

Managing Working Capital in Retail

Evidence from private and publicly listed Swedish retail firms

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Abstract

Working capital management (WCM) sits at the intersection of operations and financing, determining the extent to which a firm can fund its operations internally or must resort to costly external financing. This study investigates the relationship between WCM and financial performance among Swedish retail firms, utilizing the cash conversion cycle (CCC) and its sub-components as WCM proxies. Return on assets (ROA) and gross margin return on inventory investment (GMROI) are deployed as financial performance measures, with the latter serving as a retail-specific measure of inventory productivity. We further examine whether this relationship is shaped by firm listing status. Using an unbalanced panel of private and publicly listed Swedish retail firms over 2014-2023, we conduct a quantitative study employing OLS regression. Our results reveal significant negative relationships between WCM and GMROI, but not for ROA, establishing gross margin performance and inventory management as key determinants for working capital management efficiency. Ultimately, these findings contribute to prior WCM literature by demonstrating that the WCM-performance relationship in Swedish retail is not universal, but highly contingent upon how financial performance is measured.

Keywords: Swedish Retail, Working Capital Management, Cash Conversion Cycle, Financial Performance, Gross Margin Return on Inventory Investment, Listing Status, Financing Constraints.

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1. Introduction

The Swedish retail sector – generating around 900 billion SEK in annual turnover across 41,800 firms – contributes nearly 11 per cent of Swedish GDP together with wholesale trade (Svensk Handel, 2025). As the country’s third largest economic sector, the industry has been subject to substantial changes during the last decades, including the introduction of e-commerce and omnichannel business models. These structural transformations have reshaped retail firm’s operations and intensified competition, requiring them to manage stock across multiple channels, accelerate deliveries, and respond faster to shifting demand (Grewal et al., 2017; Verhoef et al., 2015). This places greater pressure on efficiently managed operational cash flows, making working capital management increasingly central to firm performance.

Working capital is defined as the difference between current assets and current liabilities, comprising four key components, namely cash, accounts receivable, inventory, and accounts payable (Hofmann and Kotzab, 2010). Together, these components govern the timing and magnitude of operational flows, making their management essential for sustaining daily activity and meeting short-term obligations, while supporting financial performance (Deb et al., 2023; Hofmann and Kotzab, 2010). Working capital management (WCM) is widely proxied by the cash conversion cycle (CCC), capturing the time interval between cash outflows for purchases and cash inflows from sales (Gitman, 1974; Richards and Laughlin, 1980). The CCC is decomposed into three components – days sales outstanding (DSO), days inventory outstanding (DIO), and days payable outstanding (DPO). Each component governs a distinct stage of a firm’s operating cycle during which capital is tied before being converted into cash, collectively determining how much of a firm’s activity can be funded internally and how much requires external financing (Brav, 2009; Richards and Laughlin, 1980).

The relationship between WCM and financial performance has been well documented in empirical literature. Prior research has identified a negative relationship between the length of the CCC and profitability, suggesting that shorter working capital cycles improve firm performance from reduced capital tied up in operations (Boisjoly et al., 2020; Deloof, 2003; Shin and Soenen, 1998). At component level, a positive association between shorter DSO and DIO and financial performance has been documented, based on the rationale that faster

receivables collection and more efficient inventory management releases internal liquidity that support operational continuity and profitability (Deloof, 2003; Fazzari and Petersen, 1993; Hill et al., 2010). Empirical studies have showed that high inventory turnover is linked to strong financial performance among retail firms, underpinning DIO's pivotal role in the retail sector (Fazzari and Petersen, 1993; Gaur et al., 2005). For DPO, studies on its relationship to financial performance show dispersed results. Deloof (2003) asserted a negative DPO-profitability relationship, arguing that less profitable firms tend to delay supplier payments. Hill et al. (2010) and Petersen and Rajan (1997) claim the opposite: extended payment periods reflect strategic liquidity management and stronger supplier bargaining power, suggesting a positive relationship with financial performance (Hill et al., 2010; Petersen and Rajan, 1997) (see Appendix 1).

Apart from the link to financial performance, WCM also relates to firm's access to external capital. While Sweden offers a sophisticated capital market environment (European Commission, 2025), access to these markets is not uniform across firms. In contrast to publicly listed companies who can raise capital through equity and debt markets, private firms have limited access, thereby rely more heavily on internal cash flows and short-term debt (Asker et al., 2015; Brav, 2009). Operating with financial constraints, private firms tend to combat cash-flow fluctuations by adjusting receivables, inventory levels, and payment timing – making working capital their liquidity buffer. Public firms, however, can absorb such variation through external capital, enabling more flexible working capital strategies (Brav, 2009; Fazzari and Petersen, 1993). Consequently, the impact of firm's WCM strategy is shaped by listing status and financing conditions.

For Swedish retail firms, characterized by thin margins and high inventory turnover, understanding how WCM relates to financial performance is a direct concern. Yet, important dimensions how this relationship manifests in practice remain unexplored. First, prior studies predominantly rely on broad accounting profitability measures that may obscure the real operational mechanisms through which working capital decisions affect performance in inventory-intensive settings. Second, whether this relationship differs between private and publicly listed firms remain unexamined – despite empirical evidence reinforcing that the two firm types operate under fundamentally different financing conditions that directly shape how

working capital is managed (Brav, 2009; Fazzari and Petersen, 1993; Hill et al., 2010). For private firms in particular – who primarily rely on internal cash flows rather than capital markets – WCM efficiency is not solely an operational mechanism but a direct determinant of financial sustainability. Hence, treating this relationship as universal without accounting for these dimensions would risk drawing conclusions that do not hold invariably.

The purpose of this study is to examine if there is a relationship between WCM and financial performance in the Swedish retail sector, and whether listing status shapes this relationship. Our quantitative association study is grounded in the framework of Deloof (2003), employing OLS regression on an unbalanced panel dataset of 1,526 private and 33 publicly listed Swedish retail firms over the 2014-2023 period. The selected study period captures a decade of structural transformation in Swedish retail, characterized by continued expansion of e-commerce, omnichannel retailing, and digital payment systems – all of which directly influence operational cash flows and working capital practices (Bell et al., 2014; Sveriges Riksbank, 2025; Verhoef et al., 2015). Financial performance is measured through both return on assets (ROA) and gross margin return on inventory investment (GMROI) – the latter to seize retail-specific profitability dynamics such as inventory productivity that standard accounting measures tend to overlook.

This study aims to address the following research question:

Does working capital management affect financial performance among Swedish retail firms, and is this relationship shaped by firm listing status?

Our findings reveal that the CCC is negatively associated with financial performance among Swedish retail firms, although this relationship remains significant only for GMROI when controlling for firm heterogeneity. Inventory management emerges as the dominant working capital driver, with DIO exhibiting the strongest relationship with both CCC and financial performance across model specifications. Regarding listing status, no robust moderation of the WCM-financial performance relationship is found under the primary fixed effects specification. This suggests that the apparent differential sensitivity between private and publicly listed firms observed cross-section reflects structural between-firm differences rather than genuine differences in WCM sensitivity within firms over time.

To the best of our knowledge, no prior research has jointly examined the relationship between WCM and financial performance while accounting for the role of listing status in a Swedish retail context. Hence, this study makes three key contributions to existing WCM literature.

First, our findings demonstrate that the relationship between WCM and financial performance in retail is highly sensitive to the selected profitability measure, with GMROI capturing operational WCM dynamics that broader accounting measures such as ROA fail to detect. This establishes gross margin efficiency as the level at which working capital management generates genuine value in retail. Second, inventory management emerges as the primary working capital driver in Swedish retail, with DIO dominating the CCC – an effect that manifests specifically at the gross margin level. Third, our study shows that the apparent moderation of the WCM-financial performance relationship by listing status disappears under within-firm identification. This reveals that private and public Swedish retailers differ structurally rather than in their WCM sensitivity within firms over time, qualifying prior financing constraint frameworks of Brav (2009), Fazzari and Petersen (1993), and Hill et al. (2010) in a within-firm empirical setting.

The remainder of this thesis is structured as follows. Section 2 presents the theoretical framework and develops the study's hypotheses. Section 3 outlines the research design, data collection, and model specifications. Section 4 presents the empirical results and findings, followed by section 5 discussing the findings and their implications. Section 6 concludes the study by summarizing key insights, acknowledging the study's limitations, and proposing directions for future research.

2. Theoretical Foundation and Literature Review

This section outlines the theoretical foundation and reviews relevant literature underlying the study's hypotheses. The conceptual framework and measurements of working capital management (WCM) are first established, followed by a review of empirical findings on the relationship between the cash conversion cycle (CCC), its components, and financial performance. The section concludes by examining how these relationships are shaped by listing status and financing conditions across private and publicly listed firms.

2.1 Working Capital Management: Concepts and Measurements

Working capital is defined as the difference between current assets and current liabilities, representing the financial resources available to fund a firm's daily operations (Sharma, 2009). Current assets consist of financial resources that are cash or will be converted to cash within one year, including four primary components: accounts receivable, inventory, cash, and cash equivalents. Current liabilities represent a firm's obligations that require cash settlement within the same period, primarily accounts payable, accruals, and short-term debt (Fazzari and Petersen, 1993; Sharma, 2009).

Shin and Soenen (1998) link WCM to the cash conversion cycle (CCC), initially conceptualized by Gitman (1974) as the time period during which cash is tied up in current assets, thereby emphasizing it as a determinant for the cash needed to support a given level of sales. CCC is computed as the sum of days sales outstanding (DSO) and days inventory outstanding (DIO), less the number of days payable outstanding (DPO). DSO refers to the average number of days between a sale and the receipt of payment. This reflects how efficient a firm can convert a sale into cash via its receivables collection process. DIO measures the average number of days inventory is held before being sold, capturing the speed at which a firm converts its stock into revenue. DPO indicates the average number of days it takes to settle supplier obligations, reflecting the extent to which trade credit is utilized as a source of short-term financing (Boisjoly et al., 2020; Kroes and Manikas, 2014; Richards and Laughlin, 1980; Sharma, 2009). Richards and Laughlin (1980) further operationalized the CCC-concept as the net time interval between cash expenditures on purchases and the subsequent cash recovery from product sales, positioning it as a comprehensive measure of working capital management (Deloof, 2003; Sharma, 2009).

2.2 The Role of Working Capital Management in Operational Performance

The objective of working capital management is to maintain an optimal level of working capital that ensures operational continuity and solvency, thereby supporting overall financial performance (Deloof, 2003; Sharma, 2009). Collectively, working capital components determine a firm's ability to fund internal operations, extend trade credit, and manage supply chain activities (Deb et al., 2023; Hofmann and Kotzab, 2010; Kieschnick et al., 2013). While working

capital shortages may cause inventory delays, slower turnover, and lost sales opportunities, excess working capital leads to higher costs tied up in inventories, inventory obsolescence, and an eroding asset value due to inflation (Hill et al., 2010). Therefore, achieving optimal working capital levels enables firms to navigate the trade-off between risk and efficiency (Deloof, 2003; Howorth and Westhead, 2003; Smith 1980).

Positive levels of working capital indicate a conservative working capital management approach (Hill et al., 2010). Under this approach, the inventory plays a pivotal operational role, as it is directly linked to a firm's production function (Fazzari and Petersen, 1993). By stockpiling inventory, firms can lower input costs, dampen price volatility, and reduce the likelihood of stockouts, thereby mitigating the risk of production disruptions (Blinder and Maccini, 1991; Deloof, 2003; Fazzari and Petersen, 1993). Working capital can also influence sales through its receivables and trade credit components. Selling finished goods on credit generates receivables (Boisjoly et al., 2020), while extending trade credit can stimulate demand by functioning as a price reduction mechanism (Petersen and Rajan, 1997). Adopting a conservative working capital approach implies improved liquidity, thus greater ability to meet financial obligations on time, enabling reduced financing costs and early payment discounts (Dewing, 1941; Fazzari and Petersen, 1993; Hill et al., 2010). In contrast, excessive working capital ties up internal funds that could otherwise be reinvested, generating opportunity costs that could erode firm value (Hill et al., 2010; Kieschnick et al., 2013). This is particularly relevant when liquidity is debt-financed, as it introduces additional borrowing costs (Hill et al., 2010; Kieschnick et al., 2013). Conservative working capital policies therefore involve a trade-off between maintaining liquidity and managing the cost of capital (Sharma, 2009).

An aggressive working capital management approach implies operating with current liabilities exceeding current assets, achieved by speeding up receivables collection, tightening credit terms, thereby reducing working capital investments (Meltzer, 1960). This negative working capital gap compels firms to rely more on short-term financing to support their operations and even parts of their long-term assets (Hill et al., 2010). Boisjoly et al. (2020) investigated the operational impact of WCM, finding that aggressive and continuous WCM practices including Total Quality Management (TQM), Six Sigma, and lean initiatives, alongside process digitization and

improved inventory management, drove sustained gains in operational efficiency. By extending payables, accelerating receivables collection, and shifting inventory responsibility to suppliers, firms optimized their CCC and its components, ultimately improving both liquidity and financial performance simultaneously.

Whilst empirical studies suggest that an aggressive working capital approach can improve firm performance (Boisjoly et al., 2020; Capkun et al., 2009; Deloof, 2003), it is also considered riskier. Lower working capital levels suggest lower liquidity, which increases the likelihood of failing to meet financial obligations. Restricted working capital levels may also cause stockouts, customer loss, and sales disruptions, which can hinder operations, damage supplier and customer relationships, and increase the risk of financial distress (Heshmati, 2001; Hill et al., 2010).

Ultimately, given the liquid and reversible nature of working capital, its levels can shift rapidly in response to changing operational conditions (Dewing, 1941). For example, working capital may become temporarily negative if inventory is used faster than it is replenished, or when receivables are reduced under credit pressure – adjustments that more liquid firms can absorb, while financially constrained firms cannot (Fazzari and Petersen, 1993).

2.3 The Role of Working Capital Management in Financing Decisions

Under the frictionless capital markets proposed by Modigliani and Miller (1958), unlimited access to external finance makes internal funds and working capital irrelevant for investment decisions. In practice, however, external financing is both limited and more costly than internal funds (Opler et al., 1999). As a result, firms must actively manage working capital to reduce financing costs (Heshmati, 2001; Hill et al., 2010; Press and Weintrop, 1990; Sharma, 2009). In this context, WCM functions as a link between short-term financing and investment decisions, involving the optimization of receivables, payables, cash flows, and credit policies (Sharma, 2009).

Whilst working capital itself serves as a financing instrument, firm's WCM strategies are shaped by their financing conditions. In general, firms can release cash by adjusting current assets and current liabilities, effectively deploying working capital as a financial buffer to meet future

financing needs (Aktas et al., 2015; Fazzari and Petersen, 1993; Ramey, 1989). However, the prevailing level of firm's working capital matter. Firms with limited internal funds or costly external financing often adopt aggressive WCM strategies, such as delaying payments and reducing receivables, as a substitute for external borrowing (Hill et al., 2010). For instance, firms exhibiting damped growth trends rely on trade credit as a primary financing source (Cunat, 2007; Petersen and Rajan, 1997). While financially constrained firms rely on working capital adjustments to absorb cash flow shocks, liquid firms also strategically adopt WCM s to maintain investment stability (Fazzari and Petersen, 1993). Constrained working capital levels may also induce firms to pivot towards external debt financing, risking weakened liquidity and higher default risk (Press and Weintrop, 1990). Consequently, the interaction between WCM and capital structure has important implications for working capital strategies across firm types – a dynamic particularly pronounced between firms operating with different financing conditions, such as between private and publicly listed firms (Brav, 2009).

2.4 Working Capital Management and Financial Performance

Financial performance is a central business objective, and its achievement is closely linked to the effectiveness of WCM (Godfrey, 2005; Peel and Wilson, 1996; Sharma, 2009). Whereas a comprehensive understanding of WCM can generate competitive advantages, inefficient adoption risks substantial financial losses (Opler et al., 1999). Collectively, WCM affects a firm's profitability, liquidity, and risk profile – both at a component level and at an aggregate level – making it a central determinant of corporate short-term financial management and firm value (De Almeida and Eid, 2014; Sharma; 2009; Shin and Soenen, 1998; Smith, 1980).

Previous literature establishes theoretical and empirical links between working capital management and financial performance. Efficient WCM shapes a firm's ability to generate returns from operational activity (Boisjoly et al., 2020; Gitman, 1974), directly influencing financial performance (De Almeida and Eid, 2014; Singh et al., 2017). Shin and Soenen (1998) identified a strong negative relationship between CCC and financial performance, highlighting that more efficient WCM enhances financial performance. A shorter CCC reflects faster receivables collection, more efficient inventory turnover, and strategically delayed payments to suppliers, reducing capital tied up in operations and improving financial performance (Boisjoly

et al., 2020; Deloof, 2003). Conversely, a longer CCC implies higher working capital investment and lower profitability (Deloof, 2003).

While empirical evidence supports a negative relationship between WCM efficiency and financial performance, the level of working capital held by a firm is an investment decision carrying both benefits and costs (Aktas et al., 2015; Banos-Caballero et al., 2012). While working capital investments can support growth, extend trade credit, and increase earnings, overinvestments risks value destruction and heightened exposure to external funding needs and bankruptcy risk (Aktas et al., 2015; Jensen and Meckling, 1976; Kieschnick et al., 2013). Sound working capital policies allow firms to transfer their capital costs and credit risks to other supply chain members, preserving internal resources and protecting profitability (Deb et al., 2023; Hofmann and Kotzab, 2010). Suboptimal investments, by contrast, generate opportunity costs that erode financial performance, suggesting that a firm's working capital decisions should reflect its operations, supply chain structure, and business strategy (Esenduran et al., 2022; Hofman et al., 2010). Effective working capital management therefore requires navigating the trade-off between maintaining sufficient liquidity to meet short-term obligations, while avoiding excess capital tied up in operations at the cost of profitability (Gitman, 1974; Sharma, 2009).

2.5 Contextual Determinants

The role and effectiveness of working capital management is not uniform across firms – but shaped by industry characteristics and firm-specific factors such as firm size, listing status, and access to external financing (Boisjoly et al., 2020; Deloof and Jegers, 1999; Petersen and Rajan, 1997; Schumacher and Boland, 2005). Differences in business models, operational structures, and financing environments imply that optimal working capital levels are firm- and context-specific rather than universal (Eroglu and Hofer, 2011; Hill et al., 2010; Sharma, 2009).

2.5.1 Industry Heterogeneity

From an industry perspective, profitability is shaped by structural factors such as economies of scale, capital intensity, and competition levels (Caves and Porter, 1977; McGahan and Porter, 1997; Schumacher and Boland, 2005; Waring, 1996). Hawawini et al. (1986) show that the CCC components are shaped by technology, operational efficiency, and sales volume, suggesting that

firms follow industry-specific benchmarks when setting their working capital policies. Although each component of the CCC captures distinct aspects of WCM, all three are highly correlated, suggesting that firms performing well on one component tend to perform well across all, reflecting consistent firm-level efforts toward balance sheet efficiency (Boisjoly et al., 2020). However, empirical evidence suggests that industry-specific effects show greater persistence on financial performance than firm-level factors, particularly in retail (Schmalensee, 1985; Schumacher and Boland, 2005).

Industry context determines which working capital component is most consequential. For instance in manufacturing firms – an industry characterized by production-oriented supply chains – efficient WCM must account for timing differences in cash flow streams devoted to inventory, payables, and receivables (Boisjoly et al., 2020; Kroes and Manikas, 2014). Inventories in this context act as operational buffers that absorb production shocks and stabilize outputs, affecting cash flows and short-term financing needs (Boisjoly et al., 2020; Fazzari and Petersen, 1993; Ramey, 1989). In contrast, firms without physical production, such as software companies, operate with minimal inventory and payables balances, making accounts receivables the primary driver of the CCC (Boisjoly et al., 2020). The retail industry, however, is characterized by thin margins, high inventory turnover, limited receivables, and the potential for negative CCC's – where cash is collected before supplier obligations fall due (Hill et al., 2010; Levy et al., 2019). In this context, financial performance is highly margin-driven and category-dependent, with gross margin, sales volume, inventory turnover, store size, and competitive dynamics playing pivotal roles (Ailawadi and Harlam, 2004; McGinnis et al., 1984).

The retail industry holds a distinct profile within working capital management. As inventories constitute the dominant working capital component in retail, its management is central to overall WCM efficiency (Fazzari and Petersen, 1993). Gaur et al. (2005) found a prominent link between inventory turnover, operational efficiency, and financial performance among publicly listed U.S. retail firms. Stock levels must closely align with sales demand to avoid both stockouts and excess capital tied up in unsold goods, both of which directly affect financial performance (Boisjoly et al., 2020; McGinnis et al., 1984). Additionally, high tangible asset bases enable retail firms to raise external funds at lower costs, as inventories can serve as collateral against the

loan (Fazzari and Petersen, 1993; Kieschnick et al., 2013). Consequently, DIO serves as the most critical working capital metric in retail, as most transactions are settled immediately at the point of sale – leaving DSO structurally low – while DPO is largely determined by supplier relationships and payment terms than by active working capital decisions (Fazzari and Petersen, 1993; Kortman et al., 2016; Petersen and Rajan, 1997).

2.5.2 Listing Status Heterogeneity

Private and public firms differ substantially in their access to external financing, which directly shapes working capital needs (Brav, 2009; Mortal and Reisel, 2013). Publicly listed firms can raise capital through equity and debt markets, whereas private firms exhibit limited access to these markets, thus rely primarily on internal funds and short-term debt (Asker et al., 2015; Brav, 2009). Public firms also tend to be substantially larger than private firms, accounting for a disproportionately large share of total assets and sales (Brav, 2009). Together, these structural differences in size and financing conditions generate divergent working capital strategies across firm types (Brav, 2009; Mortal and Reisel, 2013; Sharma, 2009).

Another key determinant of working capital strategy is operating cash flow, as firms with stronger internal cash flows are better positioned to capture early payment discounts and rely on internal financing (Fazzari and Petersen, 1993; Richard and Laughlin, 1980). Monitoring working capital is therefore particularly important for firms operating with volatile cash flows or constrained liquidity – conditions typically observed in smaller, private firms (Howorth and Westhead, 2003; Peel et al., 2000). In contrast, creditworthy firms exhibit superior market access, fewer borrowing constraints, thus possess greater access to external funds, a condition typically observed among larger, public firms (Hill et al., 2010; Sharma, 2009; Whited, 1992). While this enables more flexible credit and inventory policies for larger public firms (Brennan and Hughes, 1991; Petersen and Rajan, 1997), smaller firms often encounter discrimination from the banking sector, thus tend to operate with financial constraints (Guariglia et al., 2011; Guo et al., 2023). Consequently, these financing constraints raise the cost of issuing external equity due to heightened perceived risk and control dilution (Brav, 2009; Hill et al., 2010), which compels private firms to rely more heavily on short-term financing and WCM techniques such as factoring (Fazzari and Petersen, 1993; Hill et al., 2010; Petersen and Rajan, 1997).

2.6 Hypotheses

A shorter CCC implies faster receivables collection, leaner inventories, and delayed supplier payments (Boisjoly et al., 2020; Brav, 2009; Deloof, 2003). This enables quicker cash conversion and reduced capital tied up in operations, thereby supporting financial performance (Brav, 2009; Deloof, 2003; Gitman, 1974; Shin and Soenen, 1998). Conversely, a longer CCC ties up excess capital in operations, constraining financial performance (Boisjoly et al., 2020; Deloof, 2003). We therefore hypothesize a negative relationship between the length of CCC and financial performance.

***H1:** There is a negative relationship between the Cash Conversion Cycle (CCC) and financial performance in Swedish retail firms.*

DSO, DIO, and DPO independently influence firm profitability (Deloof, 2003). Shorter DSO indicates faster receivables collection which releases internal capital for reinvestment, while lower DIO reflects more efficient inventory turnover and less capital tied up in unsold goods (Deloof, 2003; Fazzari and Petersen, 1993; Gaur et al., 2005; Kroes and Manikas, 2014). Hence, we hypothesize a negative relationship between DSO and DIO and financial performance, respectively.

***H1a:** There is a negative relationship between Days Sales Outstanding (DSO) and financial performance in Swedish retail firms.*

***H1b:** There is a negative relationship between Days Inventory Outstanding (DIO) and financial performance in Swedish retail firms.*

Empirical evidence of the link between DPO and financial performance is dispersed. Deloof (2003) found a negative relationship, attributing delayed payments to financial constraints rather than strategic intent – less profitable firms take longer to pay their invoices not by choice but due to inability. In contrast, Deloof and Jegers (1996), Petersen and Rajan (1997), and Hill et al. (2010) argue that extending DPO preserves liquidity and reduces reliance on costly external financing, thereby reflecting supplier bargaining power rather than financial distress – a view

particularly relevant in a retail context where supplier relationships are central to WCM strategy (Boisjoly et al., 2020). With DPO being a negative component of the CCC, a positive DPO-financial performance relationship is mechanically consistent with H1 – longer payables reduce the CCC, which release internal liquidity. Given the conflicting empirical evidence, two competing directions of the DPO-financial performance relationship are hypothesized.

***H1c:** There is a positive relationship between Days Payable Outstanding (DPO) and financial performance in Swedish retail firms.*

***H1d:** There is a negative relationship between Days Payable Outstanding (DPO) and financial performance in Swedish retail firms.*

The dependence on working capital management is not uniform across firms. Public firms can raise capital via equity markets, benefit from lower borrowing costs, and maintain more diversified funding sources, which reduces their dependence on WCM efficiency to sustain profitability (Brav, 2009; Hill et al., 2010; Petersen and Rajan, 1997). Private firms, by contrast, typically face greater financing constraints and rely primarily on internal cash flows, short-term debt, and trade credit, making WCM a more critical determinant of operational liquidity and financial performance (Brav, 2009; Fazzari and Petersen, 1993; Hill et al., 2010). This suggests that WCM improvements translate more directly into higher liquidity and profitability gains for private firms than for public firms, whose capital market access provides an alternative liquidity buffer (Brav, 2009; Fazzari and Petersen, 1993; Hill et al., 2010; Mortal and Reisel, 2013). Consequently, we hypothesize that the relationship between WCM and financial performance is stronger for private firms than for publicly listed Swedish retail firms.

***H2:** The relationship between the Cash Conversion Cycle (CCC) and financial performance is stronger for private firms than for publicly listed firms in Swedish retail.*

3. Method

This section presents the methodological framework used to examine the relationship between WCM and financial performance among private and publicly listed Swedish retail firms. At the end of this section, we present our research regression models and control variables used.

3.1 Research Design

To address the relationship between working capital management and financial performance among Swedish retail firms, we conduct an association study adopting a quantitative approach entrenched with Deloof's (2003) empirical framework. Given that working capital levels, investment requirements, and management practices vary substantially across industries (Boisjoly et al., 2020; Hawawini et al., 1986), important adaptations are made to account for the retail-specific characteristics present in our data sample.

Ordinary Least Squares (OLS) regressions with firm and year fixed effects are employed on our panel dataset as our primary specification, with each WCM component examined separately against the dependent variables. Firm fixed effects account for unobserved firm-level heterogeneity while year fixed effects control for common time-related shocks. Control variables are incorporated to isolate the effect of WCM on financial performance from firm-level heterogeneity unrelated to the primary variables of interest. Pooled OLS results are presented alongside fixed effects estimates for comparability with prior literature, including Deloof (2003) and Shin and Soenen (1998). To address H2, an interaction term between each WCM component and the listing status dummy is introduced to assess whether listing status shapes the WCM-financial performance relationship. We utilize two alternative dependent variables to measure financial performance. Accompanying ROA, GMROI is selected to capture the effects of structural features common to retail firms such as high inventory turnover, low accounts receivables, and thin profit margins (Levy et al., 2019). Additionally, aligned with Deloof (2003) a robustness test excluding firms with substantially high financial asset intensity is conducted to ensure that our results reflect core operational performance.

3.2 Data Collection

The study encompasses data acquired from two sources combined into a pooled panel covering Swedish retail firms between the years 2014 to 2023 – a time period selected to capture a decade of structural transformation in the Swedish retail sector. Private firm data are sourced from the Serrano database, and data for publicly listed firms are obtained from S&P Capital IQ. As our panel dataset stems from raw accounting data, it is subject to deliberate cleaning processes, filtering, and inclusion criteria, described below.

3.2.1 Private Firms

To acquire private firm-data, two complementary sub-databases within Serrano are deployed: Serrano, serving as the primary panel database providing adjusted, calendar-year, one-entry-per-firm-year financial data; and Bokslut, serving as a supplementary database with filing-level accounting items, specifically cost of goods sold and gross profit. Both data subsets are directly filtered to the 2014-2023 period, exclusively, resulting in an initial raw dataset of 7,722,898 Serrano observations and 11,124,366 Bokslut observations. Prior to any merge of the two data subsets, a range of inclusion criteria are established. These include restrictions to solely privately owned firms and limited liability companies at the outset. Then, only firms where company-level statement data is present and adopting cost-of-sales accounting are included, thereby excluding all firms reporting consolidated statements and adopting nature-of-expense accounting and other obsolete types. Only firms including at least three consecutive observations are included to enable statistically valid firm fixed effects. We restrict our sample to solely retail firms using the two-digit SNI code, where firms classified under SNI 47 (Retail Trade) are included, exclusively. Ultimately, we arrive at 320,312 Serrano-observations across 54,728 unique firms, and 74,640 Bokslut-observations across 12,916 unique firms before deduplication. In Bokslut, multiple filings exist for the same firm-year, where only the observation with the latest modification date is retained, resulting in 74,516 observations post deduplication.

The Serrano and Bokslut data subsets are merged on firm identifier and fiscal year end date. The match rate is only 3.089%, yielding 9,892 observations across 1,528 unique firms. To ensure economic viability of all key ratio variables, only firm-year observations with valid values for both COGS and gross profit are retained. Additionally, lagged values are only assigned where

the preceding observation stems from the immediately prior year, thereby excluding observations with non-consecutive years to prevent averaging across temporal gaps. The final private firm panel comprises 9,888 firm-year observations across 1,526 unique firms over the 2014-2023 period (see Appendix 3).

3.2.2 Public Firms

Data for publicly listed Swedish retail firms are collected from S&P Capital IQ, with the initial sample constructed by screening for firms classified under *Consumer Discretionary Distribution & Retail* and *Consumer Staples Distribution & Retail* according to the Global Industry Classification Standard (GICS). Following Rosengren and Bianchi (2020), retail firms are defined as businesses engaged in the direct sale of goods and services to end consumers. Firms operating with dual wholesale-retail models are included where retail sales constitute more than 50% of revenues, while firms deriving revenues primarily from wholesale or B2B distribution are excluded. This ensures cross-firm comparability and industry consistency, even where the firm operates some proprietary stores.

Already in the firm selection process, the public firm sample is restricted to the 2014-2023 period. Prior to extraction, all firm data is pre-filtered for accounting type, company-level statements, and financials reported in KSEK – ensuring consistency with the private dataset. As not all firms report data across the full sample period or for all key variables to be viable, the dataset is unbalanced. With regards to the limited sample size relative to private firms, maximizing the number of firm-year observations is prioritized over a stricter threshold. We therefore include firms with financial data present in at least three fiscal years during the selected period. For firms transitioning from private to public status during the study period, only firm-year observations corresponding to the listed period are retained.

All required financial statement line items required for the key variables for our study are mapped using pre-defined labels. These are extracted for each year, manually validated, and structured into congruent numeric values in a firm-year panel format, controlling for potential duplicates. The final public firm panel comprises 225 firm-year observations across 33 unique firms over the 2014-2023 period (see Appendix 5).

3.2.3 Combined Panel and Data Cleaning

The private and public datasets are combined into a pooled panel of 10,113 firm-year observations (9,888 private vs. 225 public) across 1,526 unique private firms and 33 unique public firms. A set of hard filters are applied to the combined panel to remove economically unattainable observations. First, firm-year observations where sales, COGS, purchases, or average inventory are zero or negative are excluded, as these constitute invalid denominators for ratio computation. Second, observations where DSO, DIO, or DPO values are zero, negative or exceed 3,650 days (equivalent to ten years) are also excluded to avoid impossible or distorted working capital ratios. Third, observations where leverage fell below zero or above five are deducted to exclude firm-year observations with implausible balance-sheet ratios that could distort regression estimates. Post application of hard filters, we arrive at a pooled dataset comprising 1,183 unique private firms and 31 unique public firms. To mitigate the influence of outliers without removing observations, all continuous regression variables including DSO, DIO, DPO, CCC, ROA, GMROI, leverage, and sales growth, are winsorized at the 1st and 99th percentiles, consistent with standard practice in empirical WCM research (Boisjoly et al., 2020; Deloof, 2003). The total panel size post winsorization remains unchanged at 7,758 firm-year observations across 7,580 private and 178 publicly listed complete firm-year observations (see Appendix 6).

3.2.4 Robustness Test Data Cleaning

Following Deloof (2003), a robustness test is conducted to examine whether firms with high financial asset intensity drive deviations in the main results. Financial assets are scaled by total assets to capture the proportion of a firm's asset base that is financial rather than operational. A 50% threshold is applied to exclude firm-year observations where financial assets constitute a disproportionate share of total assets, reducing the private sample from 9,888 to 9,415 observations, while the public sample remains at 225 observations. The two filtered samples are then pooled into a single dataset used exclusively for the robustness test (see Appendix 7).

3.3 Model Specification of H1

To examine the relationship between working capital management and financial performance, separate panel regression models are estimated for each dependent variable, with firm and year fixed effects included in both model specifications:

$$ROA_{it} = \beta_0 + \beta_1 WCM_{it} + \beta_2 SIZE_{it} + \beta_3 SGROWTH_{it} + \beta_4 LEVERAGE_{it} + \alpha_i + \lambda_t + \epsilon_{it}$$

$$GMROI_{it} = \beta_0 + \beta_1 WCM_{it} + \beta_2 SIZE_{it} + \beta_3 SGROWTH_{it} + \beta_4 LEVERAGE_{it} + \alpha_i + \lambda_t + \epsilon_{it}$$

The variable WCM_{it} represents working capital management proxies for this model, entered separately across four alternative measures: the cash conversion cycle (CCC), days inventory outstanding (DIO), days sales outstanding (DSO), days payables outstanding (DPO). Each specification is estimated for both dependent variables, yielding eight baseline models in total.

The variable $SIZE_{it}$ represents firm size which is included to account for firm scale effects. $SGROWTH_{it}$ captures firm expansion dynamics, and $LEVERAGE_{it}$ reflects the extent of debt financing. The subscripts i and t denote firm and year, respectively. Firm fixed effects (α_i) absorb time-invariant firm-level heterogeneity, while year fixed effects (λ_t) control for common time effects such as macroeconomic shocks across the sample period.

3.3.1 Dependent Variables

Financial performance constitutes the dependent variable of this study, proxied by accounting-based performance measures. Since our pooled sample encompasses both publicly listed and private firms, market-based measures are inapplicable. Given that private and public firms typically operate under different financing structures and capital arrangements (Brav, 2009; Hill et al., 2010), their financial performance is assessed using measures that exclude interest expenses, tax regimes, and capital structure effects (Deloof, 2003).

Return on Assets (ROA) is selected as one measure of financial performance, defined as earnings before interest and taxes (EBIT) divided by average total assets. However, as expense structures vary across product lines, inventory investment decisions are particularly consequential for retail firm performance – a dynamic that standard measures such as ROA fail to capture. To address

this, we also include gross margin return on inventory investment (GMROI) as dependent variable, defined as gross profit divided by average inventory at cost. GMROI integrates gross margin and inventory investment into a single retail-specific profitability metric, which is particularly relevant given the inventory-dominant nature of retail (Bates, 1979; Fazzari and Petersen, 1993; McGinnis et al., 1984; Sweeney, 1973).

Table 1
Dependent Variables

Dependent Variable	Definition	Calculation
Return on Assets (ROA)	Measures how efficiently a firm uses its total assets to generate operating profit.	$ROA_{it} = \frac{EBIT_{it}}{\frac{1}{2}(Assets_{it} + Assets_{it-1})}$
Gross Margin Return on Inventory Investment (GMROI)	Measures how efficiently a firm generates gross margin from its inventory investment.	$GMROI_{it} = \frac{Gross\ Profit_{it}}{\frac{1}{2}(Inventory_{it} + Inventory_{it-1})}$

3.3.2 Independent Variables

The Cash Conversion Cycle (CCC) serves as a comprehensive measure of working capital management in our study, capturing the net time interval between cash outflows for inputs and cash inflows from sales (Deloof, 2003; Gitman, 1974; Richards and Laughlin, 1980). In addition, its three individual components are examined as independent variables, including days sales outstanding (DSO), days inventory outstanding (DIO), and days payable outstanding (DPO).

Table 2
Independent Variables

Variable	Definition	Calculation	Exp. Sign
Cash Conversion Cycle (CCC)	Average number of days between cash outflows for inventory and cash inflows from customers.	$CCC_{it} = DSO_{it} + DIO_{it} - DPO_{it}$	-
Days Sales Outstanding (DSO)	Average number of days to collect receivables.	$DSO_{it} = \frac{\frac{1}{2}(AR_{it} + AR_{it-1})}{Sales_{it}} \times 365$	-
Days Inventory Outstanding (DIO)	Average number of days inventory is held before being sold.	$DIO_{it} = \frac{\frac{1}{2}(Inventory_{it} + Inventory_{it-1})}{COGS_{it}} \times 365$	-
Days Payable Outstanding (DPO)	Average number of days to settle supplier obligations.	$DPO_{it} = \frac{\frac{1}{2}(AP_{it} + AP_{it-1})}{Purchases_{it}} \times 365$	+ / -

Notes: $Purchases_{it} = Inventory_{it} + COGS_{it} - Inventory_{it-1}$.

3.3.3 Control Variables

To isolate the effect of working capital management on financial performance and mitigate omitted variable bias, three control variables are incorporated in our regression models. Aligned with previous research, leverage, firm size, and sales growth are selected (Deloof, 2003).

Leverage (LEVERAGE) is measured as total liabilities divided by total assets, included to control for effects on financial performance attributable to differences in financing structure (Deloof, 2003). Firms with higher leverage face higher interest obligations thus greater financial risk – influencing both working capital policies and financial performance (Hill et al., 2010; Press and Weintrop, 1990). We therefore expect a negative relationship between leverage and financial performance.

Firm size (SIZE) is defined as the natural logarithm of total sales (Deloof, 2003). This variable is partially correlated with listing status, as publicly listed firms tend to be substantially larger than private counterparts (Brav, 2009). Including firm size is therefore particularly important to avoid converged size effects when examining WCM dynamics across firm types. Consistent with scale advantages (Deloof, 2003), a positive relationship between size and financial performance is expected.

Lastly, sales growth (SGROWTH) is measured as the year-on-year percentage change in total sales (Deloof, 2003). Growing firms typically require greater working capital investment to support expansion and may exhibit fluctuations in financial performance independent of WCM efficiency (Deloof, 2003). Omitting this variable could therefore confound the estimated WCM-profitability relationship. A positive relationship between sales growth and financial performance is expected.

Table 3
Control Variables

Variable	Definition	Calculation	Exp. Sign
LEVERAGE (Leverage)	Measures the extent to which a firm is financed through debt.	$LEVERAGE_{it} = \frac{Total\ Liabilities_{it}}{\frac{1}{2}(Assets_{it} + Assets_{it-1})}$	-
SIZE (Firm Size)	Captures the scale of the firm, measured as the natural logarithm of total sales.	$SIZE_{it} = \ln(Sales_{it})$	+
SGROWTH (Sales Growth)	Measures the year-on-year percentage change in net sales.	$SGROWTH_{it} = \frac{Sales_{it} - Sales_{it-1}}{Sales_{it-1}}$	+

Notes: SIZE is firm size measured as the natural logarithm of total sales. LEVERAGE is total liabilities divided by average total assets. SGROWTH is the year-on-year percentage change in net sales [(Net Sales – Net Salest.i) / Net Salest.i].

3.4 Model Specification of H2

To examine whether the relationship between working capital management and financial performance differs between private and publicly listed Swedish retail firms, an OLS regression model is estimated including both a public-firm dummy variable coded as 0 for private firms and 1 for publicly listed firms, and an interaction term between each working capital measure and the public firm dummy. Consistent with the H1 specification, firm and year fixed effects are included throughout. Although the public dummy is time-invariant and therefore absorbed by firm fixed effects, making β_2 unidentifiable, the interaction term $WCM_{it} \times PUBLIC_i$ varies over time as each WCM component changes annually within firms. The interaction term is therefore identifiable from within-firm variation. The public-specific WCM effect is recovered as the sum of the main effect (β_1) and the interaction term (β_3).

$$ROA_{it} = \beta_0 + \beta_1 WCM_{it} + \beta_2 PUBLIC_i + \beta_3 (WCM_{it} \times PUBLIC_i) + \beta_4 SIZE_{it} + \beta_5 SGROWTH_{it} + \beta_6 LEVERAGE_{it} + \alpha_t + \lambda_t + \epsilon_{it}$$

$$GMROI_{it} = \beta_0 + \beta_1 WCM_{it} + \beta_2 PUBLIC_i + \beta_3 (WCM_{it} \times PUBLIC_i) + \beta_4 SIZE_{it} + \beta_5 SGROWTH_{it} + \beta_6 LEVERAGE_{it} + \alpha_t + \lambda_t + \epsilon_{it}$$

3.4.1 Listing Dummy and Interaction Variable

$\beta_2 PUBLIC_i$ is the public dummy variable capturing the average level difference in financial performance between publicly listed and private firms. While the dummy variable is absorbed by

firm fixed effects, the interaction variable $\beta_3(WCM_{it} \times PUBLIC_i)$ captures the differential within-firm WCM effect for publicly listed firms relative to private firms – representing our key parameter for H₂. The private firm effect is given by β_1 , while the public-specific WCM effect is estimated as $\beta_1 + \beta_3$.

Table 4
Listing Dummy and Interaction Variables

Variable	Definition	Exp. Sign
$\beta_2 PUBLIC_i$	Binary variable equal to 1 if the firm is publicly listed, and 0 if private.	+/-
$\beta_3(CCC_{it} \times PUBLIC_i)$	Interaction term capturing whether the CCC-financial performance relationship differs between private and publicly listed firms.	+
$\beta_3(DSO_{it} \times PUBLIC_i)$	Interaction term capturing whether the DSO-financial performance relationship differs between private and publicly listed firms.	+
$\beta_3(DIO_{it} \times PUBLIC_i)$	Interaction term capturing whether the DIO-financial performance relationship differs between private and publicly listed firms.	+
$\beta_3(DPO_{it} \times PUBLIC_i)$	Interaction term capturing whether the DPO-financial performance relationship differs between private and publicly listed firms.	+

Notes: PUBLIC_i is a dummy variable, equal to 1 if the firm is publicly listed, and equal to 0 if private. While identified in the pooled OLS specification, it is absorbed by firm fixed effects in the primary specification and therefore not reported in the fixed effects results. CCC_{it} is the cash conversion cycle for firm i at time t; DSO_{it} is the days sales outstanding for firm i at time t; DIO_{it} is the days inventory outstanding for firm i at time t; and DPO_{it} is the days payables outstanding for firm i at time t.

3.5 Statistical Considerations

The validity of the estimated regression models relies on the classical Gauss-Markov assumptions. First, the assumption of linearity requires that the dependent variable is a linear function of the explanatory variables. This is assessed through visual inspection of residuals plotted against fitted values. This check suggests acceptable linearity, but a presence of heteroskedasticity, which is confirmed via the Breuch-Pagan test. To address this, we adopt the Clustered Standard Error method to our regression model, accounting for both heteroskedasticity and within-firm autocorrelation over time. Given our relatively large sample data size, where observations are nested within firms over time, our observations are not classified as independent. This suggests that within-firm correlation is expected. Hence, the Clustered SE approach is deemed more appropriate than conventional heteroskedasticity-consistent estimators such as HC3.

Firm-specific characteristics and time-series variations in the data are accounted for using firm fixed effects and year fixed effects. Firm fixed effects account for unobserved heterogeneity across firms such as managerial practices, operational efficiency, or brand strength that may influence profitability, independent of time effects. Year fixed effects are incorporated to account for macroeconomic shocks and other time-related factors affecting all firms within a given period. Normality is assessed by running residual diagnostics using the Kolmogorov-Smirnov test, indicating that the residuals deviate from normality. A potential cause is outliers in financial variables, which is subsequently mitigated through winsorization of all continuous variables at the 1st and 99th percentiles. Remaining deviations from normality do not affect the validity of the estimates due to the large sample size and the use of robust standard errors. The assumption of exogeneity requires that the explanatory variables are uncorrelated with the error term. In our study, potential endogeneity may arise due to simultaneity or omitted variable bias, particularly in the relationship between WCM and financial performance. This concern is however mitigated through the inclusion of firm fixed effects, year fixed effects, and relevant control variables. To avoid multicollinearity, the CCC and its subcomponents are estimated in separate regression specifications. In addition, pairwise correlations and variance inflation factors are examined. The Variance Inflation Factor (VIF) analysis indicates no evidence of multicollinearity, as all explanatory variables exhibit VIF values close to one. The high VIF associated with the constant term is expected and does not affect the interpretation.

4. Empirical Results and Findings

This section presents the empirical results of our study. Initially, descriptive statistics and Pearson correlation coefficients are reported to provide an overview of our findings, followed by main regression results for H1 and H2, estimated under firm and year fixed effects as the primary specification. Pooled OLS results are presented alongside for comparability with prior literature. This section concludes with robustness test excluding firm with high financial asset intensity.

4.1 Description of Data

4.1.1 Descriptive Statistics

Table 5
Descriptive Statistics

	<i>Mean</i>	<i>St. Dev.</i>	<i>Minimum</i>	<i>Median</i>	<i>Maximum</i>
ROA	0.155	0.182	-0.566	0.156	0.588
GMROI	5.948	2.705	0.188	5.786	15.163
CCC	10.854	33.563	-13.583	1.757	208.115
DSO	2.668	7.124	0.056	0.893	46.392
DIO	24.489	37.048	6.501	13.955	239.021
DPO	16.190	12.469	2.751	13.944	87.244
SIZE	11.335	1.414	1.946	11.162	19.279
LEVERAGE	0.600	0.242	0.061	0.600	1.206
SGROWTH	0.066	0.307	-0.668	0.031	2.410

Notes: N = 7,758 firm-year observations, 2014-2023. All variables winsorized at the 1st and 99th percentiles.

The descriptive statistics presents our pooled sample of 7,758 firm-year observations across private and publicly listed firms, winsorized at the 1st and 99th percentiles. The average firm has an ROA of 15.5% and GMROI of 5.948, both exhibiting considerable dispersions, with ROA ranging from -56.6% to 58.8% and GMROI from 0.188 to 15.163. This reflects substantial heterogeneity in profitability across Swedish retail firms over the 2014-2023 period. The mean CCC is 10.854 days with a standard deviation of 33.563 and median of 1.757 – a right-skewed distribution indicating that most firms operate with short CCC's. Among WCM components, DIO has the highest mean (24.489 days) and exhibits the largest dispersion, reflecting the inventory-heavy nature in Swedish retail. The average DSO is 2.668 and DPO averages 16.190 days, both of which is consistent with the structural characteristics of the retail sector.

SIZE averages 11.335 with low dispersion, indicating low variation in firm scale across our sample. LEVERAGE averages 0.600 with identical mean and median values, reflecting consistent capital structure. SGROWTH is positively skewed with a mean of 6.6% against a median of 3.1%, suggesting that the sample consists of a small number of high-growth firms.

4.1.2 Correlation Analysis

Table 6
Pearson Correlation Coefficients

	ROA	GMROI	CCC	DSO	DIO	DPO	SIZE	LEVERAGE	SGROWTH
ROA									
GMROI	0.484 *** (0.0000)								
CCC	-0.251 *** (0.0000)	-0.505 *** (0.0000)							
DSO	-0.132 *** (0.0000)	-0.257 *** (0.0000)	0.591 *** (0.0000)						
DIO	-0.254 *** (0.0000)	-0.508 *** (0.0000)	0.939 *** (0.0000)	0.491 *** (0.0000)					
DPO	-0.137 *** (0.0000)	-0.282 *** (0.0000)	0.401 *** (0.0000)	0.387 *** (0.0000)	0.626 *** (0.0000)				
SIZE	0.219 *** (0.0000)	0.167 *** (0.0000)	-0.125 *** (0.0000)	0.011 (0.3327)	-0.063 *** (0.0000)	0.192 *** (0.0000)			
LEVERAGE	-0.181 *** (0.0000)	-0.222 *** (0.0000)	-0.034 *** (0.0027)	-0.004 (0.7246)	-0.035 *** (0.0020)	-0.011 (0.3327)	0.128 *** (0.0000)		
SGROWTH	-0.083 *** (0.0000)	-0.052 *** (0.0000)	-0.028 ** (0.0137)	-0.029 ** (0.0106)	-0.047 *** (0.0000)	-0.066 *** (0.0000)	0.075 *** (0.0000)	0.286 *** (0.0000)	

Notes: $N = 7,758$ firm-year observations, 2014-2023. All variables winzorized at the 1st and 99th percentiles. P-values in parentheses where *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 6 displays pairwise Pearson correlation coefficients for all variables in our sample of private and publicly listed Swedish retail firms. The two measures of financial performance, ROA and GMROI, are positively and significantly correlated. All four WCM components are negatively and significantly correlated with both ROA and GMROI, with stronger magnitudes for GMROI. DIO shows the strongest negative association across both profitability measures, with a near-perfect correlation with CCC, reflecting that inventory management is the dominant driver of the CCC in our retail sample. DSO and DPO are positively correlated across all components, reflecting that firms with longer payment periods also tend to hold inventory longer and collect receivables more slowly.

Among the control variables, SIZE is positively correlated with both ROA and GMROI, implying scale advantages enabling firms to generate higher returns. LEVERAGE exhibits negative correlation with both measures. With publicly listed firms carrying higher mean leverage than private observed in the descriptive statistics (see Appendix 2, Appendix 4), the lower baseline profitability for public firms can be explained: higher debt obligations introduce greater financial costs that could compress financial performance (Kieschnick et al., 2013). SGROWTH is negatively correlated with ROA and GMROI, suggesting that revenue growth in Swedish retail comes at the cost of profitability – consistent with margin pressure and increased working capital demands during periods of growth (Grewal et al., 2017; Verhoef et al., 2015). The positive correlation between SGROWTH and LEVERAGE suggests that higher-growth firms carry more debt relative to their total assets, consistent with greater financing needs during expansion (Press and Weintrop, 1990).

4.2 Main Regression Results: H1

This section presents H1 regression results for each WCM component, estimated under firm and year fixed effects as the primary specification for both ROA and GMROI, respectively. Standard errors are clustered at the firm level throughout.

4.2.1 Testing H1 with ROA

Table 7
H1 Results. Dependent Variable: ROA. Clustered SE (firm level).

Variable	ROA – Firm + Year Fixed Effects (Primary)				Exp. Sign	ROA – Pooled OLS (Robustness)				Exp. Sign
CCC	0.0004 (0.1890)	–	–	–	–	–0.0013 *** (0.0000)	–	–	–	–
DSO	–	–0.0002 (0.8825)	–	–	–	–	–0.0035 *** (0.0000)	–	–	–
DIO	–	–	0.0003 (0.3189)	–	–	–	–	–0.0012 *** (0.0000)	–	–
DPO	–	–	–	–0.0001 (0.7682)	–/+	–	–	–	–0.0029 *** (0.0000)	–/+
SIZE	0.0838 *** (0.0000)	0.0784 *** (0.0000)	0.0842 *** (0.0000)	0.0780 *** (0.0000)	+	0.0283 *** (0.0000)	0.0322 *** (0.0000)	0.0301 *** (0.0000)	0.0370 *** (0.0000)	+
LEVER AGE	–0.0622 *** (0.0010)	–0.0623 *** (0.0010)	–0.0634 *** (0.0000)	–0.0618 *** (0.0010)	–	–0.1531 *** (0.0000)	–0.1503 *** (0.0000)	–0.1539 *** (0.0000)	–0.1529 *** (0.0000)	–
SGROW TH	–0.0385 ** (0.0010)	–0.0393 ** (0.0010)	–0.0383 ** (0.0010)	–0.0394 *** (0.0010)	+	–0.0283 ** (0.0230)	–0.0289 ** (0.0200)	–0.0318 ** (0.0100)	–0.0354 *** (0.0040)	+
Adj. R ²	0.692	0.692	0.692	0.692		0.147	0.113	0.155	0.132	
N	7,758	7,758	7,758	7,758		7,758	7,758	7,758	7,758	
Fixed Effects	Yes	Yes	Yes	Yes		No	No	No	No	

Notes: P-values in parentheses where *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Models (1)-(4) correspond to CCC, DSO, DIO, and DPO, respectively, each estimated alongside SIZE, LEVERAGE, and SGROWTH.

Under our main firm and year fixed effects model, all four WCM components are statistically insignificant with inconsistent signs. In contrast to the pooled OLS sample, the adjusted R² rises sharply to 0.692 across all WCM components (vs. 0.113-0.156 for pooled OLS) driven by the firm fixed effects absorbing persistent between-firm differences. This indicates that the WCM-ROA relationship does not hold within firms over time, indicating that H1 is not supported under fixed effects for ROA.

However, the pooled OLS robustness check yields consistently negative and highly significant coefficients across all four WCM components. Consistent with Deloof (2003) and Shin and Soenen (1998), this suggests that firms with longer CCC's exhibit lower asset profitability. However, the divergence from the fixed effects results confirms that these pooled estimates reflect persistent between-firm differences rather than genuine within-firm WCM dynamics.

4.2.2 Testing H1 with GMROI

Table 8
H1 Results. Dependent Variable: GMROI. Clustered SE (firm level).

Variable	GMROI – Firm + Year Fixed Effects (Primary)				Exp. Sign	GMROI – Pooled OLS (Robustness)				Exp. Sign
CCC	-0.0156 *** (0.0003)	–	–	–	–	-0.0400 *** (0.0000)	–	–	–	–
DSO	–	-0.0312 ** (0.0317)	–	–	–	–	-0.0988 *** (0.0000)	–	–	–
DIO	–	–	-0.0197 *** (0.0001)	–	–	–	–	-0.0371 *** (0.0000)	–	–
DPO	–	–	–	-0.0133 ** (0.0427)	-/+	–	–	–	-0.0733 *** (0.0000)	-/+
SIZE	0.4696 ** (0.0165)	0.5861 *** (0.0008)	0.3233 (0.1217)	0.5686 *** (0.0003)	+	0.2644 *** (0.0000)	0.3871 *** (0.0000)	0.3243 *** (0.0000)	0.5101 *** (0.0000)	+
LEVER AGE	-1.6124 *** (0.0000)	-1.5984 *** (0.0000)	-1.5356 *** (0.0000)	-1.5618 *** (0.0000)	–	-2.8617 *** (0.0000)	-2.7733 *** (0.0000)	-2.8808 *** (0.0000)	-2.8396 *** (0.0000)	–
SGROW TH	-0.2330 *** (0.0077)	-0.2084 *** (0.0177)	-0.2681 *** (0.0018)	-0.2141 ** (0.0136)	+	-0.0225 (0.8750)	-0.0315 (0.8490)	-0.1271 (0.3730)	-0.1886 (0.2350)	+
Adj. R ²	0.826	0.823	0.827	0.823		0.330	0.155	0.344	0.197	
N	7,758	7,758	7,758	7,758		7,758	7,758	7,758	7,758	
Fixed Effects	Yes	Yes	Yes	Yes		No	No	No	No	

Notes: P-values in parentheses where *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Models (1)-(4) correspond to CCC, DSO, DIO, and DPO, respectively, each estimated alongside SIZE, LEVERAGE, and SGROWTH.

In contrast to the results for ROA, all four WCM components exhibit negative and highly significant results across both specifications with GMROI, confirming genuine within-firm effects. The adjusted R² is considerably higher for GMROI than for ROA, reflecting that working capital efficiency is more closely linked to inventory-driven financial performance than overall asset profitability. H1 is therefore supported for GMROI across specifications, providing stronger evidence of genuine within-firm WCM effects on financial performance.

For both ROA and GMROI, the control variables behave consistently across all WCM components and specifications. SIZE is positive and significant across all WCM components and specifications, except for DIO under fixed effects for GMROI. This suggests that larger firms benefit from scale economies, thus operate with higher ROA and GMROI. However, for gross margin efficiency, changes in firm size do not systematically relate to changes in inventory management efficiency – a pattern that likely reflects the within-estimator absorbing size-related

firm heterogeneity. Further, relative to ROA, the increased magnitude of the SIZE variable reflects the scale-sensitivity of inventory-driven returns.

LEVERAGE is negative and significant throughout, indicating that higher debt levels reduce profitability. SGROWTH is negative and significant throughout for ROA, suggesting that faster growing firms exhibit lower return on assets – consistent with growth firms prioritizing reinvestments over short-term profitability. Under fixed effects for GMROI, the negative SGROWTH coefficients suggests that within-firm sales growth is associated with declining gross margin efficiency, potentially reflecting margin pressure and lower inventory returns during expansion periods. The insignificance of SGROWTH under pooled OLS for GMROI further suggests that this relationship is driven by within-firm variation rather than cross-sectional differences.

Utilizing the pooled OLS sample as a robustness test for our regressions reveals a discrepancy between the two profitability measures. For ROA, all WCM coefficients lose statistical significance under fixed effects, while the WCM relationships are significant and robust across specifications for GMROI. This implies that working capital efficiency has a genuine within-firm effect on inventory-driven profitability, but not on overall asset return once firm heterogeneity is controlled for.

4.3 Main Regression Results: H2

This section outlines the H2 regression results for each WCM component for both ROA and GMROI. Firm and year fixed effects are included as the primary specification, accompanied by pooled OLS to assess the test's vigor. As the PUBLIC dummy is time-invariant, β_2 is not reported in the primary specification. The public-specific effect is instead recovered as $\beta_1 + \beta_3$. Standard errors are clustered at the firm level throughout.

4.3.1 Testing H2 with ROA

Table 9
H2 Results. Dependent Variable: ROA. Clustered SE (firm level).

Variable	ROA – Firm + Year Fixed Effects (Primary)				ROA – Pooled OLS (Robustness)			
CCC	0.0005 (0.1463)	–	–	–	–0.0011 *** (0.000)	–	–	–
DSO	–	–0.0003 (0.8541)	–	–	–	–0.0027 *** (0.0000)	–	–
DIO	–	–	0.0004 (0.2839)	–	–	–	–0.0011 *** (0.000)	–
DPO	–	–	–	–0.0003 (0.5641)	–	–	–	–0.0022 *** (0.0000)
PUBLIC	<i>Absorbed by firm fixed effects.</i>				–0.2377 *** (0.0000)	–0.2365 *** (0.0000)	–0.2319 *** (0.0000)	–0.2364 *** (0.0000)
CCC × PUBLIC	–0.0007 (0.1285)	–	–	–	0.0011 *** (0.0000)	–	–	–
DSO × PUBLIC	–	0.0009 (0.7440)	–	–	–	0.0017 (0.2600)	–	–
DIO × PUBLIC	–	–	–0.0005 (0.3330)	–	–	–	0.0009 ** (0.0120)	–
DPO × PUBLIC	–	–	–	0.0013 (0.2970)	–	–	–	0.0014 * (0.0620)
SIZE	0.0854 *** (0.0000)	0.0782 *** (0.0000)	0.0854 *** (0.0000)	0.0770 *** (0.0000)	0.0353 *** (0.0000)	0.0401 *** (0.0000)	0.0357 *** (0.0000)	0.0418 *** (0.0000)
LEVERAGE	–0.0633 *** (0.0004)	–0.0621 *** (0.0006)	–0.0641 *** (0.0004)	–0.0619 *** (0.0006)	–0.1546 *** (0.0010)	–0.1547 *** (0.0010)	–0.1555 *** (0.0000)	–0.1562 *** (0.0000)
SGROWTH	–0.0384 *** (0.0014)	–0.0393 *** (0.0011)	–0.0381 *** (0.0015)	–0.0395 *** (0.0010)	–0.0270 ** (0.0290)	–0.0265 ** (0.0320)	–0.0300 ** (0.0150)	–0.0318 ** (0.0100)
Adj. R ²	0.692	0.692	0.692	0.692	0.165	0.139	0.166	0.146
N	7,758	7,758	7,758	7,758	7,758	7,758	7,758	7,758
Year Fixed Effects	Yes	Yes	Yes	Yes	No	No	No	No

Notes: P-values in parentheses where *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Each model includes one WCM component, a PUBLIC dummy (= 1 for listed firms), their interaction term, and three controls: SIZE, LEVERAGE, and SGROWTH. For FE specification. (primary), PUBLIC is absorbed thus not reported. Public-specific effect under FE is recovered as $\beta_1 + \beta_3$. For pooled OLS (robustness), PUBLIC is included.

Under our primary model specification utilizing firm and year fixed effects, all four WCM main effects and all interaction terms are statistically insignificant for ROA. H2 is therefore not confirmed in a within-firm setting. To verify whether this result holds across estimation

approaches, the pooled OLS model serves as a robustness check. The pooled estimates yield negative and significant WCM effects across components, with positive and significant interaction terms for CCC and DIO, a marginal result for DPO, and an insignificant result for DSO. This divergence compared to the primary fixed effect specification confirms that the interaction effects observed in the pooled specification reflect between-firm structural differences between private and public firms, not a genuine within-firm WCM-ROA relationship. The DSO interaction is however insignificant across both specifications, consistent with the structurally minimal receivables in this retail sample (see Section 4.1.1).

The control variables are consistent across all components and specifications. SIZE is positive and significant throughout, while LEVERAGE is negative and significant, attributing higher debt levels to reduced asset profitability. SGROWTH is negative and significant across all models, implying that revenue expansion does not necessarily generate greater financial performance.

4.3.2 Testing H2 with GMROI

Table 10
H2 Results. Dependent Variable: GMROI. Clustered SE (firm level).

Variable	GMROI – Firm + Year Fixed Effects (Primary)				GMROI – Pooled OLS (Robustness)			
CCC	-0.0175 *** (0.0008)	–	–	–	-0.0381 *** (0.0000)	–	–	–
DSO	–	-0.0330 *** (0.0391)	–	–	–	-0.0908 *** (0.0000)	–	–
DIO	–	–	-0.0204 *** (0.0005)	–	–	–	-0.0360 *** (0.0000)	–
DPO	–	–	–	-0.0125 * (0.0875)	–	–	–	-0.0679 *** (0.0000)
PUBLIC	<i>Absorbed by firm fixed effects.</i>				-4.5150 *** (0.0000)	-6.1143 *** (0.0000)	-5.2984 *** (0.0000)	-8.0521 *** (0.0000)
CCC × PUBLIC	0.0108 * (0.0828)	–	–	–	0.0276 *** (0.0000)	–	–	–
DSO × PUBLIC	–	0.0195 (0.5664)	–	–	–	0.1277 *** (0.0000)	–	–
DIO × PUBLIC	–	–	0.0043 (0.5433)	–	–	–	0.0323 *** (0.0000)	–
DPO × PUBLIC	–	–	–	-0.0070 (0.5236)	–	–	–	0.0950 *** (0.0000)
SIZE	0.4446 ** (0.0310)	0.5807 *** (0.0012)	0.3121 (0.1524)	0.5739 *** (0.0003)	0.3830 *** (0.0000)	0.5656 *** (0.0000)	0.4052 *** (0.0000)	0.6139 *** (0.0000)
LEVERAGE	-1.5963 *** (0.0000)	-1.5946 *** (0.000)	-1.5293 *** (0.0000)	-1.5612 *** (0.0000)	-2.8714 *** (0.0000)	-2.8458 *** (0.0000)	-2.8822 *** (0.0000)	-2.9247 *** (0.0000)
SGROWTH	-0.2358 *** (0.0070)	-0.2087 ** (0.0175)	-0.2694 *** (0.0017)	-0.2133 ** (0.0141)	-0.0060 (0.9660)	0.0082 (0.9590)	-0.1109 (0.4330)	-0.1428 (0.3650)
Adj. R ²	0.826	0.823	0.827	0.823	0.356	0.218	0.361	0.237
N	7,758	7,758	7,758	7,758	7,758	7,758	7,758	7,758
Year Fixed Effects	Yes	Yes	Yes	Yes	No	No	No	No

Notes: P-values in parentheses where *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Each model includes one WCM component, a PUBLIC dummy (= 1 for listed firms), their interaction term, and three controls: SIZE, LEVERAGE, and SGROWTH. For FE specification. (primary), PUBLIC is absorbed thus not reported. Public-specific effect under FE is recovered as $\beta_1 + \beta_3$. For pooled OLS (robustness), PUBLIC is included.

For GMROI, the model fit is substantially higher than for ROA (adj. $R^2 \sim 0.826$ vs. adj. $R^2 \sim 0.692$), which reinforces the suitability of GMROI as a retail-specific profitability measure in WCM research in a Swedish retail context. All four WCM components exhibit negative and significant results. While this pattern is consistent under our main fixed effects model and under the pooled OLS model, the interaction terms deviate notably between the two model specifications. Only the CCC interaction term is marginally significant ($P = 0.083$), whilst DSO, DIO, and DPO interaction terms exhibit statistically insignificant results. H2 is therefore not supported for GMROI under the primary specification, solely providing limited evidence of a differential WCM effect for the aggregate cash conversion cycle in Swedish retail.

We examine the pooled OLS specification to verify whether this holds across estimation approaches. Under this model, all four interaction terms are positive and highly significant. This divergence from the primary fixed effects model confirms that the strong interaction effects observed in the pooled specification reflect persistent structural differences between private and public firms rather than genuine within-firm WCM-GMROI relationships. Once firm fixed effects absorb these structural differences between firms, the effect disappears across all component-level specifications with only marginal evidence for the aggregate CCC.

The control variables display consistent results throughout. SIZE is positive and significant across most specifications, except for DIO under fixed effects. LEVERAGE exhibits negative and significant results throughout. This attributes larger firm size and lower debt levels to greater gross margin profitability and inventory driven returns. In contrast to the pooled specification where SGROWTH is insignificant, SGROWTH exhibits negative and significant results under firm-and year fixed effects – suggesting that within-firm revenue growth is associated with lower gross margin returns.

4.4 Robustness Test

Subsequent to excluding firm-year observations with financial assets exceeding our 50% benchmark, which could distort WCM metrics, the results remain consistent with the main analysis across both H1 and H2. For H1, the relationship between WCM and financial performance is robust across all components for both ROA and GMROI. Similarly, for H2, the

interaction terms remain insignificant across all components for both ROA and GMROI—consistent with our primary specification. Collectively, our robustness test confirms that our main findings for H1 and H2 are not driven by firms with high financial asset intensity (see Appendix 8, Appendix 9).

5. Discussion

5.1 Working Capital Management and Financial Performance

Within the Swedish retail sector, it is prevalent that working capital management shapes financial performance, most distinctively at the gross margin level. In our analysis, Swedish retail firms with longer cash conversion cycles exhibit lower financial performance, consistent with prior empirical findings of Shin and Soenen (1998), Boisjoly et al. (2020), and Deloof (2003). However, once firm heterogeneity is controlled for, the relationship remains significant only for GMROI – not for ROA. This suggests that when a firm manages its working capital more efficiently in a given year, it earns higher gross margin return on inventory investment in that same year – a dynamic that does not hold at the total asset level.

This divergence reveals where working capital management actually operates in retail and reflects a fundamental difference in the nature of the financial performance metrics. ROA is shaped by non-operating items such as depreciation, asset composition, and financing structure – all absorbed by firm fixed effects. This leaves working capital changes too narrow to shift total asset returns in a detectable way. GMROI, by contrast, directly measures gross profit per unit of inventory investment, thus capturing precisely the area in which working capital management operates in retail: at the trading margin, not at the bottom line (Fazzari and Petersen, 1993; McGinnis et al., 1984; Sweeney, 1973). Structural retail features such as thin operating margins, high fixed costs, and between-firm variation in category mix are absorbed by firm fixed effects, resulting in a genuine within-firm WCM effect at the gross margin level that ROA cannot detect (Ailawadi and Harlam, 2004; Levy et al., 2019).

Collectively, our findings extend prior WCM literature predominantly relying on ROA or gross operating income as dependent variables. Further, Deloof (2003) and Shin and Soenen (1998)

documented significant WCM-financial performance relationships using pooled estimates – our results suggest these may partly reflect between-firm compositional differences rather than genuine within-firm dynamics, and that true WCM effects operate at the gross margin level. This reinforces GMROI as the more appropriate measure for retail WCM research – a finding that is confirmed across both the full sample and the financial-asset restricted sample.

5.2 Component-Level Analysis

Our findings demonstrate that inventory management constitutes the dominant working capital driver in Swedish retail. DIO correlates strongly with both CCC and GMROI, suggesting that the cash conversion cycle in Swedish retail is largely an inventory phenomenon and that firms' inventory management largely determines their gross margin performance (see Section 4.1.2). Swedish retail firms holding inventory for fewer days convert stock into revenue faster, reduce capital tied up in unsold goods, and generate higher gross margin returns per unit of investment (Boisjoly et al., 2020; Gaur et al., 2005). This directly aligns with Gaur et al. (2005) findings, confirming among U.S. retail firms that higher inventory turnover is consistently associated with stronger financial performance.

However, it should be noted that both DIO and GMROI share average inventory in their variable construction, which may inflate their strong correlation. Nonetheless, the fact that this relationship survives firm and year fixed effects provides reassurance that it reflects genuine within-firm dynamic rather than a pure mechanical artefact.

DSO is significant but the least impactful component of our study, consistent with the structurally low receivables in retail where most transactions are settled immediately at the point of sale (Kortman et al., 2016). DPO is negative across specifications, pointing in the opposite direction than conventional theory suggesting that extended payables reflect supplier bargaining power and is positively associated with financial performance (Deloof and Jegers, 1996; Petersen and Rajan, 1997). This aligns with Deloof (2003), who attributed delayed payments to financial constraints rather than strategic intent.

5.3 The Role of Listing Status

Our results for H2 reveal that listing status does not significantly shape the relationship between WCM and financial performance. Only the CCC interaction term for GMROI under our main fixed effects model was marginally significant, suggesting that listing status only affects the relationship between aggregate working capital management measured at the gross margin level.

The pooled OLS robustness check reveals positive and highly significant interaction terms for GMROI, confirming that the moderation by listing status reflects persistent structural differences between private and public firms rather than genuine within-firm dynamics. Public and private retailers differ substantially in size, capital structure, and operational structure – structural discrepancies that cannot be separated from a true listing status effect via pooled estimations.

This result extends and qualifies prior literature on financing constraints and WCM. Brav (2009), Fazzari and Petersen (1993), and Hill et al. (2010) establish that private and public firms operate under fundamentally different financing conditions – and the theoretical expectation that this translates into differential WCM sensitivity is well-grounded. Our findings confirm that the absence of a significant interaction effect under fixed effect is not a result of listing status being irrelevant to WCM, but that it operates as a structural characteristic of firm types rather than as a dynamic within-firm mechanism. Public firms can substitute WCM inefficiency with external capital access (Brav, 2009; Petersen and Rajan, 1997; Mortal and Reisel, 2013) – but the ability to do so appears to be a structural characteristic of firm types rather than a dynamic within-firm mechanism.

Collectively, our results indicate that the WCM-financial performance relationship by listing status is a cross-sectional phenomenon – reflecting structural compositional differences between firm types rather than genuine within-firm moderation mechanisms. Private and public Swedish retailers are structurally different entities, and that difference is absorbed by firm fixed effects as time-invariant heterogeneity. The pooled OLS interaction effects, while significant, conflate genuine WCM sensitivity differences with compositional differences in size, capital structure, and operational profile. Once these are controlled for, no evidence of differential within-firm WCM sensitivity by listing status is detected.

6. Conclusion

The research question we aim to address in this thesis is: *Does working capital management affect financial performance among Swedish retail firms, and is this relationship shaped by firm listing status?*

Drawing on an unbalanced panel dataset of 1,526 private firms and 33 publicly listed Swedish retail firms over the 2014-2023-period, we employ an OLS regression model with firm and year fixed effects as the primary specification, utilizing both ROA and GMROI as measures of financial performance. We assess WCM effects on financial performance both at an aggregate level with the CCC as a comprehensive WCM proxy, and at a granular level through the CCC's subcomponents to assess the granularity of this relationship.

The central finding of this study is that the relationship between working capital management and financial performance is highly contingent upon the selected performance metric. In Swedish retail, WCM affects financial performance at the gross margin level, reflected in robust negative and significant results for GMROI across all components, while disappearing entirely for ROA once accounting for firm heterogeneity. This divergence reveals that ROA is affected by structural factors unrelated to working capital, thus being too broad to capture within firm effects of working capital decisions. At the component level, DIO emerges as the strongest CCC component across both performance metrics and model specifications. Whilst this could confirm that the cash conversion cycle in Swedish retail is fundamentally driven by inventory management, its correlation should be interpreted with caution as it shares average inventory with GMROI in their variable construction, which could partially inflate the magnitude of this relationship.

Adding the lens of listing status, our results reveal that the relationship between working capital management and financial performance is not significantly shaped by listing status. Instead, the strong H2 results derived from our pooled OLS estimation reflect persistent structural between-firm differences such as size, capital structure, and operational differences – rather than genuine within-firm WCM mechanisms.

This study makes three key contributions to existing WCM research. First, it demonstrates that inventory-based performance measures such as GMROI capture WCM dynamics more effectively in retail settings – a finding consistent with the dominance of inventory management in a working capital context. This suggests that prior studies relying solely on ROA risk misidentifying where working capital efficiency generates value. The significance of GMROI and centrality of DIO together reflect the underlying reality of Swedish retail with the cash conversion cycle being fundamentally an inventory phenomenon, and gross margin efficiency serves as its most direct financial expression.

Second, extending foundational association studies of Deloof (2003) and Shin and Soenen (1998) to a within-firm identification framework, this study confirms that the WCM-financial performance relationship is genuine, but operates exclusively at the gross margin level. Third, this study documents that the apparent listing status moderation observed in pooled specifications disappears under fixed effects, revealing that private and publicly listed firms differ structurally rather than in their WCM sensitivity. This qualifies and extends the financing constraint frameworks of Brav (2009), Fazzari and Petersen (1993), and Hill et al. (2010) to a within-firm empirical setting.

6.1 Limitations and Future Research

Our study is subject to certain limitations that warrants acknowledgement, each of which also points toward future research opportunities. First, our data sample is skewed toward private firms, reflecting a structural feature of the Swedish retail sector rather than a sampling deficiency. Nevertheless, this limitation suggests that insignificant H2 interaction terms should be interpreted with caution, as they may reflect limited statistical power rather than genuine absence of true effects. Building on this, future research could extend the analysis to matched samples of private and public firms of comparable size, to produce cleaner estimates of the WCM-financial performance effects across firm types.

Second, while our study supports GMROI to be a more appropriate measure for financial performance than ROA for retail WCM research, its mechanical overlap with DIO introduces a potential upward bias in the DIO coefficient. Future research could address this limitation by

extending the sample to broader retail markets and adopting alternative inventory-based profitability measures that do not share the average inventory with DIO.

Finally, the substantially lower ROA and GMROI of publicly listed firms relative to private firms (see Appendix 2, Appendix 4) may not reflect causal WCM effects but rather structural differences between the two firm types. As publicly listed retailers tend to be larger and more asset-heavy, they operate in different financial, yet competitive, environments relative to private firms. This suggests that the analysis of GMROI levels across firm types should be interpreted with this structural asymmetry in consideration. Future studies would benefit from replacing the binary PUBLIC dummy with continuous measures of financing constraints as it would offer a more precise test of the financing mechanism underlying H2 – better isolating listing status from the size differences documented in our study.

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8. Appendix

Appendix 1 Previous Literature

Author(s)	Data Sample	Profitability Measure(s)	CCC	DSO	DIO	DPO
*Banos-Caballero et al. (2012)	1,008 Spanish SMEs	GOI, NOI	Concave	-	-	-
*Boisjoly et al. (2020)	Over 7,000 firms	ROIC	Negative	Negative	Negative	Negative
*Deloof (2003)	1,009 non-financial Belgian firms	GOI	Negative	Negative	Negative	Negative
*García-Teruel and Martínez-Solano (2007)	8,872 Spanish SMEs	ROA	Negative	Negative	Negative	Not sign.
*Kroes and Manikas (2014)	1,233 manufacturing firms	Tobin's q	Not sign.	Negative	Negative	-
*Shin and Soenen (1998)	58,985 U.S. firms	IA, IS, ALPHA, TI	Negative	-	-	-
Louw et al. (2022)	South African retail and constructing firms	ROA, ROE, GPM, EVA	Negative	Negative	Negative	Positive
Hassan et al. (2023)	Scandinavian firms	ROA, GOI, MBV	Negative	Negative	Negative	Negative
Lazaridis and Tryfonidis (2006)	ASE-listed firms	NOP	Negative	Negative	Negative	Negative
Jaworski and Czerwinka (2022)	Firms listed on Warsaw Stock Exchange	ROA	Negative	-	-	-
Deari et al. (2021)	EU firms	ROA	Concave	Negative	Negative	Negative
Enqvist et al. (2014)	Finnish listed firms	ROA	Negative	Not sign.	Negative	Negative
Potswana et al. (2022)	JSE listed firms	OPM, ROA	Negative	Positive	Negative	Negative
Afrifa and Padachi (2016)	160 UK-listed AIM SMEs	ROA, ROCE, ROE	Concave	-	-	-
Abuzayed (2012)	52 ASE-listed firms	GOP, Tobin's q	Positive	Positive	Positive	Negative
Kasozi (2017)	69 JSE-listed manufacturing firms	ROA	Not sign.	Negative	Positive	Negative
Yazdanfar and Öhman (2014)	13,797 Swedish SMEs	ROA	Negative	-	-	-

Notes: Studies marked with * are cited and discussed throughout the thesis and are therefore included in the main reference list. Other references are used exclusively for this appendix, see below.

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Appendix 2

Descriptive Statistics – Private Firms

	<i>Mean</i>	<i>St. Dev.</i>	<i>Minimum</i>	<i>Median</i>	<i>Maximum</i>
ROA	0.158	0.182	-0.566	0.160	0.588
GMROI	6.032	2.662	0.188	5.840	15.163
CCC	9.589	31.783	-13.583	1.631	208.115
DSO	2.423	6.650	0.056	0.873	46.392
DIO	22.471	34.014	6.501	13.811	239.021
DPO	15.301	10.491	2.751	13.881	87.244
SIZE	11.262	1.293	1.946	11.134	17.798
LEVERAGE	0.600	0.242	0.061	0.600	1.206
SGROWTH	0.064	0.308	-0.668	0.030	2.410

Notes: $N = 7,580$ firm-year observations across 1,183 unique firms. 2014-2023. All variables are winsorized at the 1st and 99th percentiles.

Appendix 3
Data Cleaning Process – Private Firms

Step	Action	# Observations
1	Load 10 Serrano Panel Data Files, filter for the 2014-2023 period.	7,722,898
2	Apply inclusion filters: privately owned limited liability companies [ser_ftgkategori = 30, ser_jurform = 49] and retail trade only [SNI2 = 47].	320,312 (54,728 unique)
3	Load 10 Bokslut Files, filter for the 2014-2023 period.	5,746,367
4	Filter: Company-level statements only [BSTYP = “B”]	5,677,830
5	Filter: Cost-of-sales accounting only [REDTYP ∈ {F, BF, FF, XF}]	74,640
6	Filter: Valid amount-unit codes only (KSEK) [BELKOD ∈ {1, 2, 3}]	74,640
7	Deduplication Bokslut: retain latest filing per firm-year [MODDTM], removing 124 duplicates.	74,516 (12,916 unique)
8	Merge Serrano and Bokslut on ORGNR and year (left merge). Match rate 3.089%.	9,892 (1,528 unique)
9	Retain observations with valid COGS and gross profit; construct COGS as sales – gross profit [KOSALVAR = rr01_toms – BRUTORES].	9,888 (1,526 unique)
10	Construct lagged and average variables for consecutive firm-years only – exclude firms with non-consecutive years to avoid firm-year gaps.	9,888
11	Construct all thesis variables (DSO, DIO, DPO, CCC, ROA, GMROI, leverage, size, sales growth)	9,888

Final private firm panel: 9,888 firm-year observations across 1,526 unique firms (2014-2023).

Appendix 4
Descriptive Statistics – Public Firms
2014-2023; N = 178

	<i>Mean</i>	<i>St. Dev.</i>	<i>Minimum</i>	<i>Median</i>	<i>Maximum</i>
ROA	0.038	0.143	-0.566	0.059	0.379
GMROI	2.356	2.024	0.188	1.949	15.163
CCC	64.746	55.913	-13.583	51.364	208.115
DSO	13.081	14.785	0.056	7.045	46.392
DIO	110.424	54.894	16.801	123.062	239.021
DPO	54.019	25.071	10.335	52.022	87.244
SIZE	14.442	2.466	7.616	14.664	19.279
LEVERAGE	0.622	0.212	0.145	0.613	1.206
SGROWTH	0.133	0.261	-0.586	0.083	1.546

Appendix 5
Data Cleaning Process – Public Firms

Step	Action	# Observations
<i>Manual Screening in S&P Capital IQ</i>		
1	Screen for firms classified under Consumer Discretionary Distribution & Retail and Consumer Staples Distribution & Retail (GICS) over the 2014-2023 period. Include dual wholesale-retail firms where retail revenue exceeds 50% of total revenues; exclude B2B wholesale firms.	34 (firms)
2	Exclude firms with fewer than three fiscal years of financial data during the study period	33 (firms)
<i>Python Extraction and Processing</i>		
3	Load CIQ workbook (34 sheets, one per firm). Dynamically parse each sheet: detect year row, map raw CIQ labels to thesis variables (Revenue → sales, Cost Of Goods Sold → cogs, Gross Profit → gross_profit, Operating Income → ebit, Accounts Receivable → accounts_receivable, Inventory → inventory, Total Assets → total_assets, Accounts Payable → accounts_payable, Total Debt → total_debt). Set public = 1 for all observations.	225
4	Extract total liabilities via separate parsing loop over all CIQ sheets; construct liabilities dataframe with one row per firm-year	225
5	Merge total liabilities into public panel (left merge on sheet_name and year); assign firm_id using integer codes with 10,000,000 offset to prevent overlap with private firm IDs; sort by firm_id and year. Missing total_liabilities: 0	225
6	Compute lagged values (lag_inventory, lag_ar, lag_ap, lag_assets, lag_sales) within firm; set to missing where year – lag_year ≠ 1; compute averages (avg_inventory, avg_ar, avg_ap, avg_assets); compute purchases = lag_inventory + cogs – inventory	225
7	Construct all thesis variables with strict denominator validity rules (identical to private firm logic); set to missing where denominator invalid	225
8	Set PUBLIC dummy to 1 for all observations; save final public panel.	225
<i>Final Public firm panel: 225 firm-year observations across 33 unique firms (2014-2023).</i>		

Appendix 6
Data Cleaning Process – Pooled Sample

Step	Action	# Observations	Private	Public	Total
1	Align private and public datasets to common set of 33 variables via vertical concatenation. Verify 0 duplicate firm_id-year rows.		9,888	225	10,113
2	Confirm Unique firms pre-filtering.		1,526	33	1,559
<i>Hard Filters:</i>					
3	Exclude observations where COGS; Purchases; avg_inventory ≤ 0.		–	–	–
4	Exclude observations where DSO, DIO, DPO < 0 or > 3,650 days.		–	–	–
5	Exclude observations where leverage falls below 0 or above 5 [0,5].		–	–	7,758
6	Confirm Unique Firms post filtering.		1,183	31	1,214
7	Winzorize all continuous regression variables at 1 st and 99 th percentiles.		–	–	7,758
8	Drop observations with missing ROA or SGROWTH values.		7,580	178	7,758

Final Pooled Data Panel: 7,758 firm-year observations across 1,214 unique firms (2014-2023).

Appendix 7

Data Cleaning Process & Robustness Sample Construction

Step	Action	# Observations	Total	Public	Private
1	Compute financial asset share <i>Private</i> : ($\text{fin_assets_share} = \text{br04_fianltsu} / \text{br09_tillgsu}$) from filtered Serrano sample (320,312 obs); merge into private panel on <code>firm_id</code> and <code>year</code> . Missing <code>fin_assets_share</code> post-merge: 3	–	–	–	9,888
2	Compute financial asset share <i>Public</i> : Extract financial asset items from CIQ workbook: Long-Term Investments, Loans Receivable Long-term, Notes Receivable, and Total Assets.	–	–	225	–
3	<i>Public</i> : Convert items to numeric; compute $\text{fin_assets_total} = \text{sum of available items}$ (missing treated as zero); compute $\text{fin_assets_share} = \text{fin_assets_total} / \text{Total Assets}$	–	–	225	–
4	<i>Public</i> : Map sheet names to firm names using confirmed firm-level mapping (225 mapped, 0 unmapped); merge <code>fin_assets_share</code> into public panel on <code>firm_name</code> and <code>year</code> . Missing <code>fin_assets_share</code> post-merge: 0	–	–	225	–
5	Apply 50% threshold: Exclude observations where financial assets exceed 50% of total assets across both samples, 473 observations excluded [<i>private</i>]; 0 observations excluded [<i>public</i>].	–	9,415	225	9,640
<p><i>Private Robustness Sample: 9,415 firm-year observations across 1,199 unique firms (2014-2023). Distribution before filtering: mean = 0.099, median = 0.008, max = 1.000. Observations above 0.50: 470; missing: 3.</i></p> <p><i>Public Robustness Sample: 255 firm-year observations across, 33 unique firms (2014-2023). Distribution before filtering: mean = 0.006, median = 0.000, max = 0.099. No observations above 0.50.</i></p>					
6	Align private and public robustness samples to common set of 34 variables; vertically concatenate. Verify 0 duplicate <code>firm_id</code> -year rows.	–	9,415	225	9,640
7	Apply hard filters: (valid sales, COGS, purchases, <code>avg_inventory</code> , DSO, DIO, DPO, leverage).	–	7,326	178	7,504
8	Winsorize all continuous variables (CCC, DSO, DIO, DPO, ROA, GMROI, size, leverage, <code>sales_growth</code>) at 1st and 99th percentiles	–	7,326	178	7,504
<p><i>Final Robustness Sample: 7,504 firm-year observations across 7,326 private and 178 public firms. 0 duplicate firm-year rows. Effective regression samples vary by dependent variable due to listwise deletion: $N = 7,483$ for ROA, $N = 7,487$ for GMROI.</i></p>					

Appendix 8

H1 Results – Robustness Test; Clustered SE (firm level). Firm + Year Fixed Effects.

Variable	Restricted Financial Asset Sample				Restricted Financial Asset Sample			
	ROA				GMROI			
CCC	0.0001 (0.8380)	–	–	–	–0.0177 *** (0.0000)	–	–	–
DSO	–	–0.0024 * (0.0523)	–	–	–	–0.0477 ** (0.0015)	–	–
DIO	–	–	–0.0000 (0.9726)	–	–	–	–0.0207 *** (0.0000)	–
DPO	–	–	–	–0.0003 (0.5007)	–	–	–	–0.0147 ** (0.0297)
SIZE	0.1158 *** (0.0000)	0.1112 *** (0.0000)	0.1150 *** (0.0000)	0.1131 *** (0.0000)	0.4657 * (0.0683)	0.5676 ** (0.0222)	0.3416 (0.2041)	0.5461 ** (0.0283)
LEVERAGE	–0.0693 *** (0.0003)	–0.0700 *** (0.0002)	–0.0694 *** (0.0002)	–0.0685 *** (0.0003)	–1.5046 *** (0.0000)	–1.4772 *** (0.0000)	–1.4367 *** (0.0000)	–1.4225 *** (0.0000)
SGROWTH	–0.0208 (0.1131)	–0.0221 ** (0.0937)	–0.0211 (0.1095)	–0.0214 (0.1045)	–0.2901 *** (0.0060)	–0.2548 ** (0.0150)	–0.3380 *** (0.0012)	–0.2520 ** (0.0150)
Adj. R ²	0.703	0.704	0.703	0.703	0.835	0.832	0.836	0.832
N*	7,483	7,483	7,483	7,483	7,487	7,487	7,487	7,487
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*Notes: P-values in parentheses where *** $p < 0.01$ ** $p < 0.05$ * $p < 0.10$. Each model includes one WCM component alongside three controls: SIZE, LEVERAGE, and SGROWTH. N = 7,483 (ROA) and N = 7,487 (GMROI). Difference from post-winsorization sample of 7,504 reflects listwise deletion of observations with missing values in dependent variable or SGROWTH.*

Appendix 9

H2 Results – Robustness Test; Clustered SE (firm level). Firm + Year Fixed Effects.

Variable	Restricted Financial Asset Sample				Restricted Financial Asset Sample			
	ROA				GMROI			
CCC	0.0001 (0.7382)	–	–	–	–0.0200 *** (0.0001)	–	–	–
DSO	–	–0.0027 ** (0.0471)	–	–	–	–0.0510 *** (0.0018)	–	–
DIO	–	–	0.0000 (0.9894)	–	–	–	–0.0214 *** (0.0000)	–
DPO	–	–	–	–0.0005 (0.3188)	–	–	–	–0.0140 * (0.0627)
PUBLIC	<i>Absorbed by firm fixed effects.</i>				<i>Absorbed by firm fixed effects.</i>			
CCC × PUBLIC	–0.0003 (0.5003)	–	–	–	0.0132 ** (0.0281)	–	–	–
DSO × PUBLIC	–	0.0031 (0.2137)	–	–	–	0.0386 (0.1998)	–	–
DIO × PUBLIC	–	–	–0.0001 (0.8355)	–	–	–	0.0050 (0.4469)	–
DPO × PUBLIC	–	–	–	0.0015 (0.1894)	–	–	–	–0.0055 (0.6198)
SIZE	0.1165 *** (0.0000)	0.1105 *** (0.0000)	0.1152 *** (0.0000)	0.1122 *** (0.0000)	0.4383 * (0.0912)	0.5587 ** (0.0251)	0.3302 *** (0.2259)	0.5492 ** (0.0269)
LEVERAGE	–0.0697 *** (0.0002)	–0.0695 *** (0.0002)	–0.0696 *** (0.0002)	–0.0689 *** (0.0003)	–1.4882 *** (0.0000)	–1.4708 *** (0.0000)	–1.4308 *** (0.0000)	–1.4214 *** (0.0000)
SGROWTH	–0.0207 (0.1156)	–0.0222* (0.0924)	–0.0211 (0.1105)	–0.0217* (0.0991)	–0.2953 *** (0.0052)	–0.2560 ** (0.0145)	–0.3399 *** (0.0011)	–0.2509 ** (0.0158)
Adj. R ²	0.703	0.704	0.703	0.703	0.835	0.832	0.836	0.832
N*	7,483	7,483	7,483	7,483	7,487	7,487	7,487	7,487
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*Notes: P-values in parentheses where *** $p < 0.01$ ** $p < 0.05$ * $p < 0.10$. Each model includes one WCM component, a PUBLIC dummy (= 1 for listed firms), their interaction term, and three controls: SIZE, LEVERAGE, and SGROWTH. N = 7,483 (ROA) and N = 7,487 (GMROI). Difference from post-winsORIZATION sample of 7,504 reflects listwise deletion of observations with missing values in dependent variable or SGROWTH.*

Appendix 10

AI Disclosure

Both ChatGPT and Claude were used as assisting tools during the composition of our thesis. First, ChatGPT was used for code inspiration, generation, and troubleshooting – providing support for the quantitative analysis in our thesis. ChatGPT provided assistance in installing the correct data packages required to obtain the results needed, as well as structuring and fine-tuning. When errors occurred, ChatGPT served as an aid to work around these errors and solve the problem. However, the methodical choices, variable constructions, definitions, and interpretations were established independently by us. For instance, the data collection process and interpretation of public firm data was a completely manual process – from data extraction to the complete panel dataset ready to utilize in Python. From the outset, each code input and output were manually reviewed and validated to ensure credibility. Second, Claude was used for language refinement, such as reducing repetitiveness and synonym sourcing.

The use of AI tools improved efficiency in both the coding and writing processes, by accelerating troubleshooting and providing subtle aid for text refinement. Whilst helpful, risks associated with our utilization of AI were identified. For instance, the AI tools tend to make assumptions if not told to “never guess” and also tend to churn back to what has been already stated. To mitigate these risks, we renewed prompts continuously to avoid repetitive behavior and obtain a more nuanced output from Claude. The coding and writing processes were conducted with meticulous attention to detail and continuous cross-checks throughout, which enabled us to quickly identify potential errors or mistakes conducted by the AI tools.

Related to our work, the utilization of AI taught us new and improved ways of developing code, for instance by presenting alternate ways to account for statistical considerations in our dataset. It increased our awareness of AI’s strengths and limitations in academic work, particularly the risk of repetitiveness, pinpointing the importance of critical evaluation and human oversight.

We take full responsibility for all data, analyses, interpretations, and conclusions presented in our thesis. AI tools did not replace authorial judgment at any stage of the research process, and the work meets the standards for reproducibility and research integrity expected of academic work.