over the 1998-2016 period. Their analysis revealed a linear and statistically significant negative relationship between CCC and Return on Assets. Enqvist et al. (2014) examined the role of business cycle on the working capital-profitability relationship using a sample of Finnish listed companies over the 1990-2008 period. They found a negative relationship between CCC, DIO, DSO and DPO, and Return on Assets. Furthermore, they found that the impact of business cycles on the relationship was more pronounced in economic downturns relative to economic booms, and that the significance of efficient inventory management and accounts receivables conversion periods increases during periods of economic downturns. To conclude, all seven studies found support for the hypothesis that efficient working capital management, in the form of a shorter CCC, is associated with higher firm profitability.

2.1.2 Working Capital Management's Effect on Firm Profitability: The Retail Industry

There are several previous empirical studies on the relationship between working capital management and firm profitability in the retail industry as a whole. Louw et al. (2019) did a cross-industry comparison study between retail firms and construction firms in South Africa over the 2004-2015 period. Firstly, they found a statistically significant negative relationship between CCC and firm profitability. Secondly, they found that faster stock turnover (lower DIO), reduced debtor's collection period (lower DPO), and slightly delaying creditor's payment (lower DSO), is associated with higher firm profitability and vice versa. They explained that the lower significance level of DSO could be due to the nature of the retail industry where accounts receivable are of lower importance. Gross Operating Income was the most impacted profitability measure. Additionally, working capital management was found to have a greater impact on the profitability of retail firms than of construction firms, implying that the effect of working capital management on firm profitability may differ between industries.

In reviewing empirical studies on the working capital-profitability relationship in retail firms that operate in developed markets, there are findings that support the aforementioned conclusions regarding the relationship between the CCC and firm profitability. Except for the findings of comparison studies that focus on several different industries at once (Jose et al., 1996; Yazdanfar & Öhman, 2014), there are consistent findings of studies that solely focus on the retail industry. For instance, Ebben & Johnson (2011) investigated the relationship between CCC and levels of liquidity, invested capital and firm performance in small firms over time. They used a sample of small U.S. manufacturing firms and small U.S. retail firms over the 2002-2004 period. Consistent in both industries, they found that firms with shorter CCCs were more liquid, required less debt and equity financing, and had higher returns. They explain the negative relationship between CCC and firm performance as a result of reduction in inventory costs and receivable collection costs that operational inefficiencies bring.

There are several retail studies of South African retail firms for time periods stretching between 2004-2019 that all found a statistically significant negative relationship between CCC, DIO, DSO and DPO, and firm profitability, indicating that efficient working capital management is associated with high firm profitability for firms in this industry (Garg, 2015; Mandipa & Sibindi, 2022). However, Potwana et al. (2022) used a specific sample of

JSE-listed South African clothing retailers for the 2003-2019 period and obtained the same results, except for DPO which was found to be statistically significantly positively related to firm profitability, suggesting that the within-industry sector might matter for these relationships. Although developing countries represent a market with immense potential for e-commerce, many of them experience several obstacles for e-commerce to fully flourish, such as customer readiness, technical and managerial expertise, legislation, and e-payment and financial systems (Alyoubi, 2015). Furthermore, South African retail studies are not representative for developed markets like Sweden, which is the focus of this study, and we will later see that the financial environment could impact firms' working capital management. Moreover, these studies relied on small sample sizes due to the limited number of South African retail firms, affecting their reliability.

2.1.3 Working Capital Management's Effect on Firm Profitability: Swedish Firms

Swedish firms benefit from a stable financial system with easy access to financing, allowing them to maintain lower cash reserves and rely on short-term financing (International Monetary Fund, 2023; European Commission, 2024). Sweden's stable economy and strong financial and legal systems provides Swedish firms with more predictability in their working capital needs, which simplifies efficient working capital management (Rasmussen & Anbelin, 2020; Baños-Caballero et al., 2020; Mättö & Niskanen, 2021). Sweden is a leader in technological adoption, and Swedish firms tend to implement innovative technologies to employ operational and logistical systems that improve working capital management, such as inventory tracking tools, automated accounts payable/receivable systems, predictive analytics for demand forecasting, and for hybrid retail firms; omnichannel inventory management systems such as "click-and-collect" (PwC, 2024). Additionally, many e-commerce and hybrid retail firms partner with accounts receivable factoring companies like Klarna and Qliro, to decrease or reset their accounts receivables, in order to improve liquidity and reduce short-term financing needs (Sveriges Riksbank, 2024).

In a Swedish study, Yazdanfar & Öhman (2014) investigated the impact of CCC on firm profitability in Swedish small and medium-sized enterprises (SMEs) operating in four different industries (retail, metal, restaurant, wholesale) over the 2008-2011 period. They found a statistically significant negative relationship between CCC and Return on Assets, implying that Swedish SMEs could potentially increase firm profitability by improving their working capital management. Hassan et al. (2023) did a study on the relationship between

working capital management and firm profitability in Scandinavian markets over the 2007-2020 period. They found statistically significant negative relationships between CCC, DIO, and firm profitability, and a statistically significant positive relationship between DPO and firm profitability. Their results for the relationship between DSO and firm profitability were negative but inconclusive regarding its significance as it depended on the choice of the model.

2.1.4 Working Capital Management's Effect on Firm Profitability: Contradicting Results

Although results from previous empirical studies are mostly consistent, some researchers have found a contradictory positive relationship between CCC and firm profitability, particularly in studies focusing on emerging markets. For instance, Sharma & Kumar (2011) found a positive, but not statistically significant, relationship between CCC and Return on Assets when using a sample of non-financial firms listed at the Bombay Stock Exchange (BSE) over the 2000-2008 period. Furthermore, they found that DIO and DPO had negative relationships with Return on Assets, whereas DSO had a positive relationship with Return on Assets. Aravind (2016) did a similar study on Indian manufacturing firms over the 2005-2015 period and found that CCC was positively related to Net Profit Ratio (NPR), but negatively related to Return on Equity (ROE). Moreover, he found that DIO was negatively related to firm profitability, while DSO and DPO were positively related to it. Kasozi (2017) examined working capital management's impact on firm profitability in manufacturing firms listed on the Johannesburg Stock Exchange (JSE) over the 2007-2016 period. He found a statistically significant positive relationship between CCC, DIO, and Return on Assets, and a statistically significant negative relationship between DSO and Return on Assets. Kasozi explained his results regarding DIO by suggesting that firms with higher DIO suffer less from stock-outs which increases sales and results in higher profitability. Abuzayed (2011) found statistically significant positive relationships between CCC, DSO, DIO, and Gross Operating Income, when using a sample of firms in Jordan listed on the Amman Stock Exchange over the 2000-2008 period. Additionally, he found that DPO and firm profitability were negatively related.

Other researchers claim that the relationship between working capital management and firm profitability is not linear but invertedly U-shaped, and that there therefore exists an optimal level of working capital for each and every firm at which profitability is maximized. For

instance, Afrifa & Padachi (2016) used a sample of Alternative Investment market (AIM)-listed small and medium-sized enterprises (SMEs) over the 2005-2010 period, and found a concave relationship between working capital level (measured by CCC and its square, CCC^2) and firm profitability. Mun & Jang (2015) arrived at the same conclusion of a concave relationship investigating restaurant firms over the 1963-2012 period. Additionally, they revealed that a firm's cash level is an important factor for efficient working capital management, suggesting interactive effects among working capital, cash levels, and firm profitability. Specifically, if firms have both positive cash levels and positive working capital, working capital will have a negative impact on operating profit. Deari et al. (2022) also found evidence of an inverted U-shaped relationship between CCC and Return on Assets for a sample of firms in eight European Union (EU) countries over the 2006-2015 period. Moreover, Aktas et al. (2015) found evidence of an optimal working capital level for stock and operating performance in a large sample of US firms over the 1982-2011 period. They also found that corporate investment is the channel through which efficient working capital management translates into superior firm performance, as it allows firms to redeploy underutilized corporate resources to higher-valued use. All in all, these empirical studies suggest that, in order to maximize operational efficiency and profitability, firms must consider their individual operational needs, industry conditions, and financial strategy when determining their level of working capital. Furthermore, proof of an invertedly U-shaped relationship between working capital management and firm profitability could be an explanation why some studies provide contradicting results depending on sample selection.

Czerwonka & Jaworski (2022) argue that a concave model is more appropriate when examining working capital's (Current Assets - Current Liabilities) effect on firm profitability. Conversely, they found that a linear model is more appropriate when using CCC and its components as independent variables as it does not contain irrelevant variables that may interfere with examined dependence. Similarly, Louw et al. (2019) found that, when investigating the retail and construction industries, the linear relationship is predominant, especially in the retail industry.

2.2 Theoretical Perspective

2.2.1 The Definition and Measurements of Working Capital Management

Working capital is commonly calculated as current assets (e.g., inventory, account receivables, cash) less current liabilities (e.g., account payables, short-term debt). Generally, working capital is often referred to in the context of gauging a firm's liquidity and operational efficiency as it represents the amount of liquid assets a firm has available, and how well it can transform these into cash (e.g., by collecting receivables or selling inventory) to pay for its short-term financial obligations (Preve, L.A. & Sarria-Allende, 2010). Notably, working capital management is closely tied to liquidity management.

The concept of the cash conversion cycle (CCC) was first touched upon by Gitman (1974) who initially defined it as the number of days from the time a firm pays for its purchases to the time it collects cash from the sale of its finished product. The concept was later operationalized by Richards & Lauglin (1980) as an additive measure of the number of days funds are committed to inventories and receivables; that is, days inventory outstanding (DIO) plus days sales outstanding (DSO), less the number of days payments are deferred to suppliers; that is, days payables outstanding (DPO). There exist some modified versions of the CCC such as the Weighted Cash Conversion Cycle (WCCC) and the Net Trade Cycle (NTC), however the CCC is a more common and suitable measurement of working capital management for empirical studies (Shin & Soenen, 1998).

2.2.2 The Determinants of Working Capital Management

Understanding the key drivers of working capital levels in firms, the so-called "determinants of working capital management", helps create the theoretical and empirical foundation of a study like this. Numerous empirical studies have found that working capital management is influenced by various internal and external factors. For instance, in terms of firm-specific factors, several empirical studies have found a significant relationship between firms' CCCs and their size and age, sales growth, financial leverage and cash flows, and that these are significant determinants of working capital management (Czerwonka & Jaworski, 2023; Manoori & Muhammad, 2012; Nastiti et al., 2019; Palombini & Nakamura, 2012; Sardo & Serrasqueiro, 2022). According to these studies, larger and younger firms with higher sales growth, financial leverage and cash flow levels, are associated with shorter CCCs and are thus better at managing their working capital efficiently. Palombini & Nakamura (2012)

further found firm size and sales growth to be negatively related to accounts payable as well, suggesting that smaller firms with lower sales growth rates wait longer to pay their bills. Additionally, both Appuhami (2008) and Manoori & Muhammad (2012) observed a negative relationship between operating cash flow and working capital, while operating and interest expenditures were positively related to working capital, indicating firms hold more current assets when facing such obligations.

Considering that accounts receivables and payables are two out of three factors of the CCC, which is a proxy for working capital management, there is no doubt that trade credit policy is a key determinant of working capital management. Empirical studies of trade credit suggest that a firm's trade credit policy may depend on its cash levels (Deloof & Jegers, 1996; Emery, 1984). According to these studies, when a firm has a shortage of cash, trade credit could be used as a major source of financing through extending supplier credit terms (increasing DPO) or by reducing customer credit terms (decreasing DSO). Gertler (1988) argued that external finance may be more costly than internal finance due to transaction costs, agency problems, and asymmetric information, which is consistent with the trade credit theories and the Pecking Order Theory (Myers & Majluf, 1984). From the perspective of working capital management, this theory implies that firms would aim to maintain an adequate level of working capital and manage it efficiently so that they can raise internal capital for investments by "freeing up" up cash from working capital before issuing any debt or equity. Fazzari & Petersen (1993) highlighted that working capital is a source of liquidity that could be used to smooth fixed investments relative to cash-flow shocks if firms face finance constraints, and that working capital competes with fixed investment for a limited pool of finance. Furthermore, Appuhami (2008) found a negative relationship between capital expenditure and working capital requirement for firms listed on the stock exchange in Thailand over the 2000-2005 period, suggesting higher capital investment is associated with lower working capital levels in these firms. Manoori & Muhammad (2012) also found a similar negative relationship between capital expenditure and the CCC in Singapore-listed firms over the 2003-2010 period.

In terms of country-specific factors, several empirical studies have found financial and legal systems and markets, and their level of development, explain most of the country-level differences in working capital management (Baños-Caballero et al., 2020; Mättö & Niskanen, 2021). These studies found that firms in countries with stronger financial and economic

development, safer legal systems, better investment protection, and market-based systems, are associated with shorter CCCs and are thus more efficient in managing working capital. Kwenda & Matanda (2015) further found that trade credit was the dominant short-term financing instrument used to finance operations in firms listed on the Zimbabwe Stock Exchange over the 2009-2014 period, and concluded that trade credit plays an indispensable role in countries where firms have difficulties in accessing external financing due to underdeveloped financial markets. Furthermore, some studies investigating country-specific determinants of working capital management have found that firms operating in countries with high GDP growth are associated with longer CCCs (Czerwonka & Jaworski, 2023; Nastiti et al., 2019), likely due to the fact that developing countries generally have higher GDP growth, and that the characteristics of developing countries are generally associated with longer CCCs as found in the aforementioned studies. However, studies of other countries have found GDP growth to be negatively related to the CCC (Manoori & Muhammad, 2012; Nyeadi et al., 2018).

Lastly, several researchers argue for industry-specific determinants of working capital management as they have found that needs of working capital differ by industry, and that efficiency of working capital management - the length of CCCs - even varies within sectors (Czerwonka & Jaworski, 2023; Davies & Merin, 2014; Hawawini et al., 1986; Czerwonka & Jaworski, 2022). Moreover, Czerwonka & Jaworski (2023) found that industry-specific factors are more influential determinants of working capital management than country-specific factors. Hawawin et al. (1986) claim that the level of investment in working capital is similar within industries, but differ among industries. Specifically, they argue that investment in the different working capital components is a function of a firm's technology (nature of products and processes), its level of efficiency in managing its operating cycle, and its level of sales. Firms operating grocery stores are given as an example of firms that require a lower level of working capital in comparison to manufacturing firms that usually require a higher level of working capital to sustain the same level of sales. However, they stress that firms with the same technology might still require different levels of working capital as a result of differences among firms' managerial efficiency; higher managerial efficiency of working capital components might reduce the working capital requirement. Due to market competition, firms operating in the same industry typically have the same firm technology and managerial efficiency degrees. Hence, optimal industry norms develop which establish

within-industry working capital benchmarks that firms adhere to when deciding on their working capital management policies.

Smith (1980) discusses the trade-off theory between liquidity and profitability, highlighting the existence of an optimal balance. Supporting this theory, Czerwonka & Jaworski & (2022) found a positive but non-linear relationship between liquidity and firm profitability: profitability rises with liquidity up to a point, after which it declines. They found a similar relationship between working capital (Current Assets - Current Liabilities) and firm profitability. In contrast, Ebben & Johnson (2011) found that firms with shorter CCCs tend to have higher liquidity as well as profitability, which challenges the trade-off theory. They attributed this to their sample of small firms, where limited capital means tied-up assets reduce cash liquidity, referencing Fazzari & Petersen (1993). Liquidity management is closely linked to working capital management (Smith, 1980). Excess working capital ties up resources that could be more profitably employed elsewhere and increases the risk of obsolete inventory or expired receivables, while too little can increase borrowing costs due to short-term overborrowing or cause operational issues, such as unmet short-term obligations or inventory shortages. This indicates a trade-off similar to that in liquidity-profitability theory that firms may consider in deciding the working capital management policies. The theory is further supported by studies proposing a concave relationship between working capital management and firm profitability (Afrifa & Padachi, 2016; Aktas et al., 2015; Deari et al., 2022; Mun & Jang, 2015).

2.2.3 Working Capital Management in Hybrid Retail Firms

It is proclaimed that working capital needs differ by industry and that the level of efficiency in managing working capital varies within sectors (Czerwonka & Jaworski, 2023; Davies & Merin, 2014; Hawawini et al., 1986). This might seem evident as different business models infer differences in financial dynamics which in turn affects working capital management. When investigating working capital management at an industry and sector level as we do in this study, it is thus important to note how working capital management in the retail industry generally differs from other industries, and how it differs in firms in the hybrid retail sector in comparison to firms in other retail sectors.

Gaur et al. (2005) found that inventory represents a significant part of total and current assets in retail firms, with inventory turnover varying widely across retailers and over time, and

being strongly linked to gross margin, capital intensity and sales surprise. Similarly, Kortman et al. (2016) found that inventory performance (DIO) is a key performance differentiator for retail firms, with receivable days (DSO) being a critical driver of the overall working capital position as the retail industry is typically characterized by low DSOs. While customers usually use cash-based payment methods when shopping in physical stores, e-commerce retailers often offer credit-based payment methods as well, which are used as a marketing tool to increase spending levels (Xie et al., 2021). Credit-based payment methods generally would increase accounts receivables, however it has become increasingly more common for e-retailers to factor their accounts receivables by selling them to factoring companies to gain quick access to cash and reduce their DSOs (Borgia & Burgess, 2000; Sopranzetti, 1998). In terms of current liabilities, retailers often have high accounts payable (DPO) due to their need to purchase inventory from suppliers. Extending payment terms with suppliers helps them manage liquidity.

The e-commerce market has been growing rapidly since the 1990s, with revenues expected to continue increasing at a 9.49% annual growth rate between 2024 and 2029 (Statista, 2024). The COVID-19 pandemic temporarily accelerated this growth due to world-wide imposed lockdowns and social distancing measures, shifting consumer behavior toward online shopping, a trend that persisted post-pandemic (Ngoh & Groening, 2022; Tudor, 2022; Young et al., 2022). As a result, to capture the increasing customer demand for online shopping, many companies that once relied on physical store selling have embraced digital transformation by introducing their own online shopping platforms, leading to the rise of hybrid retail which integrates both e-commerce and physical retail strategies (Gomes et al., 2024; Levary & Mathieu, 2000; Tudor, 2022).

Levary & Mathieu (2000) noted that hybrid retail firms combine the best of e-retail with the best of physical retail, and that hybrid retail strategy is the optimal one for companies navigating today's transforming retail landscape. However, they also share the challenges of both. While hybrid retailers share the high costs and operational complexity of traditional stores, inventory management and distribution networks, they also benefit from the flexibility of e-commerce, offering a broader range of products, information, flexible logistics, and can benefit from both cash and credit payment systems to balance liquidity. For instance, hybrid retail firms can use remote and cheaper warehouses or drop-shipping to complement their physical stores. Ratchford et al. (2022) further found that having an e-commerce component

in addition to physical stores does not necessarily significantly cannibalize or threaten the survival of the physical stores, but might improve customer retention and increase sales due to the service integration between the channels. Furthermore, he highlighted that e-retailers have lower inventory holding and distribution costs, and benefit from internet technologies. For example, search engines, online agents, websites and marketplaces reduce information and search costs, provide potential for differentiation and targeted advertising, and thus improve customer willingness to pay (Bakos, 2001).

On the other hand, e-commerce can complicate working capital management, requiring close coordination between retailers and suppliers to avoid delays and disruptions that might impact cash flow, increase holding costs, and amplify financial risks (Mai et al., 2025). Hybrid retailers must manage complex computer and information systems to coordinate inventory and orders between online and physical stores (Gomes et al., 2024). However, the complexity of e-commerce logistics can be managed through technologies like automation, EDI technology, AI-driven inventory management and blockchains, which all positively affect working capital efficiency in e-commerce supply chains (Mai et al., 2025). Kortman et al. (2016) found that efficient working capital management is essential for hybrid retailers to release cash needed for investments in the required complex supply chains and inventory management. According to them, hybrid retailers need to become increasingly competitive which in turn requires additional funding.

In summary, the rise of e-commerce and the shift towards hybrid retail has significantly impacted working capital management in the retail industry. Hybrid retail presents opportunities and challenges in working capital management. While hybrid retail firms benefit from the advantages of both e-retail and traditional retail in terms of operational efficiency and customer satisfaction, efficient working capital management through navigating inventory, logistics and technology integration is crucial to meet the demands of the rapidly transforming retail environment and to stay competitive and operationally efficient, which may all - ultimately - facilitate firm profitability.

2.3 Hypotheses

In formulating our hypotheses, we draw upon the findings of prior empirical research on working capital management and firm profitability, with special emphasis on research contexts similar to those we are examining (see Appendix 1 for a literature overview).

Specifically, we uniquely focus on the hybrid retail industry in Sweden. Previous studies have often found that working capital management plays a crucial role in determining the profitability of firms across various sectors. However, we have also seen that the relationship between working capital management and firm profitability can differ depending on industry characteristics and geographic context. Our main hypothesis is rooted in the well-established premise that efficient working capital management, characterized by a shorter CCC, is associated with higher firm profitability. This relationship has been consistently highlighted in the literature, where companies that are able to reduce the time it takes to convert their investments in inventory and receivables back into cash tend to perform better financially. For firms in the Swedish hybrid retail sector, we anticipate that the same dynamics will hold true. Thus, we hypothesize that:

> ***H1:*** *There is a significant negative relationship between working capital management (CCC) and firm profitability for firms in the Swedish hybrid retail industry.*

This hypothesis is based on the assumption that efficient working capital management, meaning a shorter CCC and thus better efficiency in managing inventory, receivables and payables, leads to improved liquidity and operational efficiency, reduced need for external financing, new investment opportunities and better profitability, including a stronger Return on Assets (ROA). Additionally, we hypothesize that the components of the CCC; Days Inventory Outstanding (DIO), Days Sales Outstanding (DSO), and Days Payables Outstanding (DPO), all individually impact firm profitability. Thus, our second to fourth hypotheses are:

> ***H2:*** *There is a negative relationship between DIO and firm profitability for firms in the Swedish hybrid retail industry.*
>
> ***H3:*** *There is a negative relationship between DSO and firm profitability for firms in the Swedish hybrid retail industry.*
>
> ***H4:*** *There is a negative relationship between DPO and firm profitability for firms in the Swedish hybrid retail industry.*

This hypothesis builds on the understanding that a shorter DIO, DSO, and DPO will be associated with higher profitability for firms in the hybrid retail industry, as these measures directly affect cash flow and operational efficiency. While a negative relationship between

DPO and firm profitability might be considered counterintuitive, especially considering the calculation of CCC and trade credit theories (Deloof & Jegers, 1996; Emery, 1984), a majority of previous empirical studies confirm this negative relationship (Appendix 1), some explaining it by referring to discounts for prompt payment or to evidence that suggest an inverse relationship; that less profitable firms wait longer to pay their bills (e.g., Deloof, 2003; García-Teurel & Martínez-Solano, 2007).

3. Method

This section outlines the methodological framework used to examine the relationship between working capital management and firm profitability in Swedish hybrid retail firms. First, we present our research design describing how the data analysis will be conducted and how we account for key econometric assumptions. Second, we present the dependent, independent, and control variables used in the regression models, along with the rationale behind their selection, followed by a description of the model specification. Finally, the sample selection process is described on which the data analysis will be performed.

3.1 Research Design

For our data analysis, we use a quantitative research method which is based on the methodology of a similar study conducted by Deloof (2003). Many other subsequent empirical studies have followed Deloof's methodology as well to examine the same relationship but on different samples of firms (Czerwonka & Jaworski, 2022; García‐Teruel & Martínez‐Solano, 2007; Lazaridis & Tryfonidis, 2006). Considering that our sample is industry-specific, consisting of Swedish hybrid retail firms different from Deloof, slight adjustments of the research design are made to fit the objective of our study. Specifically, we use another dependent variable as our main and use a different set of control variables that are more closely tied to it.

Our data analysis consists of three parts. First, we calculate descriptive statistics covering the mean, standard deviation, minimum, medium and maximum value of the variables included in the regression models. Second, we conduct a Pearson correlation analysis that calculates correlation coefficients for each variable in order to determine if the variables in the models move together in a predictable manner, and if so, quantify the strength and direction of their relationships. Third, to investigate the relationship between working capital management and firm profitability four regressions analyses are performed, one for each separate independent

variable, each using a Fixed Effects regression model which are useful when having a panel data set including multiple observations over time. However, the primary reason for using Fixed Effects models is to control for unobserved heterogeneity to avoid biased or inconsistent estimates. Our Fixed Effects models estimate firm fixed effects and year fixed effects. Firm fixed effects assume firm-specific intercepts which capture the effects of variables that are particular to each firm and that are constant over time, e.g., management practices, location and strategy. Year fixed effects control for time-invariant factors that do not change over time but might influence the dependent variable, e.g., seasonality, economic conditions and technological advancements. Since the models essentially focus on the variation within each entity over time, ignoring the variations between entities, it allows us to examine how changes within a given firm over time affect the dependent variable.

In order to ensure accuracy and quality of our results, it is important to consider whether the Gauss-Markov assumptions for linear regression models hold or if corrections need to be done. Pearson correlation and Fixed effects models generally assume a linear relationship between the independent and dependent variables. As mentioned, many researchers have found the linear model to be more appropriate when testing the CCC-profitability relationship in particular, especially when the sample consists of retail firms (Czerwonka & Jaworski, 2022; Louw et al., 2019). Thus, we assume a linear relationship between our independent and dependent variables, which also is confirmed when visually plotting the observed versus the predicted values (Appendix 6.1). Next, there is an assumption of no heteroskedasticity; the conditional variance of the error terms is assumed to be constant across all entities and time periods. Furthermore, there is an assumption of no autocorrelation, which occurs when a lagged time series value is a predictor of the current value. Heteroskedasticity and mild positive autocorrelation was detected using the Breusch-Pagan test and Durbin-Watson test respectively (Appendix 6.2), but are controlled for by using Bartlett Kernel HAC standard errors which is a common method for robust standard errors that account for both heteroskedasticity and autocorrelation in panel data. No endogeneity is another standard assumption for linear regression models especially when investigating causality, which occurs when an explanatory variable is correlated with the error term in a regression model. However, exogeneity (no endogeneity) is not strictly required as an assumption for linear regression models to be valid in a descriptive or exploratory sense. Since the goal of this study is to explore associations and not causality, we disregard the potential existence of endogeneity. Also, the firm and year fixed effects included in our regression models address

any endogeneity arising from unobserved, firm-specific factors that are constant over time, and external time-specific factors that affect all firms similarly.

Another important assumption is that no perfect multicollinearity exists, meaning that the independent variables must not be perfectly correlated with each other. Since the independent variables DSO, DIO and DPO are all factors of another independent variable CCC, these variables are likely highly correlated to one another, which can also be detected in the Pearson Correlation analysis. To avoid multicollinearity, all four independent variables are included separately in four different regression models. Furthermore, no multicollinearity was detected when calculating Variance Inflation Factors (VIFs) for each variable in each model (Appendix 6.2). Finally, the data analysis is also sensitive to outliers which can disproportionately influence the results. To handle outliers, winsorization has been used on all data included in the calculations of our key variables. This method limits extreme values to a certain percentile which we choose to be the 5th percentile and the 95th percentile. Hence, values below the 5th percentile are set to the value of the 5th percentile and values above the 95th percentile are set to the value of the 95th percentile. Also, the HAC robust standard errors are more resistant to outliers than non-robust ones. To ensure more representative results, regression analyses, Pearson correlation coefficients and descriptive statistics are calculated using the winsorized data due to the presence of extreme outliers.

To check the robustness of our results, we re-estimate all four Fixed Effect models using Gross Operating Income (GOI) as the dependent variable, and substitute Lagged Gross Operating Income (GOI_{t-1}) for Lagged Return on Assets (ROA_{t-1}) as a control variable. Furthermore, another important assumption for linear regression models is the assumption of normally distributed data, which we tested using the Kolmogorov-Smirnov test (Appendix 6.2). We found CCC, DIO, DSO, DPO, and Sales Growth to be non-normal and positively skewed. Thus, as an additional robustness test, once again re-estimate all four Fixed Effect models using log transformed variables for CCC, DIO, DSO and DPO, and square root transformed Sales Growth. As log transformation drops negative and zero values, as these cannot be log transformed, regression model (1) ends up with fewer firm-year observations. The data for Sales Growth contains many negative data points. Thus, to preserve more observations and maintain predictive power of the models, square root transformation is used for this variable which computes the square root of each Sales Growth observation after adding a small constant of 1 to handle zero or negative values.

3.2 Variables

3.2.1 Dependent Variables

Since we measure the effect working capital management has on firm profitability, the dependent variable in our models is a profitability measure. Specifically, we use Return on Assets (ROA) as the dependent variable in all four main models, in line with previous research (Jose et al., 1996; García‐Teruel & Martínez‐Solano, 2007; Shin & Soenen, 1998; Yazdanfar & Öhman, 2014). Return on Assets measures how effective a company is in utilizing its assets to generate profit and can be calculated in various different ways. We use Operating profit/loss (EBIT) as the numerator in the calculation formula, as this operating profitability measure provides insights into the core operational efficiency of the sampled firms, an area closely linked to working capital management. This choice is particularly relevant for hybrid retail firms, whose operations focus on the sale of goods, where operational efficiency and cost management are key drivers of profitability. Accordingly, operating profit serves as a highly relevant indicator of financial performance in this context.

As mentioned, for one of the robustness tests, we use Gross Operating Income (GOI) as the dependent variable in place of Return on Assets. Gross Operating Income is the percentage of gross profit a company generates relative to its assets, and is used as the main dependent variable in Deloof's study and subsequent studies building on his methodology (e.g., Lazaridis & Tryfonidis, 2006; Louw et al., 2019). There are different ways of calculating Gross Operating Income, but in line with previous research we use the specific definition in the above mentioned studies to ensure comparability. While Return on Assets can be considered a more overall indicator of profitability, Gross Operating Income more closely measures operational performance even higher up in the income statement. With this robustness test, we can check whether our results are consistent across different dimensions of profitability and widen our insights on the relationship between working capital management and firm profitability.

Table 1

Dependent Variables

Dependent Variable	Definition	Calculation
Return on Assets (ROA)	% of operating profit a firm generates on its total assets.	EBIT / Average Total Assets
Gross Operating Income (GOI)	% of gross operating income a firm generates on its total assets.	(Net Sales - Cost of Goods Sold Depreciation & Amortization) / Average Total Assets

Notes: Average total assets is used to better reflect the asset base over time and is calculated as (Total Assets (Opening Balance Year X) + Total Assets (Closing Balance Year X)) / 2. Due to lack of data of Cost of Goods Sold (COGS) in several annual reports of our sampled firms, COGS is calculated as Net Sales * (1 - Gross Margin). Due to lack of data of Depreciation & Amortization (D&A) in several annual reports of our sampled firms, D&A is calculated as EBITDA - EBIT.

3.2.2 Independent Variables

Four independent variables are included separately in each of the four regression models. As this study uses the Cash Conversion Cycle (CCC) as a comprehensive measure of working capital management, the CCC will be the main independent variable in one model. Furthermore, since this study additionally aims to examine the individual effects that each working capital factor of the CCC has on firm profitability, the three remaining independent variables are Days sales outstanding (DSO), Days inventory outstanding (DIO) and Days payable outstanding (DPO), that each are considered in separate models.

Table 2

Independent variables

Independent Variable	Definition	Calculation	Expected sign
Days Sales Outstanding (DSO)	Average No. of days it takes for a company to collect its receivables after making a sale.	(Accounts Receivable / Net Sales) * 365	-
Days Inventory Outstanding (DIO)	Average No. of days inventory is held before it is sold.	(Total Inventory / Cost of Goods Sold) * 365	-
Days Payable Outstanding (DPO)	Average No. of days it takes for a company to pay its suppliers after receiving goods or services.	(Accounts Payable / Cost of Goods Sold) * 365	-
Cash Conversion Cycle (CCC)	Average No. of days it takes for a company to convert its investments in resource inputs into cash flow from sales.	DSO + DIO - DPO	-

Notes: Due to lack of data of Cost of Goods Sold (COGS) in several annual reports of our sampled firms, COGS is calculated as Net Sales * (1 - Gross Margin). Expected signs are based on previous empirical results (Appendix 1).

3.2.3 Control Variables

To isolate the specific effects of working capital management on firm profitability and to ensure that the effects are indeed due to changes in working capital management, the regression models contain control variables. Many of the control variables are the most commonly seen in previous empirical studies (Deloof, 2003; Lazaridis & Tryfonidis, 2006; García‐Teruel & Martínez‐Solano, 2007). These are Firm Size, Sales Growth and Financial Leverage. Larger firms tend to have more resources, access to credit, lower financing costs, economies of scale, etc., that all may improve firm profitability. Similarly, sales growth is associated with increases in profitability due to increases in revenue. Financial Leverage indicates the degree to which a firm is financing its assets through debt. Firms may experience different profitability outcomes depending on the level of debt. On the one hand, debt financing can improve profits by providing capital for investment without diluting equity, but on the other, leverage increases financial risk and can reduce profitability due to

interest payments and debt obligations. However, previous empirical studies that use the same calculation as in this study have all found the coefficient for Financial Leverage to be negative, and we thus expect the same for our models (e.g., Deloof, 2003; Lazaridis & Tryfonidis, 2006; García-Teurel & Martínez-Solano, 2007). Additionally, we include Lagged Return on Assets (ROA); that is, previous year's Return on Assets (ROA in year t-1), as a control variable. The reasoning behind this is to account for persistence in a firm's earnings, and to control for autocorrelation in the data, which can help to improve accuracy and robustness of our analysis. Accounting performance indicators, such as ROA, often exhibit strong persistence over time; a firm that performs well in one period is likely to continue performing well in subsequent periods (Easton et al., 1992).

Table 3

Control Variables

Control Variable	Definition	Calculation	Expected sign
Firm Size	The size of the firm, estimated based on level of sales.	Ln (Net Sales)	+
Sales Growth	The annual sales growth.	(Net Sales$_t$ - Net Sales$_{t-1}$) / Net Sales$_{t-1}$	+
Financial Leverage	The degree to which a firm is financing its assets through debt.	Financial Debt / Total Assets	-
Lagged Return on Assets (ROA$_{t-1}$)	Return on Assets of the previous year (year t-1).	EBIT$_{t-1}$ / Average Total Assets$_{t-1}$	+

Notes: Ln (Net Sales) is the natural logarithm of Net Sales and is used as a measure of Firm Size to reduce skewness and normalize the data. Expected signs are based on previous empirical results (Appendix 1).

3.4 Model Specification

In the data analysis, regression estimates are obtained for the following Fixed Effect models:

$$ROA_{it} = \beta_0 + \beta_1 WCM_{it} + \beta_2 ROA_{i,t-1} + \beta_3 SIZE_{it} + \beta_4 SGROWTH_{it} + \beta_5 LEVERAGE_{it} + \alpha_i + \lambda_t + \varepsilon_{it}$$

In each of the four regression models, WCM (Working Capital Metric) is replaced by CCC, DIO, DSO, or DPO, respectively. CCC measures the Cash Conversion Cycle, DIO the Days Inventory Outstanding, DSO the Days Sales Outstanding, DPO the Days Payables

Outstanding, ROA the Return on Assets, ROA_{t-1} the (lagged) Return on Assets in the previous year (year t-1), SIZE the Firm Size, SGROWTH the Sales Growth, and LEVERAGE the Financial Leverage (debt-to-assets) ratio. α_i are firm fixed effects that measure the particular characteristics of each firm and λ_t are year fixed effects that measure characteristics that change over time but are the same across all firms.

3.5 Sample Selection

The sample data was initially collected from the database *Retriever: Business*, a comprehensive database on Swedish firms. We began by filtering for firms belonging to the "Retail Trade" Industry (SNI 47), excluding e-commerce firms belonging to the industry sector "Mail and on-line trade" (SNI 47.9) to omit purely e-commerce firms. Each firm was then manually reviewed to determine whether it qualified as a hybrid firm - defined as selling both online and offline.

To ensure firms were generally comparable in terms of firm size as well as operational and financial characteristics, we selected the 185 largest Swedish hybrid retail firms based on the latest available revenue data at the time of the collection. The number was not prespecified, however, since the availability of financial data declined notably for smaller firms, we selected top 185 to ensure a sufficiently robust final sample after accounting for expected data gaps.

We exported firm-year data for the period 2014-2023, as well as a limited dataset for the period 2012-2013 to construct lagged variables, Sales Growth and Return on Assets for 2014. Firms with missing or incomplete data due to reasons such as bankruptcy, liquidation or mergers were removed. When possible, missing data points were instead manually complemented using annual reports. The data retrieving and cleaning process is thoroughly demonstrated in Appendix 2. After data cleaning, our final sample consists of 100 Swedish limited hybrid retail firms covering a ten year time period (years 2014-2023), totaling 1,000 firm-year observations. Since our final sample includes only surviving firms, the sample is subject to survivor bias. Finally, the winsorization technique was used to handle outliers, hence no additional observations were dropped after controlling for outliers.

4. Findings and Analysis

This section presents the key empirical results and findings derived from the data analysis, beginning with a descriptive overview of the dataset and followed by a correlation analysis and regression results. The descriptive statistics offer an initial overview of the performance, operational and financial characteristics of the sampled firms. The Pearson correlation matrix that follows provides insight into the direction and strength of relationships among the variables. Finally, the fixed effects regression results show the findings regarding the relationship between working capital management and Return on Assets, including an assessment of the statistical significance and economic relevance of the relationship.

4.1 Description of data

Table 4 below presents descriptive statistics of the variables of interest after winsorizing the data. Return on Assets (ROA) is on average 10.52%, while the median is 8.94%. Gross Operating Income (GOI) is on average 108.39% of total assets (median is 99.72%). This is a very high percentage indicating that the firms are generating gross operating income well over their asset base, and is likely due to our specific definition of Gross Operating Income which includes depreciation and amortization in the numerator in line with previous research. The average cash conversion cycle is 91.50 days, while the median is 79.86 days. Firms receive payment on credit sales of products after an average of 10.38 days (median is 3.91 days). It takes on average 124.38 days for firms to sell inventory (median is 111.79 days), and it takes on average 43.16 days for firms to pay their purchases to suppliers (median is 38.8 days). Mean Sales Growth is 9.34%, while median Sales Growth is 5.9%. On average, 53.66% of total assets are financed with financial debt (median is 51.22%). Interestingly, CCC has a high standard deviation of 73.26 meaning that the data points are more spread out from the mean implying that the value of CCC varies widely across firms. This is most likely due to the standard deviations of its components; DIO, DSO and DPO which have standard deviations of 79.60, 13.41 and 27.76 respectively. The standard deviation for DIO is particularly high with a minimum value of 16.79 days and a maximum value of 316.46, meaning that the time it takes for firms to sell their inventory particularly varies widely across firms. The most reasonable explanation for the high and varying values of CCC, DIO and Gross Operating Income is that the balance sheet items included in the variable calculations are industry-specific. This is also evident when manually examining the balance

sheets of the sampled Swedish hybrid retail firms and comparing it to the balance sheets of firms in other industries.

Table 4

Descriptive Statistics
100 Swedish Hybrid Retail Firms, 2014-2023: 1,000 Firm-year Observations

	Mean	*St. Dev.*	*Minimum*	*Median*	*Maximum*
ROA	0.1052	0.1428	-0.1794	0.0894	0.3925
GOI	1.0839	0.4540	0.4511	0.9972	2.1331
CCC	91.4982	73.2555	-7.9210	79.8574	268.3841
DIO	124.3762	79.5950	16.7872	111.7896	316.4585
DSO	10.3822	13.4138	0.0428	3.9097	45.1055
DPO	43.1609	27.7582	5.1948	38.7978	109.7803
SIZE	13.2617	1.5417	10.5541	13.2063	16.1067
SGROWTH	0.0934	0.1590	-0.1515	0.0590	0.5161
LEVERAGE	0.5366	0.2285	0.1813	0.5122	0.9561

Notes: ROA is Return on Assets (EBIT / Average Total Assets). GOI is Gross Operating Income ((Net Sales - Cost of Goods Sold + Depreciation & Amortization) / Average Total Assets). CCC is Cash Conversion Cycle (DIO + DSO - DPO). DIO is Days Inventory Outstanding ((Total Inventories / Cost of goods sold) * 365). DSO is Days Sales Outstanding ((Accounts Receivable / Net Sales) * 365). DPO is Days Payable Outstanding ((Accounts Payable / Cost of Goods Sold) * 365). SIZE is Firm Size (Ln(Net Sales)). SGROWTH is Sales Growth ((Net $Sales_t$ - Net $Sales_{t-1}$) / Net $Sales_{t-1}$). LEVERAGE is Financial Leverage (Financial Debt / Total Assets).

Table 5 below presents the Pearson correlation coefficients for all variables of interest after winsorizing the data. There is a negative correlation between the operational profitability measures Return on Assets (ROA) and Gross Operating Income (GOI), and the measures of working capital management (CCC, DIO, DSO, DPO). This is consistent with the view that decreasing the time lag between expenditure for purchases and collection of sales of products translates into greater profitability. Interestingly, the correlation between DSO and Return on Assets is not statistically significant, and much less negative than the correlation between DSO and Gross Operating Income. While there is a positive and significant correlation between Sales Growth and both Return on Assets and Gross Operating Income, most likely due to higher sales levels, Firm Size has a positive correlation to Return on Assets but a negative correlation to Gross Operating Income, and Financial Leverage has a negative correlation to Return on Assets but a positive correlation to Gross Operating Income. Thus, the control variables Firm Size and Financial Leverage have different relationships with different profitability measures even though interest expenses and depreciation are controlled

for, which otherwise could be consequences of an increase in Firm Size and Financial Leverage.

Table 5

Pearson Correlation Coefficients
100 Swedish Hybrid Retail Firms, 2014-2023: 1,000 Firm-year Observations

	ROA	*GOI*	*CCC*	*DIO*	*DSO*	*DPO*	*SIZE*	*SGROWTH*	*LEVERAGE*
ROA									
GOI	0.2762 (0.0000) (***)								
CCC	-0.1956 (0.0000) (***)	-0.2345 (0.0000) (***)							
DIO	-0.2388 (0.0000) (***)	-0.2621 (0.0000) (***)	0.9095 (0.0000) (***)						
DSO	-0.0327 (0.3012)	-0.2341 (0.0000) (***)	0.0894 (0.0047) (***)	-0.0611 (0.0535) (*)					
DPO	-0.2040 (0.0000) (***)	-0.2625 (0.0000) (***)	0.0791 (0.0123) (**)	0.4060 (0.0000) (***)	0.1038 (0.0010) (***)				
SIZE	0.0546 (0.0844) (*)	-0.0541 (0.0875) (*)	-0.2657 (0.0000) (***)	-0.2437 (0.0000) (***)	-0.2187 (0.0000) (***)	-0.0621 (0.0498) (**)			
SGROWTH	0.2440 (0.0000) (***)	0.1296 (0.0000) (***)	-0.0254 (0.4225)	-0.0136 (0.6685)	0.0770 (0.0149) (**)	0.0187 (0.5555)	-0.1650 (0.0000) (***)		
LEVERAGE	-0.3097 (0.0000) (***)	0.1595 (0.0000) (***)	-0.1236 (0.0001) (***)	-0.0900 (0.0044) (**)	0.0161 (0.6105)	0.0732 (0.0207) (**)	-0.0368 (0.2449)	0.0690 (0.0292) (**)	

Notes: p-values and stars, to denote significance levels, in parenthesis. '*': significance at the 10% level; '**': significance at the 5% level; and '***': significance at the 1% level. ROA is Return on Assets (EBIT / Average Total Assets). GOI is Gross Operating Income ((Net Sales - Cost of Goods Sold + Depreciation & Amortization) / Average Total Assets). CCC is Cash Conversion Cycle (DIO + DSO - DPO). DIO is Days Inventory Outstanding ((Total Inventories / Cost of goods sold) * 365). DSO is Days Sales Outstanding ((Accounts Receivable / Net Sales) * 365). DPO is Days Payable Outstanding ((Accounts Payable / Cost of Goods Sold) * 365). SIZE is Firm Size (Ln(Net Sales)). SGROWTH is Sales Growth ((Net $Sales_t$ - Net $Sales_{t-1}$) / Net $Sales_{t-1}$). LEVERAGE is Financial Leverage (Financial Debt / Total Assets).

4.2 Summary of Results

4.2.1 Main Regression Model Results

Table 6 below presents the results of our main regression analysis after winsorizing the data. In Regression (1), the coefficient of CCC is negative (-0.0003) and highly statistically significant (p-value = 0.0000), meaning that a one unit (day) increase in CCC is associated with a 0.03% decline in Return on Assets (ROA). In Regression (2), the coefficient of DIO is negative (-0.0004) and highly statistically significant as well (p-value = 0.0000), meaning that a one unit (day) increase in DIO is associated with a decline in Return on Assets by 0.04%. In Regression (3), the coefficient of DSO is negative (-0.0001), but not significantly different from zero (p-value = 0.7838). In Regression (4), the coefficient of DPO is negative (-0.0005) and highly statistically significant (p-value = 0.0000), meaning that a one unit (day) increase in DPO is associated with a decline in Return on Assets by 0.05%. Regressions (1), (2), and (4) all confirm the negative and significant correlation between the independent variables CCC, DIO, DPO, and the dependent variable Return on Assets in the Pearson correlation analysis. In terms of control variables, the coefficients of Lagged Return on Assets, Financial Leverage and Sales Growth are all highly statistically significant in all four models (p-values = 0.0000). While Financial Leverage is negatively related to Return on Assets, Lagged Return on Assets and Sales Growth are positively related to Return on Assets. Thus, an increase in Financial Leverage is associated with a decrease in Return on Assets, while an increase in Lagged Return on Assets or Sales Growth is associated with an increase in Return on Assets. Firm Size is positively related to Return on Assets in all four models as well, however the relationship is not statistically significant (p-values > 0.1000).

Table 6

The Determinants of Firm Profitability
100 Swedish Hybrid Retail Firms, 2014-2023: 1,000 Firm-year Observations

Dependent Variable:		*Return on Assets (ROA)*			
Regression Model:		*Fixed Effects*			
	Expected sign	*(1)*	*(2)*	*(3)*	*(4)*
Intercept	-	-0.0593 (0.7611)	-0.0327 (0.8652)	-0.1374 (0.4925)	-0.1144 (0.5391)
CCC	-	-0.0003*** (0.0000)	-	-	-
DIO	-	-	-0.0004*** (0.0000)	-	-
DSO	-	-	-	-0.0001 (0.7838)	-
DPO	-	-	-	-	-0.0005*** (0.0000)
ROA_{t-1}	+	0.4374*** (0.0000)	0.4394*** (0.0000)	0.4324*** (0.0000)	0.4307*** (0.0000)
SIZE	+	0.0131 (0.3862)	0.0121 (0.4161)	0.0167 (0.2844)	0.0162 (0.2671)
SGROWTH	+	0.2224*** (0.0000)	0.2215*** (0.0000)	0.2297*** (0.0000)	0.2287*** (0.0000)
LEVERAGE	-	-0.0918*** (0.000)	-0.0866*** (0.0000)	-0.0863*** (0.0000)	-0.0787*** (0.0000)
Adjusted R^2		0.3387	0.3436	0.3255	0.3340
No. of observations		1,000	1,000	1,000	1,000
Firm fixed effects		Yes	Yes	Yes	Yes
Year fixed effects		Yes	Yes	Yes	Yes

Notes: p-values (robust for heteroscedasticity and autocorrelation) in parentheses. '*': significance at the 10% level; '**': significance at the 5% level; and '***': significance at the 1% level. Fixed Effect regressions include 100 firm fixed effects and 10 year fixed effects. ROA is Return on Assets (EBIT / Average Total Assets). CCC is Cash Conversion Cycle (DIO + DSO - DPO). DIO is Days Inventory Outstanding ((Total Inventories / Cost of goods sold) * 365). DSO is Days Sales Outstanding ((Accounts Receivable / Net Sales) * 365). DPO is Days Payable Outstanding ((Accounts Payable / Cost of Goods Sold) * 365). ROA_{t-1} is Lagged Return on Assets (Return on Assets year t - 1). SIZE is Firm Size (Ln(Net Sales)). SGROWTH is Sales Growth ((Net $Sales_t$ - Net $Sales_{t-1}$) / Net $Sales_{t-1}$). LEVERAGE is Financial Leverage (Financial Debt / Total Assets). Expected signs are based on previous empirical results (Appendix 1).

4.2.2 Robustness Test Results

Appendix 5 presents the results of one of the robustness tests which re-estimates all four regression models but using Gross Operating Income (GOI) instead of Return on Assets as the dependent variable, and Lagged Gross Operating Income as the control variable in place of Lagged Return on Assets. In Regression (1), the coefficient of CCC is negative (-0.0011)

and highly statistically significant (p-value = 0.0000), meaning that a one unit (day) increase in CCC is associated with a 0.11% decline in Gross Operating Income (GOI). In Regression (2), the coefficient of DIO is negative (-0.0014) and highly statistically significant as well (p-value = 0.0000), meaning that a one unit (day) increase in DIO is associated with a 0.14% decline in Gross Operating Income. In Regression (3), the coefficient of DSO is negative (-0.0048) and statistically significant (p-value = 0.0001), meaning that a one unit (day) increase in DSO is associated with a 0.48% decline in Gross Operating Income. In Regression (4), the coefficient of DPO is negative (-0.0027) and highly statistically significant (p-value = 0.0000), meaning that a one unit (day) increase in DPO is associated with a 0.27% decline in Gross Operating Income. Regressions (1) to (4) all confirm the negative and significant correlation between the independent variables CCC, DIO, DSO, DPO, and the secondary dependent variable Gross Operating Income in the Pearson correlation analysis. In terms of control variables, the coefficients of Lagged Gross Operating Income and Sales Growth are positive and highly statistically significant in all four models (p-values = 0.0000). Thus, an increase in Lagged Gross Operating Income or Sales Growth is associated with an increase in Gross Operating Income. Firm Size is positively related to Gross Operating Income in all models as well, however the relationship is not statistically significant (p-values > 0.1000). While Financial Leverage is negatively related to Gross Operating income in all four models, the relationship is not statistically significant except in Regression (1) where it is only slightly significant at the 10% level.

5. Discussion

This study examined the relationship between working capital management and firm profitability in the Swedish hybrid retail industry. The results largely support our hypotheses and align with both our theoretical framework and prior empirical research. This section discusses our key findings from our data analysis, starting with the significant negative relationships between CCC, DIO, DPO, and firm profitability, reinforcing prior research. We then address the weaker, statistically insignificant relationship between DSO and firm profitability, including robustness test results. Next, we discuss control variables and additional robustness analyses. The section continues with discussing the potential for reverse causality, industry-specific insights and relevant theoretical frameworks that contextualize

our findings within broader working capital management research, and concludes with final insights in answering our primary research question.

5.1 Significant Results: CCC, DIO and DPO

Our findings support the existing research consensus that efficient working capital management, particularly a shorter CCC, is associated with higher firm profitability. Regression (1) confirms a significant negative relationship between CCC and firm profitability, supporting H1 and aligning with both broad and retail-specific previous empirical studies (Deloof, 2003; Ebben & Johnson, 2011; Jose et al., 1996; Louw et al., 2019; Shin & Soenen, 1998). Similarly, Regression (2) shows a significant negative relationship between DIO and firm profitability, supporting H2 and reinforcing the view of previous empirical studies that faster inventory turnover improves firm profitability (Deloof, 2003; Enqvist et al., 2014; García‐Teruel & Martínez‐Solano, 2007; Louw et al., 2019). Regression (4) confirms a significant negative relationship between DPO and firm profitability, supporting H4. While a longer DPO can ease short-term liquidity, our findings are consistent with prior research suggesting excessive delays in supplier payments could harm firm profitability through, for instance, penalties or missed early payment discounts (Deloof, 2003; Enqvist et al., 2014; García‐Teruel & Martínez‐Solano, 2007; Louw et al., 2019). Considering our geographic scope, these three regression results also align with findings of previous Swedish studies (Hassan et al., 2023; Yazdanfar & Öhman, 2014). Additionally, all regression results confirm the negative correlations between the working capital variables and Return on assets as seen in the Pearson Correlation Matrix. In sum, these parallels lend external validity to our study and demonstrate that these dynamics also apply within the hybrid retail sector in Sweden.

In summary, the regression results indicate that efficient working capital management, particularly reducing the CCC through lower DIO and DPO, is associated with higher profitability in Swedish hybrid retail firms. A significant negative relationship between DIO and firm profitability suggests that firms that are able to sell their inventory more quickly are more profitable in general. One explanation for this relationship is that when inventory moves faster, cash is not tied up in stock for long periods, which means that more cash is available for other profitable activities (e.g., Smith, 1980; Ebben & Johnson, 2011). Conversely, when DIO is higher and inventory is remaining unsold or unused for a longer period of time,

inventory costs increase which negatively affects profitability. DIO's significance also supports prior findings that inventory performance is a key driver of retail profitability (Gaur et al., 2005; Kortman et al., 2016).

A significant negative relationship between DPO and firm profitability suggests that firms which take shorter time to pay their suppliers tend to be more profitable, despite DPO's role in reducing CCC. Theories of financing behavior, such as the Pecking Order Theory (Myers & Majluf, 1984) and trade credit literature (Deloof & Jegers, 1996; Emery, 1984) suggest that extending payables can improve liquidity in the short-term without resorting to costly external financing, providing the firm with flexibility to use cash for other profit-generating purposes such as investing in operations or growth opportunities, or paying off debt. This is further emphasized as explanations in those empirical studies that have conflictingly found DPO to be positively related to firm profitability (Aravind, 2016; Hassan et al., 2023; Lazaridis & Tryfonidis, 2006). However, in this case, the negative relationship between DPO and firm profitability implies that, while accounts payable can be a flexible financing tool, over-reliance on trade credit may be detrimental to firm profitability. For example, excessive delays may harm supplier relationships, increase operational risk or incur penalties such as extra fees and loss of discounts or favorable terms, all ultimately reducing profitability. Conversely, when firms pay their suppliers promptly, they are often able to maintain strong supplier relationships, avoid penalties or late fees, and negotiate better terms, which all can improve firm profitability over time. This explanation aligns with studies that correspondingly have found a negative relationship between DPO and firm profitability (Deloof, 2003; Enqvist et al., 2014; García‐Teruel & Martínez‐Solano, 2007; Louw et al., 2019).

Lastly, the significant negative relationship between CCC and firm profitability confirms that firms with shorter CCCs manage working capital more efficiently, allowing for quicker cash conversion, operational efficiency and reinvestment into profit-generating activities, consistent with much of the existing research (Deloof, 2003; Czerwonka & Jaworski, 2022; Lazaridis & Tryfonidis, 2006; Shin & Soenen, 1998). Conversely, longer CCCs suggest inefficient management of working capital, whereof more cash is tied up, which reversely can hinder profitability.

5.2 Insignificant Results: DSO

Both the Pearson correlation matrix and Regression (3) indicate a negative but statistically insignificant relationship between DSO and Return on Assets, suggesting that DSO has a weaker or less reliable impact on firm profitability in this sample when controlling for the other factors. Hence, other factors such as CCC, DIO, DPO, Financial Leverage, and Sales Growth, might be stronger determinants of firm profitability. This contrasts with most previous empirical studies (Deloof, 2003; Enqvist et al., 2014; Hassan et al., 2023; García‐Teruel & Martínez‐Solano, 2007; Lazaridis & Tryfonidis, 2006). However, our robustness test - using Gross Operating Income (GOI) instead of Return on Assets as the dependent variable and Lagged Gross Operating Income as the control variable in place of Lagged Return on Assets - found significant negative relationships between all working capital variables, including DSO, and firm profitability (Appendix 5). These variables also showed stronger effects on Gross Operating Income than on Return on Assets, and the adjusted R-squared values improved across all models. This aligns with the stronger correlations seen in the Pearson correlation matrix and findings of Louw et al. (2019). Despite this, due to the inconsistency between models, we conclude that the evidence for a significant DSO-profitability relationship is inconclusive, and reject H3.

Our results show that DSO is not statistically significant in the main regression model using Return on Assets as the dependent variable but becomes significant in the robustness test using Gross Operating Income as the dependent variable. This discrepancy may stem from our study's industry and geographical focus - Swedish hybrid retail firms - where accounts receivable are often managed through factoring, reducing the prominence of DSO (Xie et al., 2021). This is also evident in the descriptive statistics, where DSO is low or even zero for some firms. Prior studies support this context-specific variability: Hassan et al. (2023) found similar differences in the significance of DSO depending on the model used, while Louw et al. (2019) noted that DSO tends to be less significant in the retail industry due to the prevalence of cash sales. Potwana et al. (2022) also emphasized that within-industry sector differences can influence these relationships - at least in the retail industry.

Furthermore, we find DSO to be more closely correlated with Gross Operating Income than with Return on Assets, which could explain its stronger statistical significance in the robustness test. Since the calculation of DSO is based on Net Sales, profitability metrics like

Gross Operating Income, which is more closely tied to Net Sales, capture DSO's impact more directly. Therefore, Gross Operating Income would tend to move with changes in DSO, which would make the relationship between DSO and Gross Operating Income stronger and, in this case, statistically significant. On the other hand, Return on Assets captures Earnings Before Interest and Tax (EBIT), and is thus influenced by broader operational costs that may obscure DSO's effect, such as Selling, General & Administrative (SG&A) expenses, Research & Development (R&D) expenses, Provisions for bad debts and other overhead or strategic costs. Theoretically then, if a high DSO leads to more Net Sales, but more bad debts or higher collection costs (which is more likely than in the case of having a low DSO), Return on Assets could decrease even if Net Sales increase. Return on Assets, being downstream and affected by more variables, could thus have a weaker, more noisy signal which could reduce the coefficient's statistical significance as seen in this context. Despite DSO's limited significance in our main model, DSO remains an important operational metric in retail. As Kortman et al. (2016) argue, receivable days is a critical driver of the overall working capital position as the retail industry is typically characterized by low DSOs. Firms should aim to reduce the DSO to improve liquidity and reduce the credit risk of bad debts, even if its direct link to firm profitability is less pronounced in this study.

5.3 Control Variables and Additional Robustness Analysis

In terms of control variables, the results of Regressions (1) to (4) show that Sales Growth positively affects firm profitability whereas Financial Leverage has a negative impact, consistent with prior research (Deloof, 2003; García‐Teruel & Martínez‐Solano, 2007). Swedish hybrid retail firms that focus on increasing sales levels while managing debt levels effectively tend to be more profitable. As previously mentioned, higher financial leverage could be associated with either higher or lower firm profitability depending on context. The negative relationship in this case could be explained by the potential existence of reverse causality: less profitable firms are likely to borrow more due to inadequate access to internal financing. The regression results also support the persistence of earnings literature (Easton et al., 1992), as indicated by the positive and significant coefficient of Lagged Return on Assets. Lastly, firm size appears to have less of an impact on firm profitability in this sample, consistent with prior findings of researchers such as Jose et al. (1996) who emphasize that the relationship between working capital management and firm profitability is not driven by size.

In our initial robustness test, control variable results aligned with the main regression results, however Financial Leverage lost its statistical significance in all models except for the CCC model. Furthermore, all control variables, except for Financial Leverage, had a stronger impact on Gross Operating Income than on Return on Assets. Due to positive skewness in CCC, DIO, DSO, DPO, and Sales Growth, we re-estimated the regression models using transformed variables for better normality. The results confirmed the significant negative relationship between CCC, DIO, DPO and Return on Assets, and the insignificance of DSO (Appendix 4). Also, control variable results were consistent with our main results. When using transformed variables in the Gross Operating Income robustness models, the results for CCC, DIO, DSO, and DPO were consistent with the initial robustness test, and the control variable results differed only slightly (Appendix 5). While the adjusted r-squared values improved in the models with Return on Assets as the dependent variable, they deteriorated in the models with Gross Operating Income as the dependent variable.

5.4 Potential Reverse Causality

As noted in previous empirical studies, it cannot be ruled out that the observed negative relationships between working capital metrics and firm profitability are to some extent a consequence of profitability affecting working capital management (Deloof, 2003; Juan García‐Teruel & Martínez‐Solano, 2007). Deloof (2003) found evidence that less profitable firms tend to delay payments, as illustrated by a figure showing a clear pattern of higher median DPO in lower Gross Operating Income deciles, while DIO and DSO showed no distinct patterns across deciles. García-Teruel & Martínez-Solano (2007), when using instrumental (lagged) independent variables for SMEs, found DPO to be the only variable losing its significance, casting doubt on whether DPO affects profitability or reflects firms' financial constraints. However, they argued that this could be due to the multiple conflicting effects that influence the relationship between DPO and Return on Assets, although they still could not confirm that DPO actually affects firm profitability. These findings also align with research on the determinants of working capital management, such as Palombini & Nakamura (2012), who found that smaller firms and firms with lower sales growth tend to have higher accounts payable, suggesting they may delay payments due to weaker financial positions.

5.5 Industry-Specific Considerations and Theoretical Implications

This study's findings largely align with prior empirical research while also reinforcing and extending several theoretical frameworks on working capital management. The observed negative relationship between most of the working capital metrics and firm profitability supports the trade-off theory (Smith, 1980): firms must balance the benefits of holding working capital to meet short-term obligations against the costs of tying up capital in unproductive assets which can otherwise be used for investment in value-generating activities (Aktas et al., 2015; Appuhami, 2008; Fazzari & Petersen, 1993). This also aligns with the description of working capital management as a concept: working capital reflects a firm's operational efficiency and liquidity (Preve, L.A. & Sarria-Allende, 2010).

Furthermore, this study adds to growing evidence on industry-specific determinants of working capital management (Czerwonka & Jaworski, 2023; Davies & Merin, 2014; Hawawini et al., 1986; Czerwonka & Jaworski, 2022). Even sectoral traits such as product type and sales volatility, appear more influential than national factors (Czerwonka & Jaworski, 2023; Potwana et al. 2022). Thus, the patterns we observe in the Swedish hybrid retail industry are best understood in light of firm-specific and sector-specific operational models, such as inventory management practices and payment structures. Hybrid retail firms, which combine the strengths of online and physical retail, benefit from the flexibility of e-commerce and the accompanying technologies, allowing for higher sales volume, lower operational costs and better liquidity management, ultimately facilitating working capital efficiency (e.g., Levary & Mathieu, 2000; Ratchford et al., 2022). Yet, they face the operational complexities of physical stores, including greater coordination needs and technology demands which complicates working capital management (Gomes et al., 2024; Mai et al., 2025). As Kortman et al. (2016) argue, efficient working capital management is essential for hybrid retailers to release cash needed for investments and in order to remain competitive. In other words, the results are hardly surprising given the importance of working capital management and the variation in technologies and systems for operational efficiency that hybrid retail firms employ.

5.6 Final Insights: Working Capital Management and Its Effect on Firm Profitability

With reference to our study, the answer to our primary research question is yes; working capital management does affect firm profitability in Swedish hybrid retail firms. Based on the

data analysis results, we fail to reject hypotheses 1, 2 and 3; there are significant negative relationships between CCC, DIO, DPO and firm profitability for firms in the Swedish hybrid retail industry. Conclusively, in order to facilitate profitability, Swedish hybrid firms should focus on improving the speed at which they convert their inventory into sales as well as optimize their payment terms with suppliers.

6. Conclusion

This study investigates the relationship between working capital management and firm profitability in 100 of the largest Swedish hybrid retail firms over the 2014-2023 period. To our knowledge, this is one of the first studies examining the relationship between working capital management and firm profitability specifically in Swedish hybrid retail firms. Thus, our study addresses a gap in both the geographic and industry-specific literature.

Our findings support prior empirical evidence that efficient working capital management is positively associated with firm profitability. In the Swedish hybrid retail industry, a shorter Cash Conversion Cycle (CCC), driven primarily by lower Days Inventory Outstanding (DIO) and Days Payables Outstanding (DPO), is found to be significantly associated with higher firm profitability. Thus, Swedish hybrid retail firms may improve profitability by reducing inventory holding time and paying suppliers more promptly. While Days Sales Outstanding (DSO) showed a negative relationship with firm profitability, it was not statistically significant when using Return on Assets (ROA) as the dependent variable, but was significant when using Gross Operating Income (GOI). This difference likely reflects the differing scopes of the profitability measures as well as industry characteristics, such as widespread use of accounts receivable factoring in the Swedish hybrid retail industry. Thus, our results highlight the importance of industry context, particularly regarding accounts receivables. Additionally, the robustness tests show that the working capital variables have a stronger effect on Gross Operating Income than on Return on Assets, suggesting more operational measures of profitability are more sensitive to working capital management. In conclusion, our study contributes new evidence on the relationship between working capital management and firm profitability, specifically within Sweden’s hybrid retail sector.

Several limitations should be noted in this study. First, the sample consists of 100 Swedish limited hybrid retail firms for the 2014-2023 period. As such, the results of our study cannot be generalized to other time periods or samples, given potential variations. This is consistent with the differing results in previous empirical studies using different samples and methodologies (Appendix 1). Second, the sample is subject to survivorship bias which may overstate the relationship between working capital and profitability as less profitable and less efficient firms may have exited the market due to bankruptcy, restructuring or acquisition. Third, our assumption of a linear relationship between working capital management and firm profitability is a limitation, as some studies suggest a concave or reversed relationship. Fourth, log transformations eliminated the skewness of the CCC, DIO, DSO, and DPO data, the Sales Growth data remained slightly non-normal after square root transforming the control variable. Despite improved predictive power, this remains a model limitation that could affect result accuracy. Lastly, the lack of data on the proportion of sales derived from e-commerce versus in-store sales, limited our ability to link negative relationships between working capital management and firm profitability to the extent of e-commerce involvement.

Future research could replicate this study using different samples and time periods. For example, we found no studies examining the relationship between working capital management and profitability in pure e-commerce firms. Due to differences in firm structures across traditional, hybrid and e-commerce industries, a direct comparison was not feasible in our study. However, with appropriate samples, future studies could explore the impact of the e-commerce component on working capital management. In the context of hybrid retail, researchers could gather data on the proportion of online versus offline sales and investigate how online sales affect working capital metrics and their relationship with firm profitability. Additionally, one could examine how different aspects of working capital components, such as inventory systems or AI technology, influence efficiency of working capital management and firm profitability. A qualitative approach could explore what drives working capital decisions and how firms reinvest working capital savings to better understand the link between working capital management and firm profitability. Finally, future studies could address the potential for reverse relationships, investigating if firm profitability affects working capital management and not the other way around, as well as explore if there is causality and endogeneity issues in the form of simultaneity bias or reverse causality.

Appendix

Appendix 1

Literature Review Summary

Researcher(s)	Sample	Profitability Measure(s)	CCC - Profitability	DIO - Profitability	DSO - Profitability	DPO - Profitability
Jose et al. (1996)	4 industries	ROA & ROE	Negative	-	-	-
Shin & Soenen (1998)	58,985 firms	ROA, OPM, ALPHA, TI	Negative	-	-	-
Deloof (2003)	Belgian non-financial firms	GOI	Negative	Negative	Negative	Negative
Lazaridis & Tryfonidis (2006)	ASE-listed firms	GOI	Negative	Negative (not sig.)	Negative	Positive
García-Teruel & Martinez-Solano (2007)	SMEs	ROA	Negative	Negative	Negative	Negative
Czerwonka & Jaworski (2022)	WSE-listed firms	ROA	Negative	-	-	-
Enqvist et al. (2014)	Finnish listed firms	ROA	Negative	Negative	Negative	Negative
Garg et al. (2015)	JSE-listed retail firms	OPM	Negative	-	-	-
Mandipa & Sibindi (2022)	South African retail firms	OPM, ROA, ROE	-	Negative (OPM & ROA)	Negative (OPM & ROA)	Negative (ROE)
Potwana et al. (2022)	JSE-listed clothing retail firms	OPM & ROA	Negative	Negative	Positive	Negative
Louw et al. (2019)	Retail and construction firms	ROA, ROE, GOI, EVA	Negative	Negative	Negative	Negative
Ebben & Johnson (2011)	Small U.S. manufacturing and retail firms	Asset turnover & ROIC	Negative	-	-	-
Yazdanfar & Öhman (2014)	Swedish SMEs	ROA	Negative	-	-	-
Hassan et al. (2023)	Scandinavian firms	ROA, GOI, MBV	Negative	Negative	Negative	Positive
Sharma & Kumar (2011)	Non-financial BSE-listed firms	ROA	Positive (not sig.)	Negative	Positive	Negative
Aravind, M. (2016)	Indian manufacturing firms	NPR & ROE	Positive /Negative	Negative	Positive	Positive
Kasozi, J. (2017)	JSE-listed manufacturing firms	ROA	Positive	Positive	Negative	Negative
Abuyazed, B. (2011)	Jordanian firms	GOI & Tobin's q	Positive	Positive	Positive	Negative
Afrifa & Padachi (2014)	AIM-listed SMEs	ROA, ROCE, ROE	Concave	-	-	-
Mun & Jang (2015)	Restaurant firms	ROA	Concave	-	-	-
Deari et al. (2022)	EU firms	ROA	Concave	-	-	-
Aktas et al. (2015)	US firms	Excess return	Concave	-	-	-
		Total:	**20**	**12**	**12**	**12**
		Negative:	12	10	8	9
		Positive:	4	2	4	3
		Concave:	4			

Appendix 2

Data Cleaning Process

Data base: Retriever: Business		
Step 1: Filter for "Retail trade" (SNI 47) industry.	Listing all Swedish Retail Firms (traditional, hybrid and e-commerce retail).	• 119 508 registered Swedish retail firms.
Step 2: Filter for Traditional & Hybrid Retail firms only (SNI 47.9).	Exclude firms registered under the filter for the retail industry sector "Mail order & on-line trade".	• 77 173 registered Swedish traditional and hybrid retail firms.
Step 3: Order firms based on "Turnover (desc.)".	Listing traditional & hybrid retail firms from "largest" to "smallest" in terms of revenue (as of latest submitted annual reports).	• 77 173 registered Swedish traditional and hybrid retail firms.
Step 4: Identify the 185 "largest" limited hybrid retail firms.	Manually check & identify 185 limited hybrid retail firms (firms that sell both online & offline) with greatest turnover by internet search and examination of annual reports.	• 185 registered Swedish ("largest") limited hybrid retail firms.
Step 5: Download data for each hybrid retail firm for the 2012-2023 period to Excel.	Data points (firm/year): • "Org. no" • "Company name" • "EBITDA (tkr)" • "Operating profit/loss (EBIT) (tkr)" • "Net sales (tkr)" • "Gross margin (%)" • "Debt/equity ratio (%) • "Inventories total (tkr)" • "Accounts receivables (tkr)" • "Accounts payable-trade (tkr)" • "Total assets (tkr)" • "Total equity (tkr)"	• 185 registered Swedish ("largest") limited hybrid retail firms.
Step 6: Exclude hybrid retail firms that have missing or incomplete data.	Identify firms with missing data points & manually check whether data is accessible from other sources (e.g., annual reports). Fill in found data. Delete hybrid retail firms for which missing data cannot be retrieved (e.g., due to bankruptcy, liquidation or M&A during the 2012-2023 period). Only keep the 100 largest hybrid retail firms after cleaning the data.	• 100 registered Swedish ("largest") limited hybrid retail firms with complete data for years 2012-2023.
Step 7: Handle outliers.	First, identify outliers by plotting box plots for the regression variables. Use the winsorization technique in Python which limits extreme values to the 5th percentile and the 95th percentile, instead of dropping these observations.	• 100 registered Swedish ("largest") limited hybrid retail firms with complete data for years 2012-2023.
Result: 100 registered Swedish ("largest") limited hybrid retail firms for years 2012-2023. → 1,000 Firm-year observations (years 2014-2023) used in data analysis.		
Data cleaning process (cont.) for the regression analyses using transformed variables:		
Step 8: Identify variables with skewed data.	Plot the distributions of the regression variables and perform a Kolmogorov-Smirnov test to identify which variables are not normally distributed. Print the skewness and kurtosis of	• 1,000 firm-year observations (2014-2023).

	the regression variables to identify which variables should be transformed.	
Step 9: Log and square root transformation	Log transform the variables for CCC, DIO, DSO, DPO, and square root transform Sales Growth, that have skewed data. Repeat Step 8 to ensure improvement of the data. These transformed variables are then used in robustness tests (Appendix 4 & 5).	Nr of firm-year observations: ● Regression (1): 918 ● Regression (2): 1,000 ● Regression (3): 1,000 ● Regression (4): 1,000

Notes: For years 2012-2013, only data for "Net Sales" and "Total Assets" was needed to enable calculations of Sales Growth, Return on Assets and Gross Operating Income in Year 2014 (and lagged values of Return on Assets and Gross Operating Income Year 2014). In our data analyses, only variables for years 2014-2023 are used resulting in 1,000 firm-year observations.

Appendix 3

The Determinants of Firm Profitability
100 Swedish Hybrid Retail Firms, 2014-2023: 1,000 Firm-year Observations

Dependent Variable:	*Gross Operating Income (GOI)*			
Regression Model:	*Fixed Effects*			
	(1)	*(2)*	*(3)*	*(4)*
Intercept	0.2496 (0.3316)	0.3696 (0.1339)	0.1287 (0.6067)	0.0975 (0.7205)
CCC	-0.0011*** (0.0000)	-	-	-
DIO	-	-0.0014*** (0.0000)	-	-
DSO	-	-	-0.0048*** (0.0001)	-
DPO	-	-	-	-0.0027*** (0.0000)
GOI_{t-1}	0.5624*** (0.0000)	0.5563*** (0.0000)	0.5867*** (0.0000)	0.5661*** (0.0000)
SIZE	0.0243 (0.3205)	0.0202 (0.3924)	0.0262 (0.2863)	0.0335 (0.2007)
SGROWTH	0.4667*** (0.0000)	0.4608*** (0.0000)	0.5061*** (0.0000)	0.4889*** (0.0000)
LEVERAGE	-0.0773* (0.0965)	-0.0602 (0.2077)	-0.0585 (0.2045)	-0.0145 (0.7583)
Adjusted R^2	0.4580	0.4751	0.4412	0.4688
No. of observations	1,000	1,000	1,000	1,000
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes

Notes: p-values (robust for heteroscedasticity and autocorrelation) in parentheses. '*': significance at the 10% level; '**': significance at the 5% level; and '***': significance at the 1% level. Fixed Effect regressions include 100 firm fixed effects and 10 year fixed effects. GOI is Gross Operating Income ((Net Sales - COGS + Depreciation & Amortization) / Average Total Assets). CCC is Cash Conversion Cycle (DIO + DSO - DPO). DIO is Days Inventory Outstanding ((Total Inventories / Cost of goods sold) * 365). DSO is Days Sales

Outstanding ((Accounts Receivable / Net Sales) * 365). DPO is Days Payable Outstanding ((Accounts Payable / Cost of Goods Sold) * 365). GOI_{t-1} is Lagged Gross Operating Income (Gross Operating Income year t - 1). SIZE is Firm Size (Ln(Net Sales)). SGROWTH is Sales Growth ((Net $Sales_t$ - Net $Sales_{t-1}$) / Net $Sales_{t-1}$). LEVERAGE is Financial Leverage (Financial Debt / Total Assets).

Appendix 4

The Determinants of Firm Profitability
98-100 Swedish Hybrid Retail Firms, 2014-2023: 918-1,000 Firm-year Observations

Dependent Variable:	*Return on Assets (ROA)*			
Regression Model:	*Fixed Effects*			
	(1)	*(2)*	*(3)*	*(4)*
Intercept	-0.3989** (0.0145)	-0.2683 (0.3352)	-0.6223*** (0.0099)	-0.5563** (0.0224)
log CCC	-0.0168*** (0.0009)	-	-	-
log DIO	-	-0.0553*** (0.0000)	-	-
log DSO	-	-	-0.0019 (0.5811)	-
log DPO	-	-	-	-0.0152*** (0.0000)
ROA_{t-1}	0.4330*** (0.0000)	0.4359*** (0.0000)	0.4327*** (0.0000)	0.4317*** (0.0000)
SIZE	0.0047 (0.5913)	0.0088 (0.5603)	0.0156 (0.2877)	0.0142 (0.3307)
sqrt SGROWTH	0.4960*** (0.0000)	0.4869*** (0.0000)	0.4999*** (0.0000)	0.4992*** (0.0000)
LEVERAGE	-0.0989*** (0.0000)	-0.0860*** (0.0000)	-0.0855*** (0.0000)	-0.0790*** (0.0001)
Adjusted R^2	0.3483	0.3488	0.3294	0.3346
No. of observations	918	1,000	1,000	1,000
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes

Notes: p-values (robust for heteroscedasticity and autocorrelation) in parentheses. '*': significance at the 10% level; '**': significance at the 5% level; and '***': significance at the 1% level. Fixed Effect regressions include 98-100 firm fixed effects and 10 year fixed effects. GOI is Gross Operating Income ((Net Sales - COGS + Depreciation & Amortization) / Average Total Assets). Log CCC is log transformed Cash Conversion Cycle (Log (DIO + DSO - DPO)). Log DIO is log transformed Days Inventory Outstanding (Log((Total Inventories / Cost of goods sold) * 365)). Log DSO is log transformed Days Sales Outstanding (Log((Accounts Receivable / Net Sales) * 365)). Log DPO is log transformed Days Payable Outstanding (Log((Accounts Payable / Cost of Goods Sold) * 365)). ROA_{t-1} is Lagged Return on Assets (Return on Assets year t - 1). SIZE is Firm Size (Ln(Net Sales)). Sqrt SGROWTH is square root transformed Sales Growth (sqrt (((Net $Sales_t$ - Net $Sales_{t-1}$) / Net $Sales_{t-1}$) + 1)), adding 1 to avoid issues with square root transformation of negative numbers. LEVERAGE is Financial Leverage (Financial Debt / Total Assets).

Appendix 5

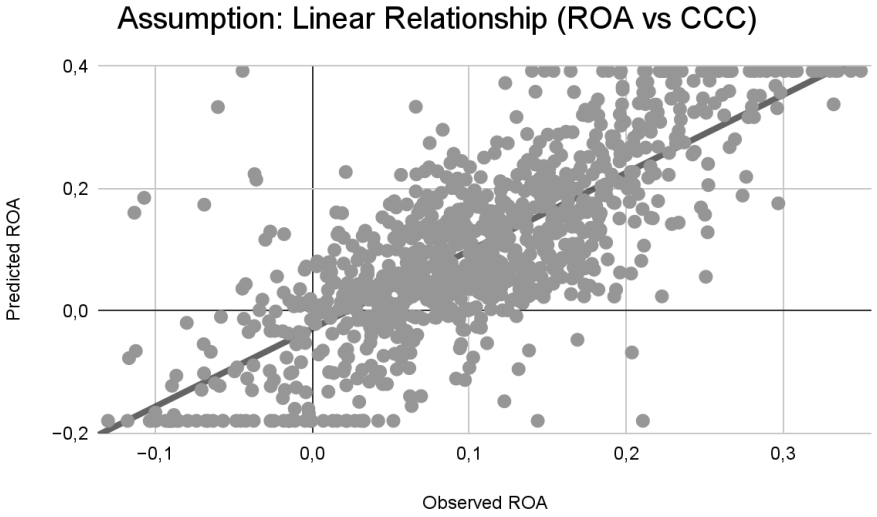
The Determinants of Firm Profitability
98-100 Swedish Hybrid Retail Firms, 2014-2023: 918-1,000 Firm-year Observations

Dependent Variable:	*Gross Operating Income (GOI)*			
Regression Model:	*Fixed Effects*			
	(1)	*(2)*	*(3)*	*(4)*
Intercept	-0.4506 (0.1697)	0.4136 (0.1755)	-0.9841*** (0.0013)	-0.5810 (0.1195)
log CCC	-0.0643*** (0.0000)	-	-	-
log DIO	-	-0.2241*** (0.0000)	-	-
log DSO	-	-	-0.0466*** (0.0001)	-
log DPO	-	-	-	-0.1000*** (0.0000)
GOI_{t-1}	0.4448*** (0.0000)	0.4275** (0.0000)	0.4534*** (0.0000)	0.4401*** (0.0000)
SIZE	0.0185 (0.5214)	0.0138 (0.5686)	0.0382 (0.1113)	0.0306 (0.3055)
sqrt SGROWTH	1.0668*** (0.0000)	1.0192*** (0.0000)	1.0872*** (0.0000)	1.0723*** (0.0000)
LEVERAGE	-0.0721 (0.2315)	-0.0458 (0.3388)	-0.0423 (0.3851)	0.0027 (0.9649)
Adjusted R^2	0.4094	0.4455	0.4116	0.4304
No. of observations	918	1,000	1,000	1,000
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes

Notes: p-values (robust for heteroscedasticity and autocorrelation) in parentheses. '*': significance at the 10% level; '**': significance at the 5% level; and '***': significance at the 1% level. Fixed Effect regressions include 98-100 firm fixed effects and 10 year fixed effects GOI is Gross Operating Income ((Net Sales - COGS + Depreciation & Amortization) / Average Total Assets). Log CCC is log transformed Cash Conversion Cycle (Log (DIO + DSO - DPO)). Log DIO is log transformed Days Inventory Outstanding (Log((Total Inventories / Cost of goods sold) * 365)). Log DSO is log transformed Days Sales Outstanding (Log((Accounts Receivable / Net Sales) * 365)). Log DPO is log transformed Days Payable Outstanding (Log((Accounts Payable / Cost of Goods Sold) * 365)). GOI_{t-1} is Lagged Gross Operating Income (Gross Operating Income year t - 1). SIZE is Firm Size (Ln(Net Sales)). Sqrt SGROWTH is square root transformed Sales Growth (sqrt (((Net $Sales_t$ - Net $Sales_{t-1}$) / Net $Sales_{t-1}$) + 1)), adding 1 to avoid issues with square root transformation of negative numbers. LEVERAGE is Financial Leverage (Financial Debt / Total Assets).

Appendix 6: Tests of Gauss-Markov's Assumptions for Linear Regression Models

Appendix 6.1



Appendix 6.2

Diagnostics

Assumptions: Normality, Homoskedasticity, No Autocorrelation, No Multicollinearity

Regression model	Independent Variable	KS Test Statistic	BP Test F Statistic	DW Test Statistic	VIF Factor
(1)	CCC	0.4252 (0.0000)	4.3557 (0.0006)	1.9605	1.1318
(2)	DIO	0.4269 (0.0000)	4.0106 (0.0013)	1.9551	1.1194
(3)	DSO	0.4243 (0.0000)	5.3720 (0.0001)	1.9772	1.0525
(4)	DPO	0.4256 (0.0000)	4.2011 (0.0009)	1.9804	1.0296

Conclusions: Residuals are not normally distributed (p-values < 0.01). Heteroskedasticity is detected (p-values < 0.01). Mild autocorrelation is detected (DW statistic < 2). No multicollinearity found (all VIFs < 10).

Corrections: Robustness test using non-linear variable transformation (Appendix 4) and Bartlett Kernel HAC robust standard errors.

Notes: p-values in parentheses. KS Test Statistic is Kolmogorov-Smirnov Test Statistic, BP Test F-Statistic is Breusch-Pagan Test F-Statistic, DW Test Statistic is Durbin-Watson Test Statistic, VIF Factor is the result from Variance-Inflation-Factor (VIF) analysis.

Appendix 7: AI Usage

ChatGPT was used as a generative AI tool in the preparation of this thesis, primarily as a discussion partner in developing and troubleshooting Python code for the regression models, and as a language assistant for grammar and spelling. All suggestions were critically evaluated and carefully verified before implementation to ensure the accuracy and integrity of the work. The tool contributed to improved clarity in the language and enhanced the efficiency and correctness of the code, thereby supporting the overall quality of the thesis.

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