Management Control Systems in Startups: Performance Impact, Configurations of Control, and Stakeholders' Influence

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Zusammenfassung

Controlling ist ein wichtiger Baustein für den Erfolg von Startups. Zwar wurden Steuerungs- und Kontrollsysteme lange als Hinderungsgrund für Innovation gesehen (Davila & Oyon, 2009, p. 278), jedoch hat sich die Sicht auf den Zusammenhang über die letzten Jahre gewandelt. Studien zeigen, dass Management-Steuerungssysteme (MCS) einen positiven Einfluss auf die Performance von Startups haben können (Davila, Foster, & Jia, 2015; Sandino, 2007; Strehle, Katzy, & Davila, 2010). Die vorliegende Arbeit schliesst an diese Erkenntnisse an und untersucht den Performanceeinfluss von MCS in Startups. Darüber hinaus werden Annahmen zum Einfluss von Stakeholdern auf die Entwicklung von MCS in Startups umfassend beleuchtet und empirisch untersucht sowie eine Systematik hinsichtlich Konfigurationen von MCS entwickelt. Im Rahmen der Dissertation wird ein umfassendes MCS-Framework basierend auf Controlling-Theorie und Startup-Forschung erarbeitet, um diese drei Fragestellung zu beleuchten. Eine unter deutschen und Schweizer Startup-Managern durchgeführte Umfrage dient als Datenbasis. Erstens zeigen die Ergebnisse, dass die frühe Einführung von Anreizsystemen und kulturellen Steuerungselementen in Startups zu höherem Wachstum und besserer Performance führt. Zusätzlich weist der Einsatz von Elementen der Planung und der kybernetischen Steuerung in Startups einen positiven Zusammenhang mit der Höhe der erhaltenen Finanzierung auf. Zweitens wird der Einfluss der vier wichtigsten Stakeholder-Gruppen auf die Entwicklung von MCS untersucht: Investoren, Mitarbeiter, Kunden und Gründer. Für alle vier Gruppen kann ein signifikant positiver Zusammenhang zwischen deren Einfluss und der Einführung sowie der Entwicklung einzelner Aspekte der MCS nachgewiesen werden. Drittens werden fünf generische Konfigurationstypen von MCS in Startups mittels Clusteranalyse identifiziert: einfache Steuerung, Planungs-, Prozess- und Incentivierungsfokus sowie ausgereifte Steuerung. Die Charakteristika dieser fünf Typen werden ausführlich aufgezeigt und diskutiert. Die Ergebnisse der Dissertation haben Implikationen für Startup-Manager und -Forscher. Einerseits untermauern sie die positive Performanceauswirkung von MCS auf Startups und konkretisieren diesen Zusammenhang weiter. Anderseits wird die Startup-Forschung um ein theoretisch fundiertes MCS-Framework erweitert, erstmalig eine Klassifikation von MCS-Konfigurationen in Startups entwickelt und der Einfluss von Stakeholdern auf die Entwicklung von MCS in Startups quantitativ untersucht.

Abstract

Management control is an important building block for the success of startups. For a long time, management accounting and control systems have been "perceived as a hindrance to innovation" (Davila & Oyon, 2009, p. 278). However, this viewpoint has changed over the last years. Studies show that management control elements can have a positive influence on the performance of startups (Davila et al., 2015; Sandino, 2007; Strehle et al., 2010). This thesis adds to these insights and investigates the performance impact of management control systems (MCS) in startups. Moreover, assumptions about the stakeholders' influence on the development of the MCS package in startups are illuminated and empirically investigated. Further, a taxonomy for configurations of MCS is developed. I create a MCS framework based on management accounting theory and startup research in order to study these three aspects. A survey amongst Swiss and German startups is used as a basis. First, the results show that early adoption of incentive systems and of cultural controls enable higher growth and better performance of startups. Additionally, the development of planning and cybernetic controls is positively associated with the received funding amounts. Second, the influence of the four main stakeholders on the development of MCS is investigated: investors, employees, customers, and founders. I find significant positive relationships between the influence and the introduction and the development of individual aspects of MCS for all groups. Third, five generic configuration types of MCS in startups are identified by cluster analysis: simple controls, planning focus, process focus, and incentive focus as well as mature controls. The characteristics of these five types are extensively illustrated and discussed. The results of the dissertation have implications for startup managers and startup researchers alike. On the one hand, the results underpin the positive impact of MCS on the performance of startups and further illustrate this relationship. On the other hand, I expand startup research with a theoretically-founded MCS framework, I provide a first-time classification of MCS configurations in startups, and I quantitatively analyze the influence of stakeholders on the development of MCS in startups.

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AC	Administrative controls
ANOVA	Analysis of variance
B2B	Business-to-business
BSC	Balanced scorecards
CC	Cultural controls
CEO	Chief executive office
CFO	Chief financial officer
CH	Switzerland
CHF	Swiss francs
CRM	Customer relationship management
CV	Control variables
CY	Cybernetic controls
DE	Germany
DV	Dependent variable
EUR	Euro
ICT	Information and communication technology
IV	Independent variable
lasso	least absolute shrinkage and selection operator
M&B	Malmi & Brown (2008)
MCC	Maximum chance criterion
MCP	Games-Howell post-hoc multiple comparison procedures
MCS	Management control systems
NA	Not available
OKR	Objectives and Key Results
OLS	Ordinary least square
PC	Planning MCS
PCA	Predictive discriminant analysis
PCC	Proportional chance criterion
PMS	Performance management systems
RC	Reward and compensation
SD	Standard deviation

TCE	Transaction cost economics
TMT	Top management team
US	United States
VC	Venture capitalist

1 Introduction

1.1 Motivation and Research Outline

Management control is an important building block for the success of startups. For a long time, management accounting and control systems in startups have been "perceived as a hindrance to innovation and has thus often been ignored" (Davila & Oyon, 2009, p. 278). However, research suggests that the personal management style limits the ability of startups to grow (Davila, Foster, & Jia, 2010). Startups can overcome this limitation with management control systems (MCS). Research has shown that the adoption of (fitting) MCS positively influences revenue growth (Strehle et al., 2010), valuation (Davila et al., 2015) and firm performance of startups (Sandino, 2007). Therefore, gaining further insights into how management control can improve startup performance is of practical relevance. The research field of management control and entrepreneurship has gained significant attention in the past years (Davila & Oyon, 2009). This is partly based on the increasing importance of startups throughout the world. Especially governments believe in the vital role of startups to boost innovation and growth in their countries (Davila, Foster, & Oyon, 2009). From a theoretical perspective, studying MCS in a contemporary setting ensures relevance of the field to management accounting research (Chenhall, 2003, p. 130). Research in management control has shown the relevance to innovation and entrepreneurship, which motivates the search for a deeper understanding from a theoretical perspective (Davila, Foster, & Oyon, 2009, p. 301).

MCS are defined as "traditional accounting controls such as budgets and financial measures, or administrative controls, for example organization structure and governance systems, along with more socially based controls such as values and culture […] to align individual's activities with organizational goals" (Malmi & Brown, 2008, p. 287). They help to ensure that employees act in the organizational interest and thereby aid to solve a central management control problem of organizations (Otley, 2003, p. 313). Examples of MCS are operating or cash budgets, product or customer profitability, and approval processes for large expenses (Davila & Foster, 2005). Insights into MCS originate mostly from research on large, well-established, multinational companies (Cardinal, Sitkin, & Long, 2004; Davila & Foster, 2009). Some authors therefore call for more

studies outside the classical industries to foster our understanding (Strauss & Zecher, 2013). Consequently, startups are the organizational setting of MCS in this thesis.

A startup in this thesis in accordance with the startup literature is defined as an "organization in search of a scalable, repeatable, profitable business model" (Blank & Dorf, 2012, p. xvii). Entrepreneurship in this context is the "process of growth from the founding of the company until it reaches the behavior of a large company with its structures, processes, and systems" (Davila, Foster, & Oyon, 2009, p. 290). Considered as startups are especially "firms that operate in information and communications technology businesses and biotech (life sciences) industry" (Granlund & Taipaleenmäki, 2005, p. 22). Of major interest in the context of the development of management control are independent firms that are 10 years or younger (Cardinal et al., 2004; Davila, 2005; Davila & Foster, 2005; Davila, Foster, & Li, 2009; Strehle et al., 2010). On the one hand, these firms have limited resources to develop their MCS package because they focus on research and development, sales, and marketing (Granlund & Taipaleenmäki, 2005). On the other hand, they need to build the foundations for future growth and satisfy the demands of different stakeholders (Strauss, Nevries, & Weber, 2013). This situation calls for more guidance for practitioners based on scientific findings.

Although the cultural environment matters for the relationship between management behavior and performance (Schneider & de Meyer, 1991), research on MCS in startups has almost exclusively focused on the Unites States (US) (Cardinal et al., 2004; Cassar, 2009; Davila, 2005; Davila & Foster, 2005, 2007; Davila, Foster, & Li, 2009; Sandino, 2007). Cultural dimensions, such as uncertainty avoidance, affect the performance relationship of MCS, as a study on business planning showed (Brinckmann, Grichnik, & Kapsa, 2010). Yet, studies outside the US are scarce. There are articles covering individual European countries such as Finland (Granlund & Taipaleenmäki, 2005), Germany (Strehle et al., 2010), the United Kingdom (Sweeting, 1991), and the Netherlands (Wijbenga, Postma, & Stratling, 2007). However, similar to other MCS research areas, a *critical mass* of studies to confirm the current findings has not been reached (Chenhall, 2003). Therefore, it remains unknown whether the created insights are valid for the thriving startup scenes in Switzerland and Germany. To complement current research, I will therefore focus on Swiss and German startups within this thesis.

The basis to understand MCS in startups is a theoretically sound MCS framework. However, the initial MCS frameworks from startup research have room for further conceptualization (Davila & Foster, 2009) and integration with the *classical* MCS frameworks. Examples of *classical* MCS frameworks are the performance management systems framework (Ferreira & Otley, 2009), the four levers of control (Simons, 1995) or the MCS as a package idea (Malmi & Brown, 2008). These are derived from established companies and not startups. Startups represent a very different setting where those classical MCS frameworks do not fit without adjustments. Startup researchers develop their own frameworks rather than adopting these classical MCS frameworks (Davila & Foster, 2007; Sandino, 2007). My analysis shows that these initial concepts are often not integrated with each other. In this thesis, I will therefore improve the theoretical development of MCS frameworks by specifically addressing startup research challenges and integrating established accounting theory. This will develop the knowledge in MCS and startups in a coherent form (Chenhall, 2003) as well as help the research field to further mature (Malmi, 2013). For practitioners, such as startup managers and startup investors, the MCS framework can serve as a guidance concerning the question of which MCS exist and consequently how these MCS can help to steer their startups.

There are three further aspects I want to add to the knowledge on MCS in startups with this thesis: First, I contribute to the understanding of how MCS impact performance in startups by developing and testing several hypotheses. With these hypotheses, the performance impact of different types of controls from the developed MCS framework is tested on a representative sample of the Swiss and German startups. The results of the performance tests will show which systems should be implemented at what point in time for the benefit of the startups. Second, I develop a taxonomy of configurations of management controls in startups to advance management control theory. The taxonomy can help practitioners to understand which controls to implement together. Third, I provide evidence for how the influence of stakeholders shapes the MCS package of startups. A field that has been neglected by management control research so far. The related research questions are presented in the following section.

1.2 Research Questions and Approach

Three research questions structure this thesis. They are formulated along the goals explained at the end of the previous section and will be developed in the following.

As pointed out above, there is evidence for a positive performance impact of the use of MCS in startups. MCS are postulated to improve managerial decisions, coordination of resources, and information flows (Davila et al., 2010; Greiner, 1972). Greiner (1972) argues that MCS are indeed necessary for companies to continue on a growth path. Even further, only with controls the firms can withstand the market pressure they are in. The adoption of MCS is also a strong signal for the managerial quality and future growth opportunities (Davila et al., 2015). In conclusion, MCS are expected to be beneficial for startups and their performance.

The evidence for a relationship between the adoption of MCS and the performance in startups is mainly based on US-studies. To complement this research, I analyze the relationship in the context of Swiss and German startups. The first research question consequently is: *How does the adoption of Management Control Systems (MCS) impact the performance of startups?*

Theorizing in management accounting research is largely based on ideal types and taxonomies (Bedford & Malmi, 2015). On the one hand, a taxonomy helps researchers to build upon each other's work and develop a common body of knowledge. On the other hand, practitioners can find guidance from the literature if they can identify themselves with one of these ideal types. Porter's (1980) generic strategies of cost leadership, differentiation, and focus are a very popular example of a taxonomy that is used in theory and practice alike.

In the management accounting literature, researchers call for more conceptualization of the overall MCS package and consistent classifications of controls (Langfield-Smith, 1997; Otley, 2003, 2016). More specifically, the question arises whether explicit configurations of MCS exist in the same context (Malmi & Brown, 2008; Otley, 1980; Strauss et al., 2013; Strauss & Zecher, 2013). The identification of configurations can help to understand why similar patterns emerge across companies (Henri, 2008). Nonetheless, few researchers have developed a classification for configurations of control at the firm level (Bedford & Malmi, 2015; Henri, 2008). Especially for startups, the evidence for common configurations is rare and no taxonomy exists (Sandelin, 2008; Strauss et al., 2013).

From a practitioners' perspective, a taxonomy of MCS packages in startups can help to understand the possible choices of configurations. Further, it can function as a guidance which MCS to implement together. For startups, it is important to understand working packages of MCS due to their limited resources in implementing them. To enhance this field of knowledge, I set out to identify stable configurations of MCS across startups. The second research question is therefore: *How do startups configure their MCS package?*

MCS support firms in adapting to the environment and in achieving goal alignment with different stakeholder groups (Merchant & Otley, 2006). The (re-)configuration of the MCS package is often connected with the goal alignment and balancing of interests with new stakeholders (Cumming & Johan, 2007; Jurkštiene, Darškuviene, & Dūda, 2008; Strauss et al., 2013). The MCS package is therefore not stable over the lifetime of a firm (Malmi & Brown, 2008) since firms react to the pressure and adapt their controls (Zilber, 2008).

For startups, several stakeholders exert pressure and can influence the development of the MCS package (Strauss et al., 2013). Investors' monitoring needs drive the adoption and development of MCS as well as the efficiency and profitability measures to increase the value of the startup (Strauss et al., 2013). Employees expect some formal structure to be assured of the legitimacy of the startup (Strauss et al., 2013). Customers need a reliable supplier and demand increased formalization from startups. Founders like to maintain the entrepreneurial spirit in their startup to keep an innovation culture with social events, shared values, and beliefs (Collier, 2005; Russell, 1989).

These pressures and these demands from different stakeholders on the MCS package of startups have been described in case studies (Collier, 2005; Strauss et al., 2013). However, a prediction of phenomena beyond the description of empirical findings is necessary (Zimmerman, 2001). This is the motivation of my third research question: *How do stakeholders influence the development of MCS in startups?*

The approach to answering the research questions is primarily based on the testing of hypotheses. The analysis is conducted on self-collected survey data from Swiss and German startups. For statistical methods, I use regression analysis, cluster analysis, and group comparison tests.

1.3 Thesis Outline

The thesis is structured as follows: In chapter 2, I give an overview of the typologies and frameworks of MCS as well as the idea of MCS as a package. In chapter 3, I cover the empirical literature on MCS in startups and develop a MCS framework for startup research. Further, the hypotheses for the empirical part are developed. The research design and methodology including the data collection are described in chapter 4. In chapter 5, I present the empirical results on performance, configurations of control, and stakeholders' influence on the development of MCS. The discussion of the results and drawn conclusions including implications for researchers and practitioners are conducted in chapter 6.

2 Theoretical Background

2.1 Overview

A basic understanding of MCS typologies and frameworks is necessary in order to understand and research MCS in startups. This chapter will provide such an overview. First, I present different typologies of MCS that exist in the management accounting literature. Second, the MCS frameworks from management accounting theory are listed and discussed. The section closes with a review of the *MCS as a package* idea.

2.2 Typologies of Management Control Systems (MCS)

A number of different typologies exist for MCS. I follow the comprehensive and systematic review by Strauß & Zecher (2013) to present the most prevailing typologies of MCS. Their review is based on interviews and a survey among accounting professors as well as a syllabi analysis to identify important books in the field. With search terms derived from these books several relevant research papers were identified. The authors point out that the understanding of MCS in the academic literature has shifted from the decision-making focus at the beginning to a control focus within the last decade (Strauss & Zecher, 2013, p. 254). The identified typologies of MCS in the literature can be divided into four main classes: object-of-control, cybernetic, transaction cost economics, and comparative sociological. Each of these four classes are discussed next.

Behind the *object-of-control* framework lays the command and control understanding of MCS (Strauss & Zecher, 2013). This is based on the three main management problems: personnel limitations, motivational problems, and lack of direction. These human behaviors need to be addressed by different types of controls. In the object-of-control typology by Merchant & Van der Stede (2003) those types are result controls, action controls, personnel controls and cultural controls. A second identified object-of-control typology bases the types of control on the general management process with strategic formulation, management control, and task control elements (Anthony & Govindarajan, 2007). This last typology is close to the cybernetic approach, which is also based on the management process.

Eilon (1962) basis the *cybernetic approach* to MCS on the management process with the stereotypical elements of goal determination, planning, execution, and control. He focuses on the control process and its MCS types. These types are measurement, evaluation, and reaction. Flamholtz, Das, & Tsui (1985) build on this typology. They differentiate four *mechanism* types, which are planning, measurement, feedback, and evaluation. Goal setting and the establishment of standards are part of the planning mechanisms. Measurement mechanisms encompass performance measures for employees and management information systems. Feedback mechanisms include variance analysis and other elements to compare the performance of the company. Evaluation mechanisms include reward systems.

Transaction cost economics (TCE) approach towards MCS by Ouchi (1980) is the third typology. It differentiates between three main types of controls: markets, bureaucracy, and clans. Within this concept, markets can measure and reward the contribution of individuals based on the price. Bureaucratic controls refer to the surveillance of subordinates, rules on processes and output quality. Clan controls are based on the informal social structure in an organization and the contained shared values and beliefs.

The *comparative sociological approach* to MCS adds to the TCE approach by incorporating the institutional context and differentiates between four control system types, namely bureaucratic, output, delegated, and patriarchal (Whitley, 1999). These types differ in four dimensions: level of formalization and reliance on procedures, control how economic activities are carried out, subordinate involvement and influence, and scope of the control system. For example, bureaucratic control systems are highly formalized and determine how economic activities are carried out. The involvement of subordinates is low and the scope of the systems is limited.

These four typologies, *object-of-control*, *cybernetic*, *transaction cost economics*, and *comparative sociological*, have been developed over many decades. They share common elements such as the idea of bureaucratic controls and measurement controls. These typologies are a first step and the basis towards building MCS frameworks. These different MCS frameworks are presented in the next section.

2.3 Classical MCS Frameworks

2.3.1 Overview

This section provides an overview of the classical MCS frameworks in the literature. I use the term *classical MCS frameworks* to refer to the frameworks based on the management accounting literature in contrast to the frameworks developed by researchers from the startup literature, which are discussed later in section 3.1.4. According to Strauss & Zecher (2013), "a framework is a conceptual structure for categorizing and systematizing complex information" (p. 256). A MCS framework allows for the analysis of individual aspects of MCS.

The frameworks presented in this section are identified as follows: Starting point is the recent literature overview on MCS by Strauß & Zecher (2013). Their overview of four frameworks is complemented by additionally own research on further developments in the literature. This research revealed a further revised levers of control framework not covered by the authors (Tessier & Otley, 2012). Current empirical papers in the field of MCS have been checked for references to other frameworks. This cross-referencing has not revealed any further missed frameworks relevant to the field.

MCS Frameworks and Their Extensions

Original Framework	Extensions & Developments
Levers of Control Simons (1995)	*"Conceptual Development of Simons Levers of Control"* Tessier & Otley (2012)
Performance Management System Otley (1999), Ferreira & Otley (2005, 2009)	*"Performance Management System: A Conceptual Model"* Broadbent & Laughlin (2009)
M&B Framework Malmi & Brown (2008)	

Table 1: MCS frameworks and their extensions.

The following five frameworks have been developed recently (see Table 1): the levers of control framework by Simons (1995), the performance management systems (PMS) first presented by Otley (1999) and later extended with a second author (Ferreira & Otley, 2009, 2005), the M&B framework (Malmi & Brown, 2008), the extended PMS

(Broadbent & Laughlin, 2009), and the revised levers of control framework (Tessier & Otley, 2012). These frameworks are presented in chronological order of their publication.

2.3.2 Levers of Control

The levers of control framework by Simons (1995) is the oldest of the five frameworks. It is by far the most cited and used MCS framework.[1] The framework focuses on formal routines and informational aspects but excludes informal controls.

Simons (1995) bases his classification of MCS on business strategy with four levers of control: beliefs, boundary, interactive, and diagnostic control systems. With this classification, he tries to address each of the four issues of core values, risks to be avoided, critical performance variables, and strategic uncertainties. Managers can use the belief systems of a company to define, communicate and reinforce the core values of the organization. Belief systems focus on the purpose and direction of the organization. Framing through codes of conduct, strategic planning system and directives are known as boundary systems within the framework. These explicit limits and rules provide a measure to avoid or reduce the risks inherent in the business strategy. The formal feedback systems, which are used to monitor results and trigger corrective actions, are called diagnostic control systems. Examples are budgets, variance analysis, and the use of key performance indicators. The fourth element is the set of interactive control systems to cope with strategic uncertainties. It describes the involvement of managers in the decision activities of subordinates.

On the one hand, Langfield-Smith (2007) points out the usefulness of the levers of control framework as a strategic control mainly attributable to its top management focus. On the other hand, this top management centricity ignores other management levels and their need for control systems (Hared, Abdullah, & Huque, 2013). The levers of control framework is applied broadly in the management accounting literature often because of its top management focus. For understanding control on this management level, the following framework is usable as well.

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[1] The book on the levers of control framework shows 3,140 citations on Google Scholar (accessed 23.02.2017). The next most cited framework is Otley (1999) with 1,891 citations. All other papers have less than one thousand citations.

2.3.3 The Performance Management Systems (PMS) Framework

The PMS framework by Ferreira & Otley (2005, 2009) incorporates the earlier frameworks by Otley (1999) and aspects of Simons' (1995) framework. The PMS framework is the result of a number of longitudinal studies on management control and analysis of the literature. According to the authors, it is foremost designed as a research tool.

The framework is divided into 12 sets of questions relating to individual MCS. According to the authors, these questions help to analyze different aspects of the design and use of PMS in organizations. The first eight questions are the core of the PMS and they order represents the intended effective direction of the elements. The questions relate to (1) vision and mission, (2) key success factors, (3) strategies and plans, (4) organization structure, (5) key performance measures, (6) target setting, (7) performance evaluation, and (8) rewards system. The last four elements are added by the authors to facilitate an integrated system: (9) feedback and feed-forward information flows, (10) type of use of the PMS, (11) change in the PMS, and (12) strength and coherence of links. External culture and other contextual factors are explicitly excluded from these questions. As stated by the authors, these factors can influence and explain the effectiveness and the choices of MCS in an organization but cannot be changed by the organization itself (Ferreira & Otley, 2009, p. 267).

This exclusion has been criticized by a number of authors (among others: Hared et al., 2013; Strauß & Zecher, 2013) and finally led to an extended framework by Broadbent & Laughlin (2009). Nevertheless, the inclusion of strategic aspects from the levers of control framework provides an adequate research tool to be used also outside the financial organization of firms, where the classical object-of-control terminology is potentially less understood.

2.3.4 Malmi & Brown Framework

The MCS framework presented in Malmi & Brown (2008) is based on Brown's (2005) analytical work on 40 years of MCS research literature ("M&B framework"). The authors provide a broader framework than the once discussed so far. The MCS package according to Malmi & Brown (2008) includes "all the devices and systems managers use to ensure that the behaviors and decisions of their employees are consistent with the organization's objectives and strategies" (p. 290).

The individual elements are grouped into five control categories: cultural controls as overarching and broadest set of controls, administrative controls as the foundation and the three sets of controls in temporal order, namely planning, cybernetic controls as well as reward and compensation. Malmi & Brown (2008) follow the notion that organizational culture and structure are not prerequisites of control but form controls in themselves (Merchant & Van der Stede, 2007; Sandelin, 2008). The cultural controls consist of clans, values and symbols. The clan controls are an element of the TCE typology (Ouchi, 1980). They describe the establishment of values and beliefs in groups by collective rituals and ceremonies. For the institutionalization of values the authors draw upon Simons' (1995) belief system. They include among others visions and mission statements of a firm similar to the PMS framework presented above. Examples of symbol-based controls are dress codes and workspace designs. Open workplace design can lead to efficient spreading of information and a fast adoption of the corporate culture (Sandelin, 2008). Governance structure, organizational structure as well as policies and procedures form the set of administrative controls. Board structure, management and project teams are referred to as governance structure including its lines of authority and accountability. The organizational structure enables functional specialization and relationships within certain groups as a control instrument. The policies and procedures as bureaucratic controls are again an element of the TCE typology (Ouchi, 1980).

According to Malmi & Brown (2008), planning is divided into strategic (long range planning) and tactical planning (action planning up to 12 months) as ex ante controls. The cybernetic controls focus on the feedback loop of standard setting through a budget, measurement of deviations (financial, non-financial, and hybrids) and the adaption of the system. This differentiation is close to the control process in the cybernetic approach by Eilon (1962). The reward and compensation controls cover controls for goal congruence between the organization and its employees. Those incentives can be linked to cybernetic controls such as budget achievement but also to cultural and other controls. Again, a link can be made to the PMS framework.

When comparing the framework to the PMS framework by Ferreira & Otley (2009), it becomes apparent that Malmi & Brown (2008) provide a structured framework of categories for individual MCS on different levels of companies while Ferreira & Otley

(2009) focus more on a research tool for top management analysis on MCS in companies. Moreover, Malmi & Brown (2008) focus less on information flows and linkage between the individual MCS. The M&B framework includes a broad perspective on MCS by using cybernetic, administrative, and cultural controls and is more concrete to aspects relevant to middle or lower management than the other frameworks. On the one hand, this concreteness is an advantage of the framework. On the other hand, fewer insights can be gained about the configuration of such a system from the framework. This configuration problem will be covered in section 2.4.

2.3.5 Extension of the PMS Framework

The fourth framework is the PMS by Broadbent & Laughlin (2009), which extends the work of Ferreira & Otley (2009) by two aspects, namely context and rationality. Two different models of rationality, instrumental and communicative rationality, lead to transactional or relational PMS according to the authors. The authors also add contextual issues to the model, which have been explicitly excluded by Ferreira & Otley (2009). Internal and external environment shape and influence the first eight questions of the original PMS. Financial transfers and other accountability measures between the organization and its subunits act as an intervening filter.

2.3.6 Extension of the Levers of Control

Another extension of an existing framework is the conceptual development of Tessier & Otley (2012). The authors use the critique on Simons' levers of control framework to improve the conceptual definitions and extend the taxonomy of the framework. According to the framework, controls can be classified on three levels. The first level is whether it is a social or technical control. Together these two form a package of controls (Otley, 1980). On the second level, Tessier & Otley (2012) distinguish control systems by two objective of control dimensions with two characteristics each, resulting in four different categories. These two dimensions are operational or strategic as well as performance and compliance. The third level includes the managerial intentions of the controls: Simons' classification of diagnostic and interactive use, enabling and constraining controls, consequences of achievement and non-achievement. The extensions overcome some critique of the original framework.

2.3.7 Conclusion

Three groups with five frameworks have been presented in this section: levers of control, PMS, and the M&B framework. The levers of control framework and the PMS framework both provide frequently used top management research tools for management accounting research. Their recent extensions and further developments overcome some of the critique but they remain focused on a top management perspective. The M&B framework is based on a broader definition of management control. It includes cultural and administrative controls to guide employees' behavior that the other frameworks do not incorporate. The question of configurations of control is only little included in the frameworks. It is discussed in the following section.

2.4 MCS as a Package

The idea of MCS as a package or a configuration of control has been articulated more than 35 years ago (Otley, 1980). As Malmi & Brown (2008) state: "MCS do not operate in isolation" (p. 287). Rather they work together as interconnected practices and processes within an organization. An accurate description acknowledges the fact that those connections do not necessarily follow a clear logic since "the concept of a package indicates that individual systems are designed and implemented by different actors at different points in time" (Strauss & Zecher, 2013, p. 260). It is important to study the whole control system in a wider context and not only focus on individual MCS in a restricted context (Otley, 1999; Sjöblom, 2003). The MCS package of a firm should not be understood exclusively as the package of formal MCS such as budgets, performance evaluation or product development milestones but it also encompasses informal MCS such as values, beliefs, and shared routines (Strauss et al., 2013, p. 159). Further, it is not stable but changes over the life of a firm because different interest groups influence the introduction of individual MCS (Malmi & Brown, 2008, p. 291).

This complexity could be one factor why research towards configurations of control is limited. Several studies have focused on individual innovating MCS such as balance scorecard, value-based management, activity-based costing, etc. Few studies examined a broader MCS package in the past (Chenhall, 2003). Not surprisingly, the idea of a package of controls has been identified as a promising research area (Chenhall, 2012).

Malmi & Brown (2008) identify two intertwined research themes within this discussion: the configuration of the MCS package within an organization and the relationship between individual MCS within the package. The first theme asks whether explicit configurations in similar situations or specific combinations of the control groups exist in a number of organizations. The second theme is concerned with the effectiveness and the relationship between individual MCS within the package. Moreover, if there are substitutes and complements of individual MCS (Chenhall, 2003; Malmi & Brown, 2008). Both venues could help to "try to build up theories containing more complex MCS constructs and explanations of why those combinations are likely to produce certain outcomes in certain circumstances" (Malmi & Granlund, 2009, p. 610). In section 5.3, I provide results on the first research theme whether explicit configurations of MCS exist in startups.

2.5 Concluding Remarks

Management accounting theory has developed a number of typologies and frameworks to group and analyze MCS in firms. Researchers propose extensions of the earlier framework, namely of the levers of control and PMS framework. The M&B framework provides a comprehensive framework that reaches beyond the mere traditional accounting controls by adding cultural and administrative controls. The idea to understand configurations of control and their emergence in companies is based on the MCS as a package idea outlined above.

In the next section, I will present the use of frameworks in startup research. Further, I will build upon the presented management accounting theory to synthesize a MCS framework for startups. Further, hypotheses are developed to be tested in the empirical part of the thesis.

3 Theoretical Development and Hypotheses Building

3.1 Empirical Research and the Use of MCS Frameworks

3.1.1 Introduction

After the discussion of the relevant MCS frameworks in the literature, this section covers the use of these frameworks in startup research. I identify the relevant articles with a bibliometric analysis in the literature of management control systems and startups. Afterwards, the use of frameworks and original developments in these articles are discussed. The section concludes with a summary on the elements of MCS frameworks in startup research.

3.1.2 Bibliometric Analysis

Bibliometric analysis is a structured method to identify relevant literature (White, 2004). The advantage of a bibliometric analysis is that it provides a framework for a comprehensive and systematic literature search and analysis to find structural patterns in the published documents (White, 2004). This method has recently been applied in research articles in management accounting (Hülle, Kaspar, & Möller, 2011) and business process management (Schmid & Kern, 2014).

The bibliometric analysis is conducted in four steps. First, multiple databases are chosen to cover the published literature on the topic. Second, relevant search terms are identified. Third, the searches are conducted in the different databases with the search terms. Fourth, the identified articles are screened for relevance to the topic to compile the final list of relevant literature.

The *Business Source Complete* database via the *EBSCOhost* research database is the main source. Additionally, the *Web of Science* database and *ScienceDirect* database provide further input. All searches were carried out in May and June 2015. To cover dissertations on the topic the *ProQuest* databases were used in September 2015.

Relevant Articles Identified with Bibliometric Analysis

Authors	Title	Methodology	Country	Main Industries	Sample Size
Cardinal, Sitkin & Long (2004)	Balancing and Rebalancing in the Creation and Evolution of Organizational Control	Case study	U.S.	Moving Services	1
Cassar (2009)	Financial statement and projection preparation in start-up ventures	Empirical	U.S.	Mixed	200
Collier (2005)	Entrepreneurial control and the construction of a relevant accounting	Case study	Australia	Packaging equipment	1
Davila & Foster (2005)	Management Accounting Systems Adoption Decisions: Evidence and Performance Implications from Early-Stage / Startup Companies	Mixed	U.S. (Silicon Valley)	ICT & biotech	78
Davila & Foster (2007)	Management Control Systems in Early-Stage Startup Companies	Empirical	U.S. (Silicon Valley)	ICT & biotech	78
Davila & Foster (2008)	The Adoption and Evolution of Management Control Systems in Entrepreneurial Companies: Evidence and a Promising Future	Literature overview	n.a.	n.a.	n.a.
Davila (2005)	An exploratory study on the emergence of management control systems: formalizing human resources in small growing firms	Empirical	U.S. (Silicon Valley)	ICT & biotech	95
Davila, Foster & Jia (2015)	The Valuation of Management Control Systems in Start-Up Companies: International Field-Based Evidence	Empirical	International	Mixed	66
Davila, Foster & Li (2009)	Reasons for management control systems adoption: Insights from product development systems choice by early-stage entrepreneurial companies	Mixed	U.S. (Silicon Valley)	ICT & biotech	69

Table 2: Relevant articles for MCS in startups identified with bibliometric analysis.

Relevant Articles Identified with Bibliometric Analysis (continued)

Authors	Title	Methodology	Country	Main Industries	Sample size
Davila, Foster & Oyon (2009)	Accounting and Control, Entrepreneurship and Innovation: Venturing into New Research Opportunities	Literature overview	n.a.	n.a.	n.a.
Granlund & Taipaleenmäki (2005)	Management control and controllership in new economy firms—a life cycle perspective	Case study	Finland	ICT & biotech	9
Rooney & Cuganesan (2013)	The control dynamics of outsourcing involving an early-stage firm	Case Study	Australia	Financial Industry	1
Rowe (2006)	Turning darkness into light: strategic thinking for entrepreneurial managers	Conceptual	n.a.	n.a.	n.a.
Sandino (2007)	Introducing the First Management Control Systems: Evidence from the Retail Sector	Mixed	U.S.	Retail	97
Strauss, Nevries & Weber (2013)	The development of MCS packages – balancing constituents' demands	Case Study	Germany	ICT & biotech	20
Strehle, Katzy & Davila (2010)	Learning capabilities and the growth of technology-based new ventures	Empirical	Germany	ICT & biotech	44
Sweeting (1991)	Early-stage new technology-based businesses: Interactions with venture capitalists and the development of accounting techniques and procedures	Case Study	UK	Technology-based	2
Wijbenga, Postma & Stratling (2007)	The Influence of the Venture Capitalist's Governance Activities on the Entrepreneurial Firm's Control Systems and Performance	Empirical	Netherlands	Mixed	93

Table 3: Relevant articles for MCS in startups identified with bibliometric analysis (continued).

The search terms relating to MCS are each combined with the terms identifying research on startups. The initial lists based on the literature are extended based on the first results leading to the final list of 32 search queries with the following search term each with an asterisk behind to include any plural or version of the words (e.g. entrepreneurial). MCS-related: management control, management accounting, control system & management ("management" was included to exclude non-management articles from other disciplines), and managerial accounting (Chenhall, 2003, p. 129; Herath, 2007, p. 899). Startup-related search terms are startup, start-up (the search algorithms distinguish between "startup" and "start-up"), entrepreneur, early stage, new economy firm, new business, new enterprise, and growth firm.

All results were limited to academic journals and books (if applicable). Additionally, the Web of Science search had to be restricted to the field of "Business economics" to render useful results. In the ScienceDirect database the search was limited to title, abstract and key words because the full text search gave more than 10,000 results with no apparent connection to the topics. For the same reason, the search in the ProQuest databases was restricted to "anywhere except full text" in order to receive meaningful results.

On the total of 1,252 source references from the databases[2] a first screening was carried out leading to 54 articles of interest to the subject of MCS and startups. Intense screening led to the identification of 18 articles relevant to the topic (see Table 2 and Table 3). Of those 18, three are of conceptual nature or literature overviews. The empirical articles are either case studies, quantitative or based on a mixed approach. The content of the articles and the use of MCS frameworks in them is subject of the next section.

3.1.3 The Use of MCS Frameworks

The identified articles on MCS in startups are analyzed with respect to their use of MCS frameworks. A first analysis reveals that the articles are mainly empirical and seldom use the established MCS frameworks. Most authors develop their own MCS frameworks instead of using an established one. Some of these developed MCS frameworks incorporate only a very limited number of individual MCS and others up to 50. In the

[2] 382 from Business Source® Complete, 60 from ScienceDirect®, 224 from Web of Science® and 586 from ProQuest (including duplicates of the multiple searches).

following the use of the established MCS frameworks will be described and afterwards the original developments by the researchers.

The five established MCS frameworks from the section 2.3 are the levers of control (Simons, 1995), the PMS (Ferreira & Otley, 2009; Otley, 1999), the MCS as a package (Malmi & Brown, 2008), the extended PMS with context and rationality model (Broadbent & Laughlin, 2009), and the extended levers of control framework (Tessier & Otley, 2012). The results show that the five MCS frameworks are barely used in startup research. Two articles use the original levers of control framework (Collier, 2005; Granlund & Taipaleenmäki, 2005). In one of those two articles the PMS framework in the context of startups is additionally discussed (Collier, 2005). The MCS as a package framework is mentioned in two article (Rooney & Cuganesan, 2013; Strauss et al., 2013). None of the identified articles mention or use the extended PMS by Broadbent & Laughlin (2009) or the extended levers of control framework by Tessier & Otley (2012). The frameworks and their explicit use is discussed one by one in the remainder of this section.

The levers of control framework (Simons, 1995) is explicitly used for analysis in two articles (Collier, 2005; Granlund & Taipaleenmäki, 2005). Most of the other articles either mention the framework especially for its interactive controls or use Simons' definition of MCS. In analyzing the case study, Collier (2005) recognizes the importance of belief systems to the investigated company and the use of boundary systems in this case for managing cash flow and increasing market share. Granlund & Taipaleenmäki (2005) view all four areas of the framework as important to their analysis of new economy firms with special emphasis on the belief system and the corporate culture in new economy firms.

The PMS framework (Ferreira & Otley, 2009) is briefly mentioned in one article but not used for analysis (Rooney & Cuganesan, 2013) and discussed in more detail in another (Collier, 2005). For Collier (2005) the PMS framework was less helpful in the analysis of the case study. The organization in his study was dominated by its founder without written but understood strategy and plans. Accordingly, no formalization of these plans took place in terms of individual target setting. Only companywide goals such as market share were used.

The M&B framework is mentioned in one article on outsourcing in startups (Rooney & Cuganesan, 2013). The idea of personnel and cultural controls is used to describe and better understand the inter-organizational relationship of an early-stage firm. The authors do not use the framework with its components for their analysis.

3.1.4 MCS Elements in Startup Research and Developed Frameworks

The analysis in the previous section reveals that researchers in the field of MCS and startups seldom use established MCS frameworks. In contrast, most researchers build their own MCS frameworks. Often these frameworks or simple lists share common elements. The articles are analyzed chronologically in the following and these elements are pointed out.

The early articles are case studies based on one to eight case companies (Collier, 2005; Granlund & Taipaleenmäki, 2005; Sweeting, 1991). The researchers do not derive a specific list of MCS as a result of their research. Nevertheless, a number of common elements can be identified. The three elements of profit & loss account, balance sheet and cash flow statement (or model) are mentioned in all articles, with special emphasis on the latter. Further important MCS mentioned by the authors are the advancement of the business job costing systems, strategic industry analysis, detailed product and customer profitability analysis as well as overhead allocation and variance analysis.

All later articles are empirical or use mixed methods. Therefore, most authors had to define the individual MCS in advance, before carrying out any hypothesis testing. With two exceptions (Cassar, 2009; Davila & Foster, 2005) most researchers cluster the MCS by different categories as they grow in number. The individual MCS are either grouped based on their functional focus such as financial planning, marketing, strategy, and human resources (Davila & Foster, 2007; Strehle et al., 2010; Wijbenga et al., 2007) or are distinguished between basic MCS and incremental MCS for different purposes such as revenue enhancing, differentiation focus or cost reductions (Davila et al., 2015; Sandino, 2007).

All startup researchers use specific MCS elements in their analysis such as sales projection, cash flow reporting, organizational charts, etc. This provides a contrast to the use of the classical frameworks in MCS research in mature firms. For example, Bedford & Malmi (2015) employ the framework of Malmi & Brown (2008) for a large data set on

Australian companies and use constructs to measure participation involvement in strategic planning or diagnostic and interactive use for measurements. They do not ask the question which components exist in the companies but how they are used. The individual MCS in startup research are more practical and concrete than in MCS research of established firms. This is mainly attributable to the fact that in startups not all systems are established yet and their existence alone is already a type of differentiation between the firms. The necessity to use complex constructs to measure budget participation or similar elements is of less importance to this area of research.

In conclusion, the earlier articles describe individual MCS present in their case study companies. Later empirical articles extend those lists and categorize the MCS by business function or by intended purpose of the MCS. The startup researchers use specific MCS components in their analysis to provide practical information to startups instead of theoretical construct development as in studies of established companies. None of these lists of individual MCS are linked to the classical MCS frameworks described in section 2.3. The startup researchers build their own body of knowledge without an integration in management accounting theory. In the following section, I will build a MCS framework for startup research in order to overcome this missing link between startup research and management accounting theory.

3.2 Development of the MCS Framework for Startup Research

3.2.1 Overview

The MCS framework for startup research is developed for two reasons. First, the pure number of possible MCS makes it necessary to group them for analytical purposes (Marginson, 2002, p. 1021). Second, as pointed out in the previous section, none of the theoretical MCS frameworks from the management accounting literature is thoroughly used in startup research so far. Startup researchers use their own frameworks and seldom build on each other's work with respect to the classification of MCS. Consequently, a framework needs to be established that builds on theory and research practice alike.

This section describes the development of the MCS framework for startup research. The result uses established accounting theory and fills in the building blocks with startup specific components. The framework is built in four steps. First, the theoretical framework is chosen. Second, specific MCS are identified to fill in the building blocks of the

framework. Third, own interviews with startups help to update and extend the list of MCS. Finally, the individual MCS are matched to the parts of the theoretical framework. The remainder of this section describes these four steps in detail.

3.2.2 Choice of the Theoretical Framework

This section answers the question which of the presented theoretical frameworks is most appropriate for startup research and how the building blocks of framework have been filled in by other researchers. The relevance and usefulness of MCS frameworks to startups depends on how well their control systems can be categorized and structured within the framework (Strauss & Zecher, 2013). The framework needs to be broad enough to be relevant to startups. A focus on only a fraction of the MCS in a company is not useful.

In the theory section 2.3, three groups of frameworks have been presented. The levers of control framework (Simons, 1995) and its extension (Tessier & Otley, 2012) provide some form of categorization and structure. Ferreira & Otley (2009) and their extension (Broadbent & Laughlin, 2009) focus on the framework as a research tool for top management analysis on MCS in companies. Malmi & Brown (2008) provide a structured framework of categories for individual MCS on different levels of companies. The framework by Malmi & Brown (2008) includes a broad perspective on MCS by using traditional accounting, administrative and cultural controls (see Figure 1). Other researchers have used the framework to reduce the risk of underspecification because this framework provides the most comprehensive categorization of MCS (Dropulić & Rogošić, 2014; Lueg & Radlach, 2015). This concreteness makes it more usable and relevant for startups as a guiding tool for the design of their MCS. It is more concrete to aspects relevant to middle or lower management than the other frameworks. For startup research, it is primarily the question which MCS components emerge under which circumstances. This provides more practical implications to founders and managers of startups. The framework by Malmi & Brown (2008) (or M&B framework) with its different categories and theoretical underpinnings allows the categorization of individual MCS. In conclusion, it is more relevant and useful than the levers of control framework (Simons, 1995) or the PMS framework (Ferreira & Otley, 2009).

M&B Framework

Cultural Controls		
Planning	Cybernetic Controls	Reward and Compensation
Administrative Controls		

Figure 1: MCS Framework by Malmi & Brown (2008).

The M&B framework can be adapted to specific circumstances. The filling in the building blocks of the M&B framework has been done by some researchers in different ways and for different purposes. The existing studies are discussed next.

The four articles show diverse applications of the M&B framework to explain configurations of control, family influence on MCS, and MCS for sustainable development. Two articles explain the design of MCS in firms on a representative country sample for Australia and Croatia respectively (Bedford & Malmi, 2015; Dropulić & Rogošić, 2014). Bedford & Malmi (2015) set out to find combinations of control mechanisms (MCS) and their association with firm context (size, age, etc.). They derive five common configurations of MCS based on their Australian sample: simple, results, action, devolved, and hybrid. Dropulić & Rogošić (2014) find evidence that firms in Croatia use more formalized controls in Croatian companies. The M&B framework is further used in a study on the family influence on MCS in Thailand (Jorissen, Maneemai, Laveren, & Voordeckers, 2016). The authors find that "family involvement in management has a direct limited significant relationship with MCS, family involvement in ownership has an indirect but much wider significant influence on a firm's MCS" (Jorissen et al., 2016, p. 1). The fourth study analyzes how MCS are used to enforce sustainable development in organizations and identifies types of controls to formalize sustainable development (Lueg & Radlach, 2015). In conclusion, the M&B framework has been shown to be adaptable for different purposes in accounting research. Consequently, the theoretical base is built on the MCS framework by Malmi & Brown (2008) because of its broad setting and the possibility to adapt it to specific circumstances.

3.2.3 Identification of Individual MCS from Startup Research

After I selected the theoretical basis, the framework is made operational in the next step. I review the existing approaches to filling in the building blocks of the M&B framework. Afterwards, I present the approach followed in this thesis.

The researchers of the four mentioned articles in section 3.2.2 chose three different approaches to operationalize the M&B framework. The first approach is to use existing (or adapted) management control constructs from the accounting literature to measure different aspects of the areas of the framework such as budget participation, diagnostic and interactive use of controls, decentralization, standardization, and belief systems. Bedford & Malmi (2015) use a total of 22 constructs to fill the framework while Jorissen et al. (2016) use eight. Both use a questionnaire to measure the constructs with 70 and 44 questions respectively. Jorissen et al. (2016) exclude cultural controls from the M&B framework without further explanation (p. 18). It is most likely due to the fact that the earlier version of the paper was not based on the M&B framework (Maneemai & Jorissen, 2012). Using management control constructs requires established MCS to some extent. The item questions of constructs often ask for the specific use of individual MCS. Startups often do not have those necessary MCS established; for example standard costs for variance analysis, individual performance targets, strategic planning processes, etc. (Bedford & Malmi, 2015). Therefore, the use of complex management control constructs is not advisable in startup research.

The second approach is conducted by Dropulić & Rogošić (2014). They base their operationalization on 40 self-developed questions for each area of the M&B framework without the use of accounting constructs. They cover all areas of the framework. Most of the questions relate to planning and cybernetic controls. Unfortunately, the questions are not provided within the article. Therefore, further use of their work is not possible.

The third approach is based on analyzing empirical studies and deducting individual MCS. Lueg & Radlach (2015) code 83 empirical studies for "control applications" (=individual MCS) in order to show a comprehensive picture of the current state of sustainable MCS (p. 160). The identified MCS are aggregated into 19 different subgroups covering all areas of the framework (see Figure 2). The authors achieve their goal of finding a comprehensive set of MCS that matches the categories of the M&B framework.

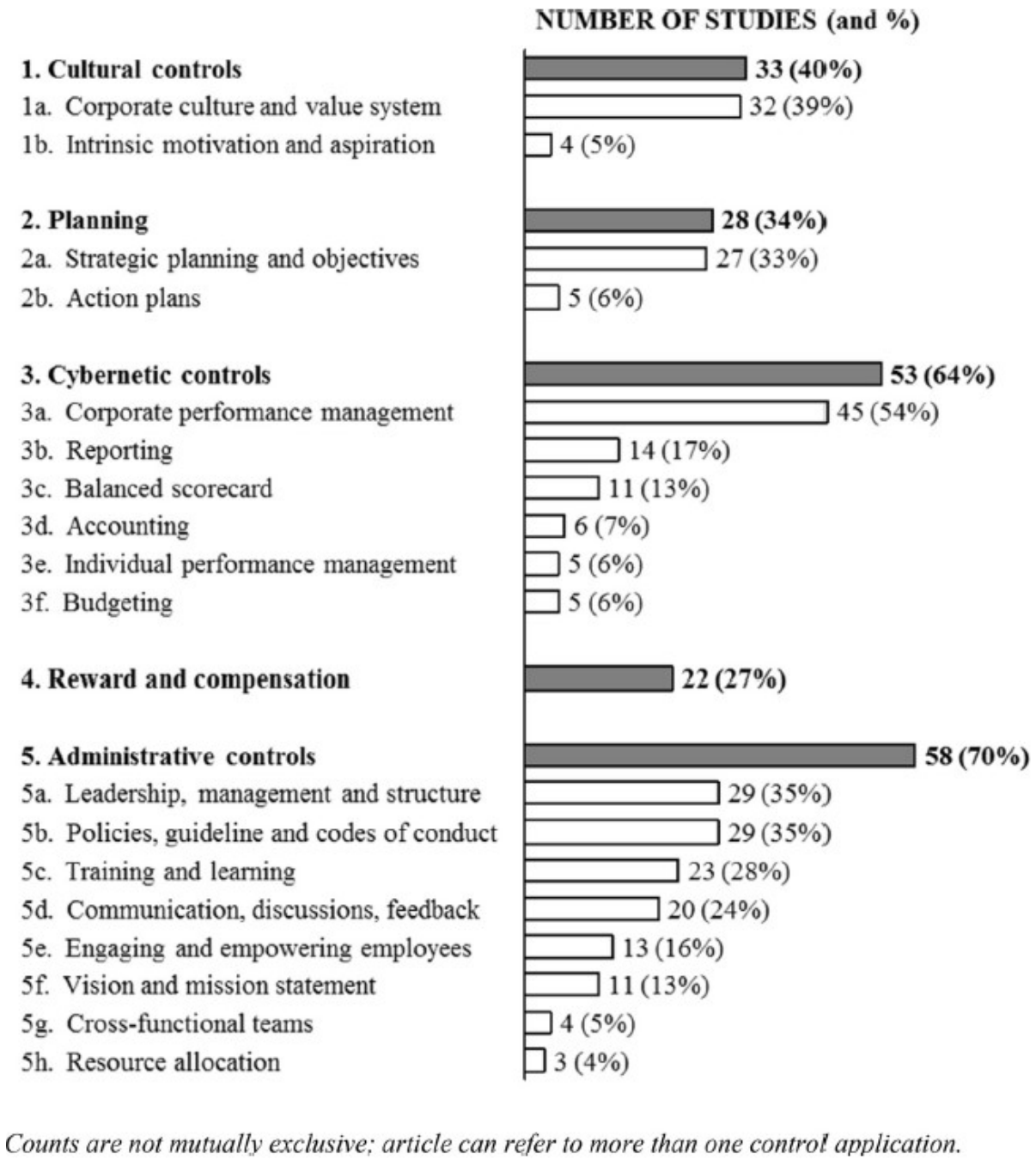

Figure 2: MCS for sustainable development identified by Lueg & Radlach (2015, p. 163).

In conclusion, authors have used constructs, self-developed questionnaires, and coding from research articles to operationalize the M&B framework. Constructs are less useful in a startup environment due to the lack of established MCS. A self-developed questionnaire without a connection to previous startup research would be counterproductive to use. Therefore, I follow a similar approach Lueg & Radlach (2015). I identify individual MCS for startups by extensive literature analysis and validate the results by interviewing managers from the field.

The identification of individual MCS from startup research follows a similar approach to Lueg & Radlach (2015), who code control elements from empirical research articles as explained above. My sample of articles for coding has been presented in section 3.1 in Table 2 and Table 3. The articles cover case studies as well as survey-based research on MCS in startups.

I searched the articles for MCS elements described to be present in startups. Wherever possible I relied on lists presented by the authors. More than 160 individual MCS were found in total (see Figure 3). Most articles name traditional accounting controls of the framework (planning, cybernetic controls, reward and compensation) with large emphasis on cybernetic controls. Examples of these described systems are presented next.

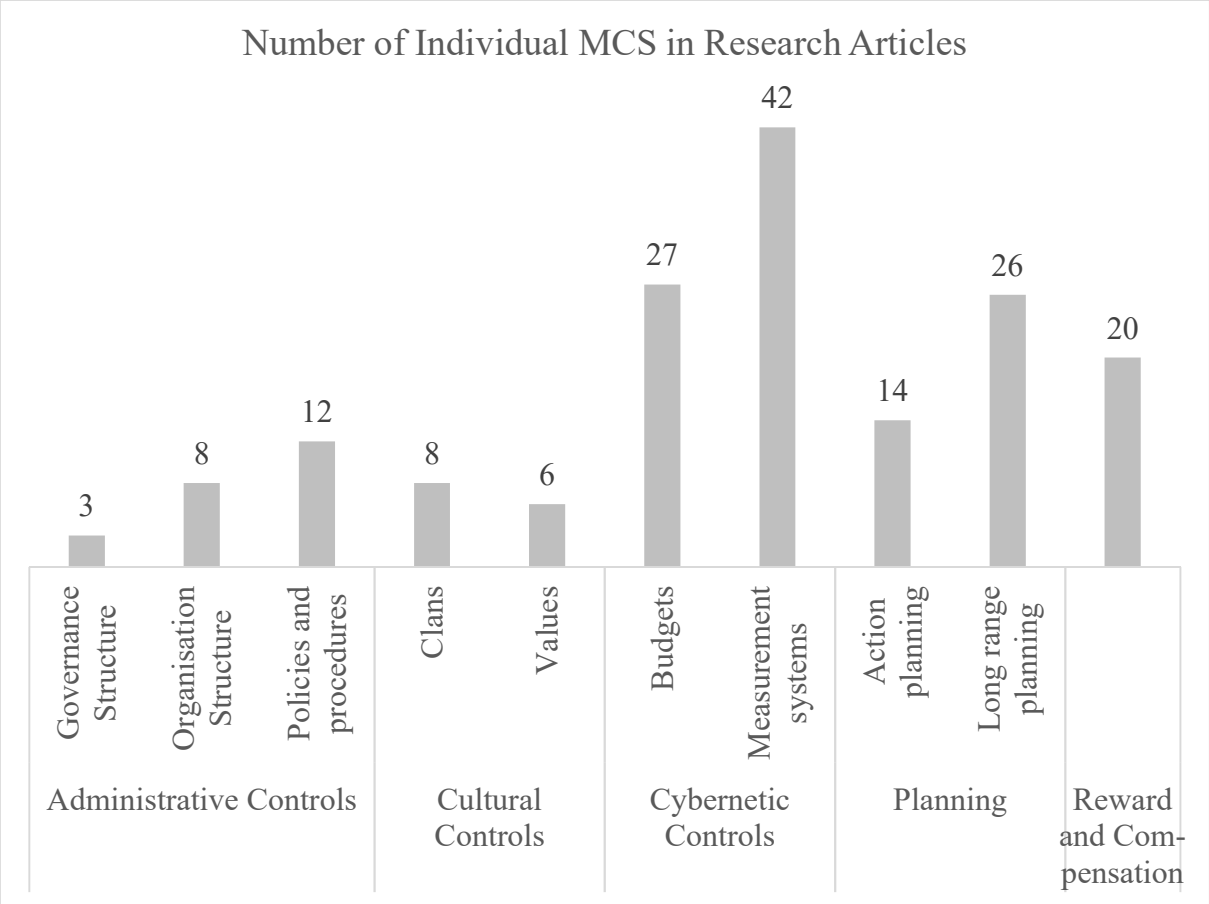

Figure 3: Number of individual MCS per framework group in research articles.

Sweeting (1991) mentions basic budgeting as well as some overhead and variance analysis in the two startups investigated. Granlund & Taipaleenmäki (2005) additionally found customer and product profitability analysis as well as multidimensional performance measurements among the examined companies. Cost controls and further

incentive and reward systems were focus of the study by Wijbenga et al. (2007). Few researchers refer to cultural and administrative controls in their articles. The longitudinal case study by Collier (2005) mentions cultural controls such as corporate values and goals as well as social events that the founder and CEO of the company used for control purposes.

Davila & Foster provide a very broad and startup-specific overview of individual MCS, which is developed over a number of articles (Davila & Foster, 2005, 2007; Strehle et al., 2010). Their large set of MCS components covers even more aspects of cultural and administrative controls such as orientation programs and trainings, organizational charts, written job descriptions, and a number of policies for sales management, collaboration and partnerships. None of the researchers use any components for symbols as a part of cultural controls.

The more than 160 individual MCS from the literature include double counts and similar systems. I reduce them to a set of 39 elements by aggregating them to broader descriptions (see Table 61 to Table 63 in the Appendix). E.g. capital expenditures, investment approval, investment budget, and capital investment approval process are all aggregated to "capital investment budget and approval process". This list from the startup literature is based on previous and older research. I therefore update the list through own interviews to possibly find more MCS components present in startups. This is described in the next section.

3.2.4 Update and Extension through Interviews

In the third step of building a MCS framework for startups, interviews with startup managers enable verification as well as an update of the list of MCS compiled in section 3.2.3. This is in line with other researchers building lists of MCS for startups (Davila & Foster, 2007), which reported to use five interviews to verify their literature findings. In the following the interview process and its result are described.

I conducted five interviews with startup managers and investors to identify individual MCS relevant for startups. The interviews were semi-structured. I openly asked for the use of management control elements without providing a complete list. I asked for the different areas of the M&B framework and checked the use of individual components

throughout the interviews. One interview was face-to-face. All the others were conducted by telephone. Notes were taken during the interviews and later confirmed with the interviewee via email. All interviews were conducted solely by the author between May 2015 and August 2016. They lasted between 30 to 45 minutes each.

The startup interviewees were a founder of a business-to-business software startup from Germany, a manager of clean tech startup in Switzerland, and the head of business development of a social network startup in Germany. The first two startups had between 10 and 15 employees at the time of the interview, the third more than 200. Overall, they were comparable to the case companies used in other studies described before. The two investor interviews included a private investor from Switzerland and a financial manager from a large German startup investor. The private investor had experience with more than 10 startups and is currently involved in middle market investments.

The startups report the use of financial planning and evaluation systems including detailed sales forecasts. Milestones, budgets and comparison reports are used to control individual projects. Besides these traditional accounting controls, the startups also use cultural controls such as monthly gatherings of all employees including fun activities ("Green Tuesday"), summer and winter events, as well as explicit or implicit core values.

The investors focus on reporting systems such as management reports and monitoring of key performance indicators. Further, they mention elements of the governance structure such as internal controls and compliance systems. These are important for the investors in order to reduce their exposure to liabilities and setting standards throughout their investments.

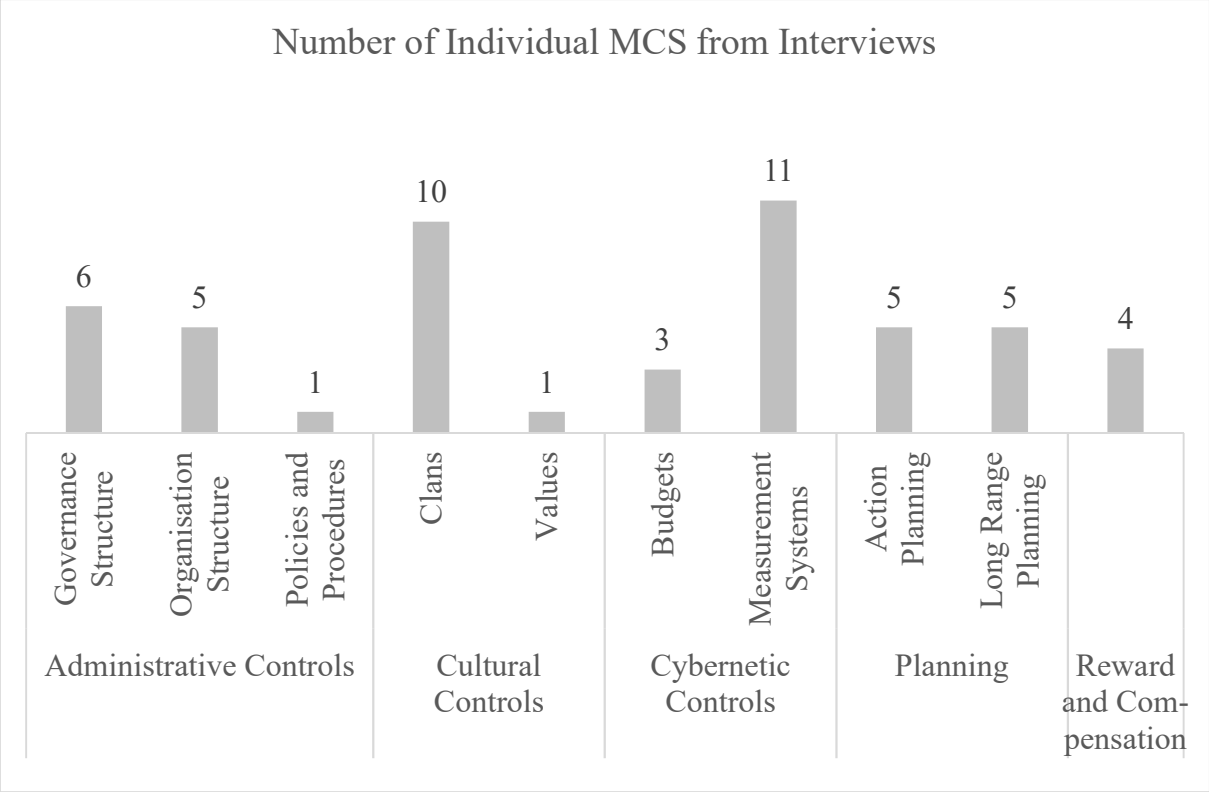

Figure 4: Number of individual MCS per framework group from interviews.

More than fifty individual MCS are identified from the interview data (see Figure 4). The list is condensed to 31 broader items. Those are checked with the list from the literature. The comparison reveals five new elements not found in the startup literature: compliance and internal control system, buddy/mentor system, meeting guidelines, regular meetings with all employees (central meetings), and employee feedback systems. The other 26 individual MCS are already part of the list deducted from the literature.

In conclusion, most of the 39 individual MCS identified in section 3.2.3 are verified by the interviews with startups. Additionally, five systems from the interviews are added to the list. The total number of individual MCS based on the literature review and interviews is 44. All of them are listed in Table 61 to Table 63 in the Appendix.

MCS Framework for Startup Research

Cultural Controls					
Clans		**Values**		**Symbols**	
- Orientation program for new employees - Company-wide newsletter - Trainings program	- Social (evening) meetings and events - Feedback - Regular meetings with all employees	- Core values		- Dress code	
Planning		**Cybernetic Controls**			**Reward and Compensation**
Long Range Planning	**Action Planning**	**Budgets**	**Measurement Systems (Financial & Non-Financial)**		
- Strategic planning - Customer development plan - Product (portfolio) roadmap - Headcount development planning - Marketing and branding - Partnership development planning	- Cash-flow projections - Milestone planning - Sales projections	- Operating budget and expense approval process - Capital investment budget and approval process - Project selection process and budgeting - Cost management	- Routine analysis of financial performance against target (Management reports) - Customer profitability analysis - Product profitability analysis	- Project reports - Partnership development reports - Product development report - CRM system - Sales reporting - Production controls	- Company bonus - Performance evaluation - Individual incentive programs - Sales force bonus system - Management incentive programs
Administrative Controls					
Governance Structure		**Organization Structure**		**Policies and Procedures**	
- Compliance & internal control systems - Meeting guidelines	- Team composition guidelines	- Written job descriptions - Organizational chart	- HR development plans - Buddy/Mentor system	- Partnership collaboration policies	- Code of conduct - Sales process

Figure 5: Self-developed MCS framework for startup research.

3.2.5 The Final Framework

Finally, the individual MCS described above are matched to the parts of the framework to develop a practical MCS framework for startup research. For every MCS the main source of reference is provided, which is the most current research paper the item has been used or mentioned in (see Table 61 to Table 63 in the Appendix). Further, items are marked that were mentioned in the interviews described above. The matching was conducted by the author and cross-checked with practitioners and academics.

According to the definition of the M&B framework, the category *symbols* in cultural controls consists of elements such as dress code. No elements in interviews or the literature have been found that match this category. To have a complete framework from a theoretical perspective, the item *dress code* is added. The final framework based on the literature analysis, the startup interviews, and this addition consists of 45 individual MCS (see Figure 5).

The MCS framework for startups established in this section is the basis to answer the proposed research questions within this thesis. All analyses will be founded on the presented framework. The next sections describe the research questions and develop the hypotheses in more detail. Before that, the MCS framework and *Objectives and Key Results* (OKR), a current performance management system in startups, are compared and discussed.

3.2.6 MCS Framework and Objectives and Key Results

OKR are currently very popular especially within tech startups (Engelhardt & Möller, 2017). The framework is mainly based on the fact, that Google has used and developed OKR for a long time (Schmidt, Rosenberg, & Eagle, 2014). OKR consist of two elements and four principles (Engelhardt & Möller, 2017; Schmidt et al., 2014). The elements are objectives and key results. Objectives are qualitative ambitious goals that should motivate and define what employees achieve together. Key results are quantifiable goals that define how the objectives can be achieved. The four principles are focus, participation, transparency, and grading. Not more than five objectives are defined per quarter (focus). 60 percent of the goals comes from the employee (participation). All OKR from every employee and manager are openly available (transparency). The grading takes place in a structured three step process (grading).

OKR are foremost an operative management system for startups (Engelhardt & Möller, 2017) but with some limitations. In the following, OKR are compared to the developed MCS framework for startup research with emphasis on the MCS five groups of the framework (see Figure 5 above). The constant feedback loop of OKR represent a clan element. Other cultural elements are not present. The whole process is focused on action planning elements rather than on long range planning. The key results are one possible measurement system under cybernetic controls. Yet, no other systems are used, especially no budgeting elements for daily tasks such as budget approval processes. OKR are not used for performance evaluation although they can influence it (Bock, 2015). Therefore, reward and compensation MCS are not represented by OKR. The principles of OKR represent one process within the company. OKR rely on administrative elements such as governance and organizations structure but are not defined by them.

In conclusion, OKR are a very popular performance management system in tech startups. They show some elements that depict a MCS framework but are far too limited to represent a whole system. OKR are therefore not sufficient to fully show the possible management control elements that are available to startups in the way the developed MCS framework for startups research is able to.

3.3 Performance Impact of MCS on Startups

In this section, the first research question about the impact of MCS on the performance of startups is described in more detail and hypotheses are developed. There are two areas of performance impact of MCS on startups investigated: the effect of early adoption of MCS and effect of the adoption of traditional accounting controls, namely planning, cybernetic controls, and reward and compensation. In general, "MCS […] enhance managerial decision-making, coordinate resources and information flows, and facilitate contracting and signaling as a company achieves a higher growth stage or scale" (Davila et al., 2015, p. 208). Authors suggest that MCS facilitate organizational learning and therefore increase performance (Kloot, 1997). More specifically, planning is thought to increase the effectiveness of the use of resources and the decision speed in startups (Delmar & Shane, 2003). A meta-analysis of business planning impact on startup performance showed a beneficial significant relationship (Brinckmann et al., 2010). Scholars argue that a "loose coupling" of the innovative spirit and flexibility of startups

and the rationality of financial control is feasible (Lukka & Granlund, 2003). Even further, only with controls the firms can withstand the market pressure they are in. In conclusion, MCS are expected to be beneficial for startups and their performance. The individual hypotheses to be tested are developed in the remainder of this section.

The (early) adoption of MCS has been argued to be a facilitator of growth in startups (Davila & Foster, 2007; Flamholtz & Randle, 2007; Simons, 1995). Empirical work shows support for this claim. Davila & Foster (2005) find that the early introduction of MCS facilitates subsequent higher growth in startups. In another study, Strehle et al. (2010), drawing on the development of dynamic capabilities, show that a co-evolution of employee growth performance and the MCS intensity exists in startups.

In the early stage of startups, the informal management style can limit the growth of the startup. The adoption of MCS can overcome this shortcoming (Davila & Foster, 2007). Greiner (1972) even postulates that adequate MCS are necessary for companies to continue on a growth path. Especially variance analysis, profit planning, and PMS help startups to overcome an entrepreneurial crisis and return on a growth path (Lee & Cobia, 2013). In conclusion, startups which adopt MCS early are expected to growth faster and perform better. This leads to the two following hypotheses:

P1: High adoption rates of MCS in early startups have a positive relationship with employee growth.

P2: High adoption rates of MCS in early startups have a positive relationship with the current performance of the startups.

The question arises whether the adoption of MCS has a positive effect on performance independently of the type of control – is every type of control better than none at all? Most arguments in the literature focus on the traditional accounting controls as presented in the MCS framework for startups before; namely planning, cybernetic controls, and reward and compensation. The framework in this thesis further consists of cultural and administrative controls. Both categories provide possibilities to coordinate resources and information flows that enable higher growth. Following the literature on the positive effect of MCS on performance, the hypotheses are also tested for the five MCS groups presented in the framework. Figure 6 illustrates the proposed relationships of the two hypotheses.

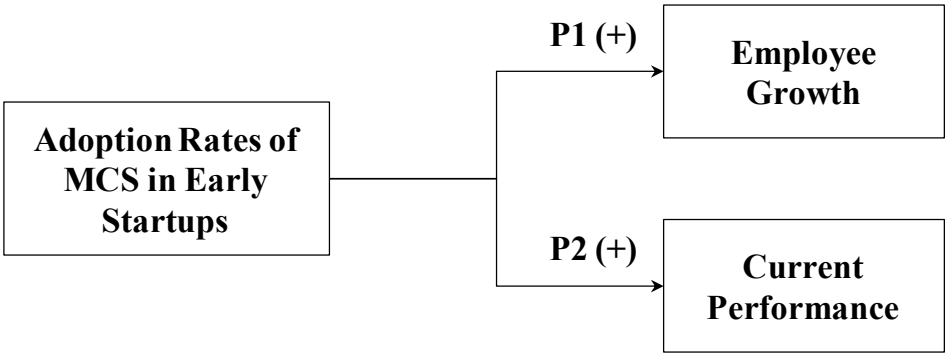

Figure 6: Illustration of first and second performance hypothesis.

The introduction and continued use of MCS requires time and resources. Both are very limited especially in startups since these companies mostly focus on product development, marketing, and growth in the beginning. The adoption of MCS is therefore a strong signal for the managerial quality and future growth opportunities (Davila et al., 2015). This is especially true for planning, cybernetic controls, and reward and compensation.

Whether the adoption of MCS in startups influences the amount of funding has not been analyzed so far. Funding has only been used as an explanatory variable to understand company growth in the context of MCS (Strehle et al., 2010). Valuation and MCS intensity has been studied before. Davila et al. (2015) show that the MCS intensity has a positive effect on the valuation of startups for an international sample.

Based on the signaling argument and the first evidence for MCS intensity and valuation, I propose that the adoption of traditional accounting controls is positively associated with the amount of funding a startup receives. See Figure 7 for an illustration.

P3: High adoption rates of the traditional accounting controls, planning, cybernetic controls, and reward and compensation, have a positive relationship with the amount of funding the startups receives.

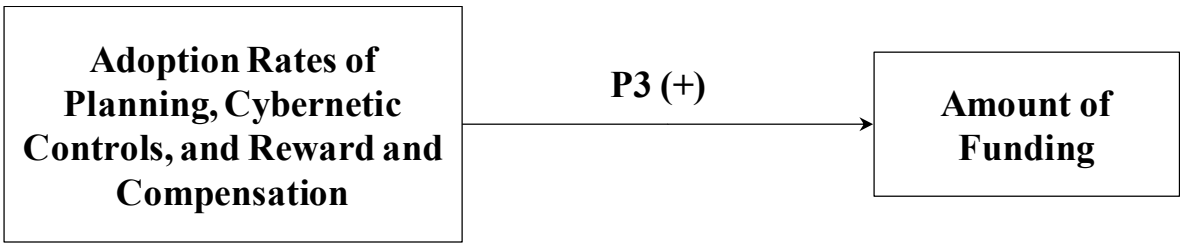

Figure 7: Illustration of third performance hypothesis.

There are situations and specific contexts which moderate the relationship of MCS on performance, namely competition and high-growth. Startups in uncertain environments and with high growth ambitions are more likely to develop financial statements (Cassar, 2009). Uncertainty and complexity are important drivers of MCS development according to the literature (Chenhall, 2003). In high-growth companies, managers are freed from administrative duties by formal management controls and have more time to focus on growth strategies (Davila et al., 2015). Early evidence suggests that competition emphasizes the use of formal controls (Khandwalla, 1972). With developed MCS, managers are better at gathering, processing and sharing relevant market information (Tushman & Nadler, 1978). In competitive environments, the expected benefits of MCS outweigh the costs of these formal controls (Chenhall, 2003). Therefore, I expect the impact of MCS on performance to vary along the two contextual factors high-growth and competitive environment in the following ways (see Figure 8):

P4: High adoption rates of the traditional accounting controls, planning, cybernetic controls, and reward and compensation, increase the performance of startups in high-growth environments.

P5: High adoption rates of the traditional accounting controls, planning, cybernetic controls, and reward and compensation, increase the performance of startups in competitive environments.

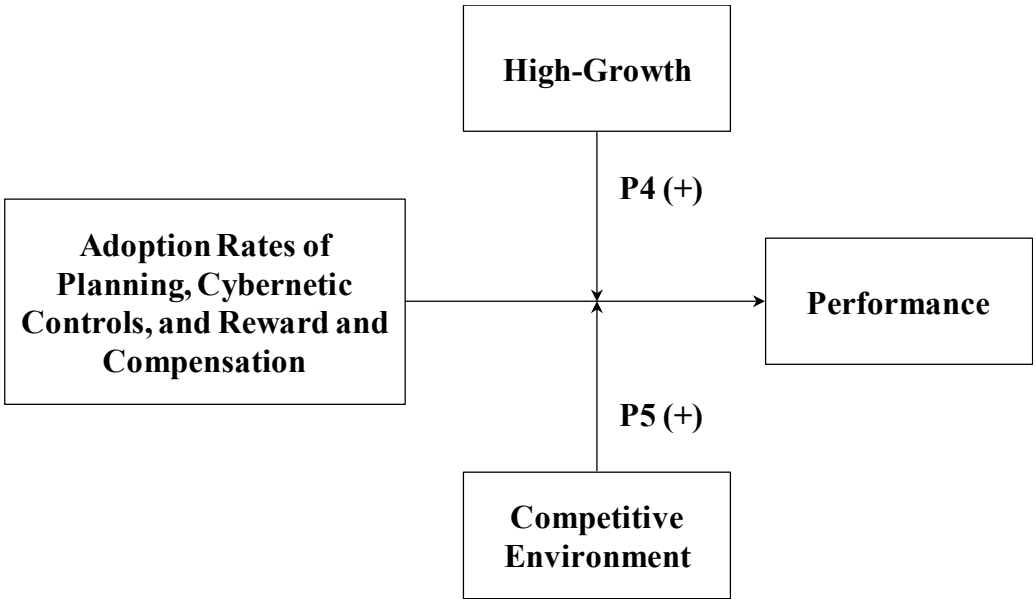

Figure 8: Illustration of the fourth and fifth performance hypothesis.

In summary, I expect the adoption of MCS to have a positive impact on employee growth, performance, and funding of startups. My contributions and the newness of my hypotheses are as follows: The relationship between employee growth and the adoption of MCS has not been tested on a sample of Swiss startups to the best of my knowledge. Furthermore, the relationship between the introduction of MCS and the amount of funding in startups is a novel hypothesis. Finally, the performance impact of the adoption of traditional accounting controls in a high-growth and a competitive environment is evaluated for the first time within this thesis.

3.4 Empirical Research on MCS as a Package

Understanding MCS as a package and the existence of explicit configurations of control in companies has been identified as a promising research area by a number of researchers (Malmi & Brown, 2008; Otley, 1980; Strauss et al., 2013; Strauss & Zecher, 2013). The identification of configurations can help to understand why similar patterns emerge across companies (Henri, 2008). As pointed out in section 2.4, little research has been conducted in this field. In the following, I give an overview of the empirical research on MCS as a package on mature companies and startups. I show that no taxonomy for startups exists but is needed for further theorizing in management accounting.

Empirical research on MCS as a package is limited. To my best knowledge only one article analyzes the whole package at a firm level and tries to identify configurations of control that are common among a number of firms with an exploratory analysis (Bedford & Malmi, 2015). Three further articles exist that identify common configurations of a large part of the MCS package at the firm level with a similar analysis (Chenhall & Langfield-Smith, 1998; Henri, 2008; Moores & Yuen, 2001). Research on configurations of control in startups is limited to two case-study-based articles (Sandelin, 2008; Strauss et al., 2013). All six articles are discussed next.

The exploratory analysis of configurations of control by Bedford & Malmi (2015) is based on a large sample of mature companies. The authors study combinations of accounting and other control mechanisms as well as the context in which these combinations exist. They use the MCS framework developed by Malmi & Brown (2008), which is described in section 2.3.4. Each of the MCS categories such as strategic planning, measurement, policies and procedures is measured by a number of constructs.

In total 22 constructs from different articles are used (Bedford & Malmi, 2015, p. 7). The context factors are divided into technology, environment, and strategy. Each component is measured by a number of constructs; 11 in total (Bedford & Malmi, 2015, p. 9). Additionally, three company characteristics are used: size, age, and stock-listing of the company. The results show evidence for the appearance of specific configurations across organizations. Five distinct clusters of MCS configurations are identified. According to the interpretation of the authors the packages are called simple, results, action, devolved, and hybrid control (Bedford & Malmi, 2015, p. 13). The authors then analyze the context factors among those five clusters and find specific context characteristics together with each MCS configuration. Predictive discriminant analysis is conducted with prediction rates of 50 percent and more for three out of the five groups to verify whether those context factors can predict the affiliation to one of the five configurations. The study provides a first attempt to answer the research call by Malmi & Brown (2008) whether specific configurations appear across organizations with the same context factors. Following the argumentation of Gerdin (2005) the authors emphasize that there is not necessarily a one-to-one relationship between context factors and the configuration of the control package. In conclusion, Bedford & Malmi (2015) are able to show some stable configurations of control across organizations based on statistical methods (cluster analysis and predictive discriminant analysis) and a characterization of these configurations.

Three older studies on large parts of the MCS package at the firm level also use cluster analysis to find common configurations of control among different firms. Chenhall & Langfield-Smith (1998) analyze the configurations of six management accounting techniques and their relationship to strategic priorities and management techniques. Those six techniques include benchmarking, strategic planning, and other measures but lack administrative and cultural controls. Moores & Yuen (2001) take a life-cycle perspective towards the development of companies and cluster their firms in five life-cycle groups. They focus their analysis on formality attributes of management accounting systems and they show how strategy and organizational complexity change the reliance on accounting information. Henri (2008) develops a taxonomy with three groups to describe different configurations of PMS. These three groups are: PMS as outcomes surveillance mechanism, PMS as a management support tool, and PMS as an institutionalized organizational process. The clustering dimensions include four measures each for PMS design

and for PMS use. Although all three articles find configurations of control for a limited part of the MCS package none of them set out to describe the whole package at the firm level. The two articles discussed next are on growth firms and startups respectively.

Sandelin (2008) uses two case studies at different stages of a growth firm in order to understand different configurations of MCS as a package. The author especially focuses on couplings among cultural, personnel, action, and result controls. His findings are that functionality and internal consistency of the MCS package depend on the reciprocal linkages between the primary mode and other controls. Further, functional demands are the main driver for the variety within the MCS package (Sandelin, 2008, p. 324). He acknowledges the fact that "management accounting change and stability can be significantly affected by informal control practices" (Sandelin, 2008, p. 340). In conclusion, the configuration of the MCS package in this growth firm depends on the functional demands and informal controls.

Strauss et al. (2013) conduct a cross-sectional field study on 20 startups. They identified the specific stakeholders of startups that influence the MCS package over three distinct development stages (nascent, start-up, and post-start-up stage). The authors identified three configuration types of MCS: connected MCS, decoupled MCS, and empty-shell MCS. Connected MCS influence each other, e.g. the "use of operative planning led to establishing an incentive system for sales personnel" (Strauss et al., 2013, p. 175). Decoupled MCS satisfy the demands of stakeholders such as board members and VCs (Strauss et al., 2013, p. 175). Those decoupled MCS function as separate control mechanisms without integration into the MCS package of the startup. Empty-shel MCS are components which are exclusively used to satisfy the needs of a stakeholder but are not used to actually influence and control parts of the startup. In conclusion, the authors find a typology for how MCS are connected in startups but do not investigate which configurations of control are common among startups.

The presented articles show first results on the identification of common configurations of control across organizations. Bedford & Malmi (2015) succeed in providing a five-cluster classification for mature companies. The other authors either only investigate parts of the MCS package or do not provide a taxonomy for whole configurations.

The classification for mature companies developed by Bedford & Malmi (2015) is not feasible to use for startups due to a number of factors. As a result of their limited resources, startups will not implement a full set of MCS at the very beginning of their existence but build it over time. As suggested by Strauss et al. (2013) the life-cycle of a startup shows different demands for the development of its MCS package. Enough creativity and flexibility in startups is necessary to defy under market pressure. Therefore, researcher suggests that a loose coupling of the MCS within the package is the best way to handle the context of a startup (Lukka & Granlund, 2003, p. 255). It is especially important for startups to understand the possible configurations of this package. However, the literature does not provide an adequate taxonomy.

Consequently, to enhance this field of knowledge, I will find such a taxonomy of configurations of control in startups. I will build upon the MCS framework for startup research and the methodology used by Bedford & Malmi (2015) to identify stable configuration of MCS across organizations. Thereby answering the call for research in this respect by Malmi & Brown (2008). The resulting taxonomy can guide entrepreneurs and managers of startups, especially to understand the possible choices of MCS and which MCS to implement together.

3.5 Stakeholders' Influence and the Development of the MCS Package

In this section, I develop hypotheses about which important stakeholders influence the development of the MCS package in startups. I use institutional theory to show that stakeholders can exert pressure and startups will respond by adapting their MCS package. The relevant stakeholders are identified using results from the research on startups and on environmental control since the latter is very advanced in understanding the influence of stakeholders on MCS. The section ends with six testable hypotheses concerning which stakeholders influence which part of the MCS package.

I use institutional theory to understand stakeholders' influence on the development of the MCS package in startups in line with Strauss et al. (2013). The influence of institutions on organizational behavior and design as well as the institutionalization of practices and roles are the focus of institutional theory (Scott, 2001, 2003; Scott & Meyer, 1983). "Institutions are social structures that have attained a high degree of resilience. [They] are composed of cultural-cognitive, normative, and regulative elements

that, together with associated activities and resources, provide stability and meaning to social life. […] Institutions by definition connote stability but are subject to change processes, both incremental and discontinuous." (Scott, 2001, p. 48). Firms exist within an institutional field that consists of suppliers, customers, government agencies, competitors, and other organizations (DiMaggio & Powell, 1983). This institutional field defines the boundaries of firms for the design and use of actions and structure (Hoffman, 1997). One part of this structure is the MCS package.

MCS help companies to adapt to the environment and achieve the goals of the different stakeholder groups (Merchant & Otley, 2006). The MCS package is not stable over the life of a firm because different interest groups influence the introduction of individual MCS (Malmi & Brown, 2008, p. 291). This is especially true for startups, where it is critical to align different interests of stakeholders with the MCS package (Strauss et al., 2013, p. 159). The different stakeholder needs should be reflected and balanced in this MCS package (Cumming & Johan, 2007; Jurkštiene et al., 2008). Firms react to pressure from institutions and adapt their controls (Zilber, 2008). These pressures can come from outside as well as from inside the organization.

For startups, several stakeholders exert pressure and can influence the development of MCS (Strauss et al., 2013). In social responsibility accounting, the stakeholders' influence on the design of the MCS is widely acknowledged and researched (de Villiers, Rouse, & Kerr, 2014; Pondeville, Swaen, & De Rongé, 2013; Rodrigue, Magnan, & Boulianne, 2013). Stakeholders are reported to choose the measures used in reporting and to influence managers (de Villiers et al., 2014). The perceived pressure by specific stakeholder groups such as regulatory stakeholders is sometimes more important to managers than obvious pressure from other groups (Pondeville et al., 2013). The influence of stakeholders is recognized at strategic and performance measurement levels (Rodrigue et al., 2013).

In Freeman's broad definition, a stakeholder is "any group or individual who can affect or is affected by the achievement of the organization's objectives" (R. E. Freeman, 1984, p. 46). Several classifications of stakeholders exist. To operationalize this definition, Clarkson (1995) differentiates between primary and secondary stakeholders depending on whether the group is necessary for the going concern of the company. Primary stakeholders are for example investors, employees, suppliers, customers, and the government.

The secondary stakeholders are e.g. media, pressure groups, competitors, and the general public. Caroll & Buchholtz (2009) use the same labels but define primary (social) stakeholders as groups with a direct stake in the company. Therefore, government is considered a secondary (social) stakeholder in their classification. Buysse & Verbeke (2003) use a principal component analysis on survey data to differentiate four stakeholder groups. They divide the primary stakeholders further in an internal (e.g. employees, investors) and an external (e.g. customers, suppliers) group. Regulatory stakeholders such as governments and public agencies are separated from the secondary stakeholder group. Although these classifications are helpful, Mitchell, Agle, & Wood (1997) argue that the perceived pressure from stakeholder groups by managers is the most important determinant for how influential a stakeholder group is on the company.

After the above overview on general definitions of stakeholder groups for companies, the relevant stakeholders for startups are discussed next. Strauss et al. (2013) identify the central stakeholder groups for startups in interviews with many managers to be initial and prospective employees, initial VC, and customers (for details see Table 64 in the Appendix). In the sustainability context, organizational stakeholders have been identified as the most important group to influence the development of environmental MCS (Pondeville et al., 2013). Organizational stakeholders are defined as managers, owners, and employees. Both of these sets consist of primary stakeholders according to the definition of Clarkson (1995). Synthesizing both sets leads to four central stakeholders for the development of MCS in startups: founders, investors (VC), employees (initial and prospective), and customers. The hypotheses developed next are based on these four groups.

Investors demand projectable success from their investments in startups and demand development of MCS to enable this success. In the nascent stage, their monitoring needs drive the adoption and development of MCS (Strauss et al., 2013, p. 166). Examples of demanded MCS include short-term budgeting for financial forecasts, fast reporting cycles, and cash budgeting (Granlund & Taipaleenmäki, 2005). To check on set milestones by the VC, measurement systems need to be set up (Sweeting, 1991). At the time of exit, VCs focus on efficiency and profitability measures in order to increase the value of the startup (Strauss et al., 2013, p. 172). In case of an initial public offering even more pressure is put on organizing control processes and accounting information systems

(Granlund & Taipaleenmäki, 2005). The conducted interviews with startups and investors as described in section 3.2.4 support this claim. Startups reported demands from investors for professional accounting and reporting. Investors expect professional reports for the valuation of their investments as well as for monitoring opportunities. This leads to the following hypothesis:

S1: Startups show high adoption rates and sophistication of planning, cybernetic controls, and reward and compensation systems when investors' influence on the MCS development is high.

Employees are among the central stakeholders for startups. New and old employees put pressure on the development of MCS. Two aspects can be differentiated as described in the following. First, new employees need integration into the firms' values and beliefs. Startups need to implement controls to spread shared values and beliefs of the founding team across new employees. Therefore, the cultural controls in startups are developed when employees increase their influence on the development of MCS.

Second, new and prospective employees demand some formal structure to see the legitimacy of the startup. This claim is supported by findings of Strauss et al. (2013). Further, startups introduce MCS to attract and maintain employees as well as to increase efficiency. The increasing number of employees leads to the introduction of team composition guidelines in order to build efficient teams (Strauss et al., 2013, p. 171). Additionally, personnel controls are required to handle the growth in employees efficiently (Sandelin, 2008, p. 328). With higher employees' influence, pressure on the development of formal MCS increases.

In conclusion, cultural and administrative controls are the most important areas which employees influence through their demands. These arguments lead to the following two hypotheses on the effect of employees' influence on the development of MCS.

S2: Startups show high adoption rates and sophistication of cultural controls when employees' influence on the MCS development is high.

S3: Startups show high adoption rates and sophistication of administrative controls when employees' influence on the MCS development is high.

Customers need a reliable supplier. Therefore, the change from early adopters to "early majority" leads to increased formalization needs for the startup (Strauss et al., 2013, p. 170). For business-to-business (B2B) startups, a pressure to develop interfaces to the customers exists (Strauss et al., 2013, p. 173). Additionally, more senior management is expected which then introduces formal MCS (Strauss et al., 2013, p. 173). Formalization within the MCS framework as presented in section 3.2 is mainly associated with administrative controls and cybernetic controls.

These arguments lead to the following two hypotheses on the effect of customers' influence on the development of MCS.

S4: Startups show high adoption rates and sophistication of administrative controls when customers' influence on the MCS development is high.

S5: Startups show high adoption rates and sophistication of cybernetic controls when customers' influence on the MCS development is high.

Founders are the fourth and final stakeholder group identified to exert pressure on the development of the MCS package. Social or cultural controls such as social events and social meetings are important for entrepreneurs (Collier, 2005). They can be an integral part of their management method (Collier, 2005). Common corporate values and a shared vision are important for a functioning MCS package. Founders have a high interest to maintain the entrepreneurial spirit in their startup to keep an innovation culture (Russell, 1989). An innovation culture, the backbone of startups, can be fostered by shared cultural beliefs and norms (Russell, 1989). Therefore, I propose the following hypothesis on founders' influence on the MCS package:

S6: Startups show high adoption rates and sophistication of cultural controls when founders' influence on the MCS development is high.

Figure 9 presents the developed model for stakeholders' influence. It shows that all five groups of the MCS framework for startups (see section 3.2) are affected by the identified stakeholders. The proposed relationships will be tested in section 5.4.

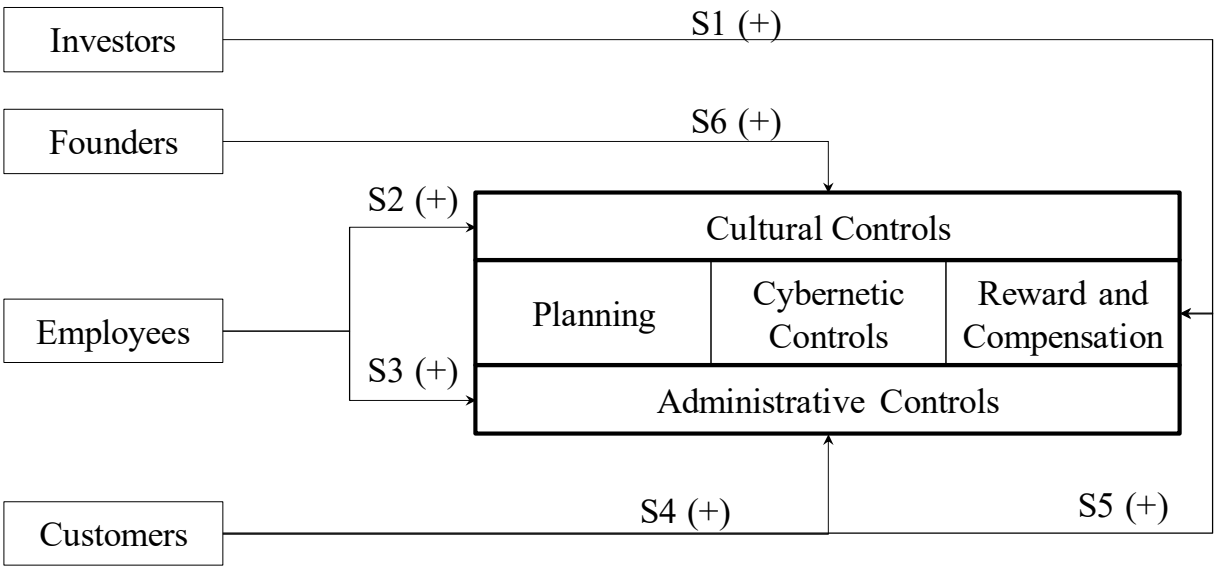

Figure 9: Model for stakeholders' influence on the development of MCS in startups with hypotheses S1-S6.

Besides the proposed relationships between the five groups of the MCS framework and stakeholders, the MCS groups intensities and sophistication levels could influence each other. E.g. the intensity of planning can affect the use of cybernetic controls as well as reward and compensation systems. This has been reported in practice, where the "use of operative planning led to establishing an incentive system for sales personnel" (Strauss et al., 2013, p. 175). Consequently, the hypotheses will be tested additionally with these dependencies between MCS groups in section 5.4.5.7.

3.6 Hypotheses Overview

In the last sections, hypotheses for the performance impact of MCS and the influence of stakeholders on the development of MCS have been developed. Table 4 lists these 11 hypotheses. The next section is concerned with the research design and methodology to test these hypotheses. The results are presented in section 5.

Summary of Hypotheses

No.	Hypothesis
P1	High adoption rates of MCS in early startups have a positive relationship with employee growth.
P2	High adoption rates of MCS in early startups have a positive relationship with the current performance of the startups.
P3	High adoption rates of the traditional accounting controls, planning, cybernetic controls, and reward and compensation, have a positive relationship with the amount of funding the startups receives.
P4	High adoption rates of the traditional accounting controls, planning, cybernetic controls, and reward and compensation, increase the performance of startups in high-growth environments.
P5	High adoption rates of the traditional accounting controls, planning, cybernetic controls, and reward and compensation, increase the performance of startups in competitive environments.
S1	Startups show high adoption rates and sophistication of planning, cybernetic controls, and reward and compensation systems when investors' influence on the MCS development is high.
S2	Startups show high adoption rates of cultural controls when employees' influence on the MCS development is high.
S3	Startups show high adoption rates and sophistication of administrative controls when employees' influence on the MCS development is high.
S4	Startups show high adoption rates and sophistication of administrative controls when customers' influence on the MCS development is high.
S5	Startups show high adoption rates and sophistication of cybernetic controls when customers' influence on the MCS development is high.
S6	Startups show high adoption rates and sophistication of cultural controls when founders' influence on the MCS development is high.

Table 4: Summary of hypotheses.

4 Research Design and Methodology

4.1 Sample and Data Collection

In this section, I present the identified data sources, the process of identification of target companies and respondents, and the procedure of data collection.

4.1.1 Sample Selection

Subject of this thesis are Swiss and German startups. Therefore, a sample for the population is gathered. In line with the research articles in the field (Cardinal et al., 2004; Davila, 2005; Davila, Foster, & Li, 2009) startups are defined as independent companies being 10 years old or younger. The remainder of this section describes how the Swiss and German startups have been selected.

For the Swiss startup population, two sources are used: The *Top 100 Startup Award* list and the *Swiss Venture Capital Report*. The *Top 100 Startup Award* is a ranking of Swiss startups based on expert opinions and application of the startups.[3] The listed companies are independent at the time of application. The *Swiss Venture Capital Report* lists financing rounds and strategic investments in Swiss startups (Heimann & Kyora, 2016). The *Top 100 Startup Award* list is available for the years 2011 to 2016, the *Swiss Venture Capital Report* for the years 2012 to 2016. All available lists are gathered and the names of startups from the combined list of the two sources are checked for double-entries. In a second step, all startups are checked if they have been acquired in the meantime or are too old. Also, I verify that the companies are still active and their home country is Switzerland. The total number of unique startups between the two sources and the number of eliminated startups can be found in Table 5. The final Swiss sampled population consists of 292 startups.

[3] Startup.ch is a Swiss startup platform by the IFJ Institut für Jungunternehmen ("Startup.ch," 2017). The aim of the platform for the startups is to get the opportunity of contacts with top investors and experts. In February 2017 the site listed 1,491 individual startups in its directory.

Source	Total startups	Unique startups	Unique between the two sources
Top 100 Award	596	285	285
VC Report	390	302	176
Total	986	587	**461**
Thereof			
Not independent (acquired or spin-off with majority shareholder)			42
Inactive/bankrupt			51
Older than 10 years			42
Other country than Switzerland			29
Investment company			5
Eliminated startups			**169**
Final number of startups in Swiss sample			**292**

Table 5: Sampled population of Swiss startups.

The list of German startups is based on multiple sources due to absence of an overview comparable to the ones in Switzerland. At first glance, the platform *Deutsche Startups* seemed representative with about 900 startups listed (Hüsing, 2017). However, around two thirds of the listed firms are inactive, too old or have been acquired. Therefore, the list is not used as a representative sample. Instead multiple sources have been used: *Angel List* with around 300 relevant startups, the *High-Tech Gründerfonds* with more than 300 startups, a list of startups in Hamburg, as well as further lists such as *Startupnight* and *TechFounders*. A total of 750 unique startups was found. 248 eliminated mainly due to inactivity (see Table 6). The final number of German startups in the sampled population is 502.

Source	Unique entries between sources
Angel List	281
High-Tech Gründerfonds	225
Hamburg Startups	84
Other sources (incl. Startupnight, StartupRanking, TechFounders)	160
Total	**750**
Thereof	
Not independent (acquired or spin-off with majority shareholder)	28
Inactive/bankrupt	113
Older than 10 years	41
Other country than Germany	56
Not relevant (Investment company, one-man startup, app only)	10
Eliminated startups	**248**
Final number of startups in German sample	**502**

Table 6: Sampled population of German startups.

The total sampled population for Switzerland and Germany consists of 794 startups. The next section covers how data for this representative sample is collected. Afterwards, descriptive sample characteristics are provided.

4.1.2 Data Collection

4.1.2.1 Survey Construction

MCS research suffers from a lack of public databases and publicly available documentation of internal control practices (Otley, 2003). Therefore, I conduct my own data collection by means of a survey, since the relevant MCS data of the identified startups is not publicly available. With the survey, I collect a large sample of respondents compared to other means of data collection, e.g. case studies (Merchant & Otley, 2006). This section describes how the survey is built while the next section covers the data collection procedure.

The survey is constructed partly based on validated questions from similar studies in the field of MCS and startups (Davila, Foster, & Li, 2009; Sandino, 2004). Further constructs and measurement instruments draw on previous research (see section 4.2 for further details). I follow the approach by Sandino (2004) to develop the questionnaire:

Rewriting to make it as consistent, clear, and simple as possible. Further rules of wording and formatting by Bernard (2013) are followed. The order of questions is optimized for higher response rate by grouping similar questions together and varying of question formats.

The survey contains general questions about the startup, about MCS introduction and use, as well as questions about the stakeholders' influence on the development of MCS. Further, questions on financing and perceived performance are part of the survey. For the full survey see the Appendix on page 155 following.

The survey was validated by a piloting study and multiple feedback loops. It was checked with management accounting professors and PhD students for clearness and verification of completion time. Further, three startup managers filled in the survey and provided feedback in a pilot study. Based on the feedback, two adjustments were made to the original survey. First, no questions for revenue numbers are asked since this information was deemed confidential by the managers and would not be provided. Second, the number of MCS compared to the total framework was reduced to balance the number of questions while keeping the response rate high.[4] Consistency between German and English version of the questionnaire was achieved with the translation-back translation approach. All feedback has been incorporated into the final version. The survey was implemented with Unipark.

Based on the survey data a number of measures is derived for the analysis of performance impact of MCS on startups, the configurations of control, and the stakeholders' influence on the MCS development. All three *areas* have different sets of dependent, independent, and control variables. These are described in section 4.2. The following section describes how the data collection process was conducted.

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[4] The original 45 individual MCS are reduced to 32 items. The aim was to have five or less items per sub-category, e.g. measurement systems as part of the cybernetic controls was reduced from nine to five while all administrative controls have been kept since there are a maximum of four per sub-category. In general, those items are kept that are mentioned most often in the different articles and interviews. Additionally, all items are ranked by three criteria to not miss important current developments: mentioned in interviews, mentioned in newer articles (Davila et al., 2015; Strauss et al., 2013), and the percentage of introduction until the end of the fifth year according to Davila & Foster (2007).

4.1.2.2 Data Collection Process

This section describes how startups were contacted, the survey was implemented, and the data was collected. Since collecting "good" data in MCS research is difficult (Merchant & Otley, 2006, p. 799), I follow established methods to secure high quality (Dillman, Smyth, & Christian, 2014).

Contact information was gathered from the websites for all startups identified in section 4.1.1. The websites were consulted to identify the current CEO, CFO, and further startup managers with possible knowledge on MCS. From the total of 794 startups 10 had to be eliminated due to lack of contact information. In total, email addresses from 964 startup managers from 784 startups were gathered. Individual access codes were generated for every contact to track whether contacts responded to the survey and finished it.

Following the tailored design method, the startup managers were contacted via email and asked to participate in the survey (Dillman et al., 2014). They were incentivized with an individual benchmark report of the survey results. The first reminder was sent one week after the invitation. The second reminder was sent another two weeks later. The contact procedure for the total sample was staggered and lasted from mid-October 2016 to mid-December 2016.

In total, 109 respondents finished the survey (see Table 7 for details). Nine responses had to be eliminated because the startups were either older than 10 years or not independent companies anymore.[5] The final number of responses used is 100. This is a considerably larger sample size to those normally used in comparative studies (Davila & Foster, 2005, 2007; Davila et al., 2015; Strehle et al., 2010). The final total response rate is 12.8 percent, which is a common response rate for management accounting surveys (Chenhall, 2012). There is a high difference between Switzerland (18.3 percent) and Germany (9.5 percent). Multiple German startup managers responded that they do not have the capacity to participate in the survey because they are receiving too many

[5] Both attributes were checked with questions at the start of the survey to ensure that only startups according to the definition in this thesis are part of the final sample.

similar requests every week. Swiss startup managers never gave this response. Therefore, the difference in the response rate could be attributed to the higher number of requests for German startups.

Survey Response Rate for Swiss and German Startups

	Switzerland	Germany	Total
Contacted startups	290	494	784
Finished surveys	57	52	109
Response rate	**19.7%**	**10.5%**	**13.9%**
Eliminations	4	5	9
Final sample	53	47	100
Final response rate	**18.3%**	**9.5%**	**12.8%**

Table 7: Response rates for Swiss and German startups.

4.1.3 Descriptive Sample Characteristics

The sample consists about equally of Swiss (53 percent) and German (47 percent) companies (see Table 8). Most companies are in the *core firm size region* with 10 to 150 employees (65 percent) according to the startup definition by a comparable study (Strehle et al., 2010). Some researchers further define startups to have between 50 and 150 employees (Davila & Foster, 2005, 2007). This would have limited the sample size to only 11 observations. I use the whole data set of 100 observations without restrictions on the number of employees to represent the whole variety of startups. Nevertheless, the results are verified with a sample of large firms (more than 10 employees and freelancers) as a robustness check throughout the analysis. The main role of the respondents is CEO (68 percent) and CFO (15 percent). Both groups have a very good overview of the introduced MCS within their companies. Therefore, the provided information can be deemed to correctly reflect the situation in the startups.

Descriptive sample characteristics

Variable		Total	Switzerland	Germany
n		**100**	53	47
Firm Size	< 10 employees	**34**	20	14
	10-150 employees	**65**	33	32
	> 150 employees	**1**	0	1
Role of respondents	CEO	**68**	39	29
	CFO	**15**	9	6
	Other	**17**	5	12
Questionnaire language	German	**72**	31	41
	English	**28**	22	6
Industry	ICT	**33**	14	19
	Life Sciences	**25**	16	9
	Product & Services	**16**	8	8
	Other	**26**	15	11
Firm Age	Younger than 5 years	**51**	20	31
	5 to 10 years	**49**	33	16

Table 8: Descriptive sample characteristics.

Most respondents answered the questionnaire in German.[6] The startups are foremost active in the information and communication technology (ICT) (33 percent) and life sciences industry (25 percent). The Swiss startups in the sample are considerably older than the German startups.

4.2 Variable Measurement

4.2.1 Introduction

Several variables are derived to answer the research questions of this thesis. Depending on the individual hypotheses and research questions, those variables are used as dependent, independent, and control variables. All measures are based on the survey data

[6] Statistics for startups managers that answered the questionnaire in English show some significant differences. There are mostly from the Life Sciences industry (39 vs. 19 percent) and are less likely to generate revenue (71 vs. 93 percent). They show both lower scores for the competitive environment (13.43 vs. 16.41) and the perceived performance (16.88 vs. 19.92). None of the MCS measures for intensity or sophistication show significant differences.

described in the previous section. The variables can be categorized into four groups. Those groups are variables related to the MCS of startups, variables related to the influence of stakeholders, performance variables, and firm variables. All four groups are discussed in detail in this section.

4.2.2 MCS-related Variables

Two sets of measurements are constructed to capture the use of MCS in startups: intensity and sophistication. Intensity is measured by counting the number of introduced MCS belonging to each group of the MCS framework developed in section 3.2. This type of overall score of elements implemented is done by many researchers in the field of startups (e.g. Davila et al., 2015, 2009; Davila, 2005; Sandino, 2007; Wijbenga et al., 2007) as well as in the wider management accounting literature (Kennedy & Fiss, 2009; Speckbacher, Bischof, & Pfeiffer, 2003).

The intensity variables are calculated as follows: The individual MCS are dummy variables and are coded as one from the year on the MCS was introduced and zero if the MCS is not present. The MCS intensity for each of the five groups (cultural controls, administrative controls, planning, cybernetic controls, reward and compensation) is calculated by averaging over the number of individual MCS for each year reported in the survey. The total MCS intensity is calculated based on the average of all individual MCS present in each year of the startup.

This concept of dichotomy – the presence or absence of individual MCS – has been criticized by some authors (Ansari, Fiss, & Zajac, 2010; Lueg & Radlach, 2015). Instead the measurement of different levels of sophistication, the "dosage" of a practice implemented, is recommended to be used (Ansari et al., 2010, p. 72). To follow this recommendation, I use MCS sophistication as an additional measure.

Different approaches towards MCS sophistication or MCS implementation exist. Most of these approaches are developed for specific MCS and are not applicable to the whole range of MCS in a firm. Burkert & Lueg (2013) develop measures for value-based management based on second level constructs with six dimensions, amongst others are key performance indicators and value-driver development, action plan identification, and target setting. These dimensions represent different elements of value-based management. Speckbacher et al. (2003) develop a scale for the state of implementation of

balanced scorecards (BSC). The scale ranges from "No contact with BSC thus far" to "BSC implemented for the entire company" (Speckbacher et al., 2003, p. 369). The scale has too much differentiation for the implementation phase (knowing, studying, project set up), which is not feasible for startups since they take a shirt-sleeve approach, e.g. the approach needs to be simpler and more practical. The scale is developed for mature companies with differentiation of implementation on the business unit level. It is therefore also not usable for MCS in startups. The implementation measure for total quality management by Kennedy & Fiss (2009) is constructed differently. The authors ask in their survey to which extent people understand and integrate total quality management in their daily work. This measurement is very general but still can capture the different levels of implementation and sophistication of MCS in a firm.

I generalize the question by Kennedy & Fiss (2009) to MCS in the following way: *"Please indicate the extent to which you believe that at this point in time the following management control systems (MCS) have been implemented throughout your company. Please consider the extent to which people in your company understand and integrate these MCS in their daily work."* I use a seven-point Likert scale with the same anchors as Kennedy & Fiss (2009) ranging from *"1 - not at all used"* over *"4 - actively used by about half of the organization"* to *"7 - actively used by 100% of the organization"* (see questions 5 and 18 on page 157 and 159 in the Appendix). The question is only asked for individual MCS that have been introduced in the startups. Otherwise the variable is coded with zero. The answer "not at all used" for an introduced MCS captures the existence of empty-shell MCS in the startups. Empty-shell MCS according to Strauss et al. (2013) are MCS that are introduced but not used. All sophistication scores for the individual MCS are averaged for each of the five groups in the same fashion as the MCS intensity of the groups. The sophistication questions are only asked for the current state in 2016. Therefore, no values exist for prior years in contrast to the MCS intensity.

The internal reliability of the two measurements is evaluated by using Cronbach's alpha (Hair, Black, Babin, & Anderson, 2009). The results of the 10 variables are given in Table 9. The measures in general show high alphas and therefore have an acceptable internal reliability. The alpha for cultural controls (0.68) is below the recommended acceptable limit of 0.7 (Nunnally & Bernstein, 1994). Also, the alphas of sophistication measurement of cultural controls (0.57) and of administrative controls (0.61) are below

that limit. Dropping individual MCS from the scale does not improve the alpha sufficiently. The alphas are taken as acceptable for exploratory studies in line with other researchers (Pondeville et al., 2013; Sponem & Lambert, 2016), but the connected results will be interpreted with these limitations in mind.

Cronbach's Alpha for MCS Measurements

MCS Group	Number of Items	Intensity	Sophistication
Cultural Controls	5	0.68	0.57
Administrative Controls	10	0.78	0.61
Planning	6	0.83	0.75
Cybernetic Controls	8	0.87	0.77
Reward and Compensation	3	0.81	0.83

Table 9: Cronbach's alpha for MCS intensity and MCS sophistication.

4.2.3 Stakeholder Variables

The influence of stakeholders on the decision of managers is an often-discussed topic for environmental management control systems as pointed out in section 3.5 (de Villiers et al., 2014; Pondeville et al., 2013; Rodrigue et al., 2013). Therefore, I develop my own generalized measurement for MCS based on this research area. The existing approaches are presented next before I develop my own measurement.

Pondeville et al. (2013) use a measure of perceived stakeholder pressures based on a five-point Likert scale ranging from *"1=not at all influenced by"* to *"5=very much influenced by"*. Each of the 24 identified stakeholder groups is rated by the respondents on that scale. The measurement aims at finding common stakeholder groups such as regulatory stakeholders and market stakeholders. Since I only have four stakeholders (founders, investors, employees, and customers), this approach is not feasible.

Rodrigue, Magnan, & Boulianne (2013) analyze the stakeholders' influence on environmental strategy in more detail. The authors identify four types of influences stakeholders can use: influence mediated through strategy, direct and indirect effect such as asking for measures at events, influence through a joint effort for sustainability, and environmental benchmarking. The last two types are environmental-specific. The first two are more general.

Based on the presented research above, I develop the following question to measure stakeholders' influence on the MCS development in startups: *"How influential were the following stakeholder groups in the development of management control systems within the last 12 months? Influence includes direct influence through requests for the development of MCS and indirect influence through pressure on the choice of strategy or asking for information."* (see question 19 on page 159 in the Appendix). The response is measured on a seven-point Likert scale from *"1 - not influential"* to *"7 - very influential"*. The measurement was validated and tested with startup managers and academics. Further, the survey responses are cross-checked successfully with objective measures such as founders' portion on the top management team and funding amount for verification.

4.2.4 Performance Variables

I use four measures to capture different performance aspects of the startups. First, employee growth based on the development of employees in the startups. Second, the amount of funding acquired by the startup. Last, perceived performance based on a four-item construct as well as overall performance, which is one of the dimensions of the construct. All variables are described in detail in this section.

Frequently used measures of performance in the literature are growth and profitability (Brinckmann et al., 2010). Due to the lack of profits in most startups, profitability is not used in this thesis. Growth is either defined as growth in revenues or growth in employees by researchers. Revenue growth cannot be used since most startups are not allowed to share revenue information with outsiders due to confidentiality agreements. Therefore, employee growth is used as a performance measure as it has been done in other studies (Davila, 2005; Sandino, 2007; Strehle et al., 2010). It is defined as the change in the number of employees compared to the previous year. The data of the questionnaire allows the calculation of employee growth over many years of the startup since the respondents are asked for a full history of employee development of their startup.

The acquired funding amount of the startups is used as an objective financial measure of performance. The funding from German startups is measured in Euro. To form a common funding variable those figures are transformed to Swiss Francs (CHF) with the average annual exchange rate for the respective year, since the funding can occur at any

time during the year. The exchange rates are taken from the Swiss Federal Tax Administration (2017). From the survey data, it is possible to derive the cumulative as well as the annual funding amount. Both variables are used in the analysis.

The firm performance is measured as a time-independent variable based on the subjective evaluation of the respondent. A "subjective performance measurements might not capture the true performance effects as accurately as objective performance measurements due to the bias of the respondent" (Brinckmann et al., 2010, p. 36). Still some authors argue that neither category, objective nor subjective measurements of performance, are superior to the other (Dess & Robinson, 1984; Henri, 2006; Venkatraman & Ramanujam, 1987). Sandino (2007) uses a subjective performance measure in the context of retail startups and MCS. I therefore argue that a perceived performance measure is the best measure in startups due to the lack of other common financial performance indicators.

The perceived performance of startups is measured by a performance indicator construct developed by Deshpande, Farley, & Webster (1993) and Kammerlander, Burger, Fust, & Fueglistaller (2015). On a seven-point Likert scale respondents are asked how they would assess the company's performance over the last 12 months relative to its competitors in terms of: overall performance, market share, revenue growth, and profitability. The original construct asked for the last 36 months. Since startups act in a fast-moving environment, the period is shortened to the last 12 months. The construct shows a good internal reliability measured by a Cronbach's alpha of 0.77 (Hair et al., 2009). The first of the four items is used as single-item construct for the overall performance. This is in accordance with the use of Sandino (2007) in her study.

4.2.5 Firm Variables

Several firm variables including age, size, industry, etc. are constructed from the survey responses to capture different aspects of the startups. All of them are described in this section.

The age is calculated as the number of years since the startup was founded. Startups founded in 2016 are measured as being one year old no matter in which month they have been founded. The oldest startups in the sample were founded in 2007.

The firm size is in general defined as the average number of employees per year. It is calculated as the average of employees at the beginning and the end of the year. For the analysis of employee growth, the firm size is defined as the number of employees at the end of the year. Since the number of employees can be a misleading indicator for the firm size due to a high degree of outsourcing among startups, the average number of freelancers is added to the average firm size. In the following, this measure is called total firm size or firm size including freelancers. It is always an average number per year.

The influence of venture capitalists (VC) on MCS is an often-discussed topic in the literature. Researchers mostly found a positive relationship between the presence of a VC and the adoption and intensity of MCS (Davila, 2005; Davila & Foster, 2005, 2007; Strehle et al., 2010). Some articles did not find a significant impact of VC presence on the MCS development (Cassar, 2009; Davila et al., 2015; Sandino, 2007). The variable VC is defined as one beginning from the year the first VC became investor of a startup.

There are three variables connected to the top management team of the startup: The replacement of the founder by a chief executive officer (CEO), the presence of a full-time financial manager (CFO), and the portion of founders on the top management team (TMT). The benefits from MCS are intangible and therefore previous experience with them increases the knowledge on their effect. Accordingly studies include CEO experience to reflect this cost-benefit relationship (Davila & Foster, 2005; Sandino, 2007). The variable is coded as one from the year the founder was replaced by another CEO and zero otherwise. Hiring of a CFO is another driver of MCS adoption. The variable is coded as one from the year the startup employed a CFO and zero otherwise. The portion of founders on the top management team is calculated as the number of founders divided by the total number of members of the TMT. It is an objective indicator for the influence of founders and used to validate the stakeholders' influence. The measure represents the current state in the TMT at the time of the survey. Therefore, it cannot be used in a longitudinal setting such as the other two variables, CEO change and hiring of a CFO.

Industry affiliation is used as a control variable as it has been done by other authors (Davila & Foster, 2005, 2007; Wijbenga et al., 2007). The startups are distinguished by

belonging to the two main industries, ICT and life sciences, or any other industry. Additionally, the respondents were asked whether the startups can be classified as business-to-business (B2B) or not.

Two time-dependent dummy variables for revenue are generated from the survey data. The variables are one beginning from the year of the first revenue respectively from the first international revenue (Davila et al., 2015; Strehle et al., 2010). Besides the described funding amount variable, the number of funding rounds is measured as well. Funding rounds represent the number funding rounds by the startups in each year. The total funding rounds measure is the sum of all funding rounds for the startups.

International activities are measured as a time-dependent dummy variable that is one from the time the startup established an office or production site outside Switzerland or Germany respectively. There is a positive association between international operations and MCS intensity in startups (Davila & Foster, 2005, 2007). High growth is also a time-dependent dummy variable that is one if the company's annual headcount growth rate ranks in the top half of the sample in the year and zero otherwise (Davila et al., 2015).

The intensity of the competitive environment of the startup is measured by four items on a seven-point Likert scale developed by Jaworski & Kohli (1993) and Birkinshaw, Hood, & Jonsson (1998). It has been used by Jansen, Van Den Bosch, & Volberda (2006), and recently by Kammerlander et al. (2015). The respondents are asked how strongly they agree or disagree with the following statements about their competitive environment: Competition in our local market is intense / Our organizational unit has relatively strong competitors / Competition in our local market is extremely high / Price competition is a characteristic of our local market (see question 23 to 26 on page 160 in the Appendix). The competitive environment is measured by the sum of the answers to the four questions. The construct shows a good internal reliability measured by a Cronbach's alpha of 0.79 (Hair et al., 2009).

4.2.6 Concluding Remarks

Table 10 and Table 11 give an overview of the described variables from the previous sections. For every variable, it is indicated whether the variable is available for all years such as the MCS intensity variables or only for the year 2016, e.g. the current state of the startup such as the MCS sophistication. The following empirical results in chapter 5

are structured according to the three research questions of the thesis. For each section the variables are used differently. The MCS intensity variables are independent variables for the analysis of startup performance, cluster variables for the explorative analysis of configurations of control, and dependent variables in the analysis of stakeholders' influence on the development of MCS.

Variables and Their Roles

Variables	Time Frame	Roles		
		Performance (5.2)	Configurations of Control (5.3)	Stakeholders' Influence (5.4)
MCS Intensity				
Cultural Controls	AY	IV	Cluster V	DV
Administrative Controls	AY	IV	Cluster V	DV
Planning	AY	IV	Cluster V	DV
Cybernetic Controls	AY	IV	Cluster V	DV
Reward and Compensation	AY	IV	Cluster V	DV
MCS Sophistication				
Cultural Controls	2016		Cluster V	DV
Administrative Controls	2016		Cluster V	DV
Planning	2016		Cluster V	DV
Cybernetic Controls	2016		Cluster V	DV
Reward and Compensation	2016		Cluster V	DV
Stakeholders' Influence				
Founders	2016			IV
Investors	2016			IV
Employees	2016			IV
Customers	2016			IV
Performance Variables				
Employee Growth	AY	DV	Context V	
Funding Amount	AY	DV	Context V	
Perceived Performance (construct)	2016	DV		
Overall Performance (item)	2016	DV		

AY = all years; DV = dependent variable; IV = independent variable; V = variable.

Table 10: Variables and their roles in the analysis of performance, of configurations of control, and of stakeholders' influence.

Variables and Their Roles (continued)

Variables	Time Frame	Roles: Performance (5.2)	Roles: Configurations of Control (5.3)	Roles: Stakeholders' Influence (5.4)
Firm Variables				
Age	AY		Context V	Control V
Firm Size	AY	Control V	Context V	Control V
Freelancer	AY		Context V	
VC	AY	Control V	Context V	(Control V)
CEO replacement	AY*			(Control V)
CFO	AY	Control V	Context V	(Control V)
Founders in TMT	2016*			
Industry	AY*	Control V	Context V	(Control V)
B2B	AY*		Context V	Control V
Revenue	AY	Control V	Context V	(Control V)
Intern. Revenue	AY		Context V	(Control V)
Funding Rounds	AY	Control V	Context V	
Intern. Office	AY		Context V	Control V
High-Growth	AY	IV		
Competitive Environment	2016	IV		(Control V)

*) CEO Replacement only for first replacement; industry and B2B are assumed to be stable over the life of the startup; Founders in TMT only used for validation purposes.
AY = all years; DV = dependent variable; IV = independent variable; V = variable.

Table 11: Variables and their roles in the analysis of performance, of configurations of control, and of stakeholders' influence (continued).

The four stakeholders' influence variables are only used for the third research question. The performance variables are used for the performance analysis as well as context variables for the configurations of control section. The firm variables are used as context or control variables only except for high-growth and competitive environment. These two are used as moderators in section 5.2.

4.3 Statistical Methods

4.3.1 Overview

Different statistical methods are used to answer the three research questions (see Table 12). All analyses are carried out using the statistical program R. In the following, the methods used in this thesis (group comparison test, regression analysis, and cluster analysis) are described.

Statistical Methods and Research Questions

Research Question	Type	Used Methods
1. Performance	Hypothesis testing	Group comparison tests, regression analysis (OLS and negative binomial)
2. Configurations of control	Exploratory	Cluster analysis
3. Stakeholders' influence	Hypothesis testing	Group comparison tests, regression analysis (OLS)

Table 12: Statistical methods for research questions.

4.3.2 Group Comparison Tests

In several cases I evaluate differences between groups by splitting the sample and comparing the means of those groups. Two approaches exist to conduct these comparisons: parametric and non-parametric tests. Parametric tests assume a normal distribution for the test variable. To account for differences in variances, I use a Welch parametric test (Welch, 1937). In most cases, the evaluated variables are not normally distributed. Therefore, I additionally conduct the Mann-Whitney-Wilcoxon test (Mann & Whitney, 1947; Wilcoxon, 1946) as a non-parametric test. I report both test statistics for the group comparisons and use the latter test to verify the results of the parametric test as done in a similar study (Strehle, 2006).

4.3.3 Regression Analysis

For the empirical analysis of the research questions one and three, I use ordinary least square (OLS) regressions and maximum likelihood estimation of negative binomial models.

OLS regression analysis is used to test the hypotheses on performance for high-growth and competitive environments as well as early MCS adoption, and on stakeholders' influence on the MCS development of startups. OLS regressions are conducted using robust standard errors to account for heteroscedasticity.

I use a negative binomial regression for funding amount data since the variable violates the model assumptions of the normal distribution (Nadolska & Barkema, 2007). The negative binomial distribution can better handle overdispersed count data (Strehle, 2006). A negative binomial model does not provide an R^2 as do linear regression models.

To test the goodness of fit of the model, I use a likelihood-ratio test, Wald test, and McFadden's pseudo-R^2 (Greene, 2012; Hair et al., 2009; McFadden, 1974). The pseudo-R^2 is comparable to the R^2 from an OLS regression. The higher the pseudo-R^2, the better is the specification of the regression model. No standard exists for the interpretation except for values of zero and one (Long, 1997).

As pointed out in section 4.2, several variables are used in the later analyses. With a limited set of observations and a large number of control variables, variable selection methods are useful to increase the reliability of the results. One possibility is to calculate all subsets of the possible control variable combinations and use the residual sum of squares to select the best set (Furnival, 1971; Morgan & Tatar, 1972; Schatzoff, Tsao, & Fienberg, 1968). However, this is not feasible for large number of variables since the possible number of subsets increases exponentially by 2^p, where p is the number of variables. Forward and backward selection can be used as an alternative with a much smaller number of subsets that need to be calculated (Efroymson, 1960). I use forward and backward selection for control variable selection for the negative binomial regressions. The other shrinkage method that is used in this thesis is lasso (least absolute shrinkage and selection operator). This method sets the coefficient of irrelevant variables to zero and thereby performs variable selection (Tibshirani, 1996). The result are sparse models with only a subset of control variables (James, Witten, Hastie, & Tibshirani, 2013).

4.3.4 Cluster Analysis

4.3.4.1 Introduction

Cluster analysis will be used to identify configurations of control because it provides a structured approach to identify similar cases or observations within a given sample based on a number of clustering variables or characteristics (Everitt, Landau, Leese, & Stahl, 2011; Sarstedt & Mooi, 2014). It is an exploratory method that minimizes the statistical variance between characteristics in the same group, while the inter-group variance is maximized (Ketchen & Shook, 1996). Cluster analysis is most useful in research that is interested in revealing patterns not known ex-ante instead of testing hypotheses (Everitt et al., 2011). The technique has been used in the field of MCS research to study multiple aspects and context variables (Auzair, 2015; Chenhall, 2012; Chenhall &

Langfield-Smith, 1998; Henri, 2008; Moores & Yuen, 2001; Reid & Smith, 2000). Recently it has been applied in two studies (Bedford & Malmi, 2015; Sponem & Lambert, 2016).

Two questions need to be addressed before engaging into cluster analysis: multicollinearity and adequacy of the sample size. The clustering variables should not be highly correlated, e.g. have no correlation over 0.9 (Sarstedt & Mooi, 2014, p. 279). For the sample size of this analysis no generally accepted rule exists (Sarstedt & Mooi, 2014, p. 280). Two recommendations are known for the minimum number of observations for a given number of clustering variables: a minimum of 2^m (Formann, 1984) and *70 times m* (Dolnicar, Grun, Leisch, & Schmidt, 2013), where *m* is the number of clustering variables. Both recommendations lead to very different minimums. For five clustering variables Formann (1984)'s minimum is 32 observations whereas Dolnicar et al. (2013) recommend 350 observations. With nine variables, the recommendations are at about the same level (512 and 630). Using fifteen variables implies more than 32,000 observations when using Formann (1984)'s rule and only 1,050 when following Dolnicar et al. (2013). The differences make it worthwhile to check the sample size and clustering variables against previous studies. Those are discussed next.

Number of Observations per Number of Clustering Variables

Number of Clustering Variables	**9**	**10**	**11**	**13**	**15**	**22**
Recommendations						
Formann (1984)	512	1,024	2,048	8,192	32,768	4,194,304
Dolnicar et al. (2013)	630	700	770	910	1,050	1,540
Research Articles						
Chenhall & Langfield-Smith (1998)					74	
Henri (2008)	383			383		
Moores & Yuen (2001)		49				
Bedford & Malmi (2015)						400
Sponem & Lambert (2016)			269			

Table 13: Number of observations in research articles compared to recommendations.

The five management accounting studies on MCS presented in Table 13 use nine to 22 clustering variables. None of the authors provide the recommended sample size. Henri (2008) uses 383 observations for nine clustering variables. The recommendation is 512 and 630 respectively. This is the closest any of the researchers comes to meeting the

recommended size. Chenhall & Langfield-Smith (1998) use as little as 74 observations for a set of 15 clustering variables. The recommendation would be to use more than 1,000 observations in this case. In general, the sample sizes in management accounting studies using cluster analysis are far below the recommended number of observations.

Two prerequisites need to be met before cluster analysis can be used: clustering variables should not be highly correlated and a minimum sample size depending on the number of clustering variables needs to be available. From the discussion above it is clear that management accounting studies rarely meet the requirements for minimum sample size.

4.3.4.2 Method

Two groups of clustering procedures exist: hierarchical and non-hierarchical procedures. The main difference is that for non-hierarchical procedures the number of clusters needs to be known at the beginning of the process (Hair et al., 2009).

Hierarchical procedures either use agglomerative clustering or divisive clustering (Sarstedt & Mooi, 2014). In agglomerative clustering, the procedure starts with individual observations and merges them to clusters. In divisive clustering the starting point is a single cluster which is split up over the process. Euclidean distance is most widely used measure for dissimilarity between clusters (Sarstedt & Mooi, 2014). Different clustering algorithms exist. Ward's method and the average linkage are used in this thesis due to their ability to handle outliers better than other methods, e.g. complete linkage (Sarstedt & Mooi, 2014, pp. 290–291).

K-means clustering is the most widely used non-hierarchical procedure (Sarstedt & Mooi, 2014). It uses a heuristic algorithm to randomly assign observations to clusters. Over the time of the process cluster affiliation can change (Hair et al., 2009). The number of clusters needs to be specified before conducting the process (Sarstedt & Mooi, 2014, p. 295). The suggested sample size in order to use k-means clustering ranges from 200 (Dougherty, 2013, p. 145) to 500 (Sarstedt & Mooi, 2014, p. 297).

Clustering analysis in management accounting research has often been applied in a two-stage process (Bedford & Malmi, 2015; Henri, 2008; Sponem & Lambert, 2016): First, a hierarchical clustering procedure (often Ward's method) is used to identify the ideal number of clusters. Second, k-means clustering is used to identify the cluster affiliation

because the algorithm is "superior to hierarchical methods as it is less affected by outliers and the presence of irrelevant clustering variables." (Sarstedt & Mooi, 2014, p. 297). Further, non-hierarchical clustering allows for switching cluster membership of observations during the clustering process (Henri, 2008). It is therefore more flexible and superior to the hierarchical procedures. Afterwards, the cluster solution needs to be validated. I will use this two-stage process in my cluster analysis. The identification of the ideal number of clusters is discussed in the next section.

4.3.4.3 Clustering Validity and Number of Clusters

As outlined above, a decision on the number of clusters and their validation is a necessary step in cluster analysis. The decision needs to be based on statistical and practical considerations (Sarstedt & Mooi, 2014). The final clustering result can then additionally be validated using predictive discriminant analysis.

Three statistical considerations are important to undertake: the inspection of a dendrogram, using clustering validity indices, and the consistency of cluster membership between the use of different methods. First, a dendrogram illustrates the result of a hierarchical clustering in a tree diagram. The distance between nodes of the tree is a representation of the measure of dissimilarity between the groups (Sarstedt & Mooi, 2014, p. 293). Second, there are many clustering validity indices which have only been developed recently and are seldom used in the mentioned articles. Only Bedford & Malmi (2015) use one of these indices, the Duda-Hart index. I will use 28 different indices provided by the R package ***NbClust*** to statistically determine the relevant number of clusters (Charrad, Ghazzali, Boiteau, & Niknafs, 2014). Third, multiple methods should be used to determine the cluster membership of observations and the results should differ by not more than 20 percent (Sarstedt & Mooi, 2014, p. 300). I will use average linkage with Euclidean distance as a second hierarchical procedure since it is less affected by outliers than other alternative methods and results in clusters with low within-cluster variance (Sarstedt & Mooi, 2014, p. 290). The results of all three methods (Ward, average linkage, and k-means) are then compared to each other with respect to their agreement on cluster membership.

Practical considerations are meaningful and interpretable results. They are deemed more important than statistical measures by some authors (Sarstedt & Mooi, 2014, p. 294).

Examples in the management accounting literature mostly use a five-cluster or six-cluster solutions (Bedford & Malmi, 2015; Chenhall & Langfield-Smith, 1998; Moores & Yuen, 2001; Sponem & Lambert, 2016). One author uses a three-cluster solution (Henri, 2008). The interpretation of the three-cluster solution does not provide more insights than a "low-medium-high" gradation. The scientific value of a solution with three clusters seems very limited. More than six clusters will rarely be interpretable except if the differences between most clustering variables are large and significant. A four to six cluster solution is therefore most interpretable from a practical standpoint.

In a final step, predictive discriminant analysis is used to provide predictive validity of the results and test whether contextual variables can explain cluster membership, thus giving more interpretability to the individual cluster solutions (Bedford & Malmi, 2015; Henri, 2008). Two tests are used to determine whether the hit rate, the correctly classified observations, is significantly high. The first test is a minimum threshold for the hit rate based on the maximum chance criterion (MCC) and the proportional chance criterion (PCC) (Hair et al., 2009). The second test is based on Press's Q statistic, which should exceed 10.83 to be significant at the 0.1 percent level (Ho, 2014, p. 382). The predictive power of the contextual variables to determine cluster membership is given if the number of correctly classified observations is above the threshold and the Q statistic above 10.83. All tests will be conducted in this thesis to assess the predictive validity of the results.

5 Empirical Results and Analysis

5.1 Descriptive Statistics

This section on descriptive statistics is structured as follows: First, I describe the general statistics of the four variable groups defined in section 4.2. Second, the longitudinal development of the MCS intensity in startups is presented. Third, the event history of the startups is given. I compare the results with other research articles on MCS wherever possible.

The descriptive statistics of the sample are given in Table 14 and Table 15 below. The four different variable groups, MCS intensity and sophistication, stakeholders' influence, performance, and firm variables, are described in the following. The total MCS intensity ranges from 19 percent to 94 percent in the sample with an average adoption rate of 61 percent. All five MCS groups show adoption rates of over 50 percent except for administrative controls (49 percent). Planning exhibits the highest adoption rate (82 percent) with the highest sophistication level (0.61). Statistically significant differences exist between Swiss and German startups for the total MCS intensity. The intensity of planning, cybernetic controls, and reward and compensation are significantly higher in Switzerland than in Germany. No difference exists for the total MCS sophistication. Only the sophistication of reward and compensation is significantly higher in Switzerland. In conclusion, the Swiss startups in the sample introduce more MCS but have a similar sophistication level in comparison with their German counterparts.

The influence of stakeholders is reported for the four different groups. The founders are the strongest stakeholder group with an influence score of 6.33 and a maximum of 7.00. Investors (4.14) and employees (4.26) are about equally influential. Investors are slightly stronger in German startups, whereas employees show a greater influence in Swiss startups. Customers of the startups are the least influential group (2.81). There are no statistically significant differences between Swiss and German startups for the influence of stakeholders.

The statistics of the three performance variables are as follows: Perceived performance as indicated by the startup managers ranges from the possible minimum (4) to the maximum (28) with an average of 19.11. The average cumulative funding amount in 2016

for all startups is 8.38 million CHF with a median of 2.13 million CHF. This is considerably smaller than the cumulative funding amount in a comparable German study, where the amount was 15.5 million EUR with a median of 11 million EUR (Strehle et al., 2010, p. 34). The financing amount for the startups in 2016 reaches from no acquired financing up to 105 million CHF. Swiss startups acquired more funding in 2016 than German startups (3.73 million CHF vs. 1.94 million CHF) but without any significant differences. Firms in the sample grew by 9.05 employees and freelancers and on average 77 percent in 2016. The sample includes shrinking firms (minimum -26 percent) and young firms with very high growth (maximum 733 percent). There are several missing values (NA – not available) for the performance variables. The reasons are incomplete responses for perceived performance, incomplete records of funding amounts for some funding rounds, and the fact that five firms are only one year old and thus firm growth could not be calculated.

The wide range of firm variables is described next (see Table 15). Startups are on average 5.01 years old with a significant difference between Swiss startups (5.74 years) and German startups (4.19 years). The average age of the companies is similar to other studies: 5.47 years with a median of 5 (Davila & Foster, 2007, p. 912) and 5.70 years with a median of 5 as well (Strehle et al., 2010, p. 34). Startups in my sample employed on average 21.34 employees and 4.70 freelancers. This is considerably lower than in other studies, which report average number of employees of 118 (Davila & Foster, 2007, p. 912) and 54 (Strehle et al., 2010, p. 34). The use of freelancers differs largely between companies with a median of two and a maximum of 90. On average, 60 percent of the startups are financed by a VC. Large significant differences exist between Switzerland (43 percent) and Germany (79 percent). 18 percent of the companies have replaced the founder with a new CEO. 31 percent of the startups employ a CFO. The founders represent about two thirds of the top management teams. Two thirds of the companies are in the B2B sector. Almost all companies generate revenues (87 percent) and most startups also international revenues (73 percent). 34 percent maintain an international office or production site. The companies conducted 2.26 funding rounds (median 2) on average. This is lower than the 3.43 funding rounds reported for a US-based sample (Davila & Foster, 2007, p. 912). The competitive environment is significantly more challenging for German startups than for Swiss startups (score of 16.78 vs. 14.51).

Descriptive Statistics (2016)

Variables	Mean CH	Mean DE	Mean Total	SD	Diff CH vs. DE	Min	Median	Max	NA
MCS Intensity	0.65	0.58	0.61	0.18	*	0.19	0.63	0.94	0
Cultural Controls	0.58	0.55	0.56	0.26		0.00	0.60	1.00	0
Administrative Controls	0.50	0.48	0.49	0.20		0.10	0.50	0.90	0
Planning	0.87	0.77	0.82	0.20	*	0.17	0.83	1.00	0
Cybernetic Controls	0.70	0.60	0.65	0.27	.	0.00	0.63	1.00	0
Reward and Compensation	0.67	0.52	0.60	0.40	.	0.00	0.67	1.00	0
MCS Sophistication	0.49	0.44	0.46	0.16		0.08	0.47	0.83	0
Cultural Controls	0.44	0.44	0.44	0.23		0.00	0.49	1.00	0
Administrative Controls	0.37	0.35	0.36	0.17		0.03	0.34	0.81	0
Planning	0.63	0.60	0.61	0.22		0.10	0.62	1.00	0
Cybernetic Controls	0.51	0.44	0.48	0.24		0.00	0.47	1.00	0
Reward and Compensation	0.56	0.38	0.48	0.37	**	0.00	0.48	1.00	0
Stakeholders' Influence									
Founders	6.49	6.15	6.33	1.44		1.00	7.00	7.00	0
Investors	3.98	4.32	4.14	2.00		1.00	4.50	7.00	0
Employees	4.34	4.17	4.26	1.71		1.00	4.00	7.00	0
Customers	2.83	2.79	2.81	1.91		1.00	2.00	7.00	0
Performance Variables									
Perceived Performance	19.14	19.09	19.11	5.04		4.00	19.00	28.00	2
Funding Amount	3.73	1.94	2.92	11.70		0.00	0.57	105.00	16
Cum. Funding Amount	10.69	5.58	8.38	28.42		0.00	2.13	255.00	16
Total Firm Growth	8.13	10.11	9.05	15.22		-4.00	4.50	110.00	5
Total Firm Growth Rate	0.72	0.83	0.77	1.10		-0.26	0.46	7.33	5

., *, **, and *** indicate significance at the 10%, 5%, 1% and 0.1% levels respectively.

Table 14: Descriptive statistics for all variables in 2016.

Descriptive Statistics (2016)

Variables	Mean CH	Mean DE	Mean Total	SD	Diff CH vs. DE	Min	Median	Max	NA
Firm Variables									
Age	5.74	4.19	5.01	2.44	**	1.00	4.00	10.00	0
Firm Size	19.85	23.02	21.34	30.89		2.00	10.50	240.00	0
Total Firm Size	24.51	27.77	26.04	35.66		3.50	13.25	264.00	0
Freelancer	4.66	4.74	4.70	11.62		0.00	2.00	90.00	0
VC	0.43	0.79	0.60	0.49	***	0.00	1.00	1.00	0
CEO Replacement	0.21	0.15	0.18	0.39		0.00	0.00	1.00	0
CFO	0.32	0.30	0.31	0.46		0.00	0.00	1.00	0
Founders in TMT	0.58	0.70	0.64	0.32	.	0.00	0.67	1.00	0
ICT	0.26	0.40	0.33	0.47		0.00	0.00	1.00	0
Life Sciences	0.30	0.19	0.25	0.44		0.00	0.00	1.00	0
B2B	0.66	0.68	0.67	0.47		0.00	1.00	1.00	0
Revenue	0.85	0.89	0.87	0.34		0.00	1.00	1.00	0
Intern. Revenue	0.70	0.77	0.73	0.45		0.00	1.00	1.00	0
Cum. Funding Rounds	2.36	2.15	2.26	1.57		0.00	2.00	7.00	0
Intern. Office	0.40	0.28	0.34	0.48		0.00	0.00	1.00	0
High-Growth	0.51	0.41	0.46	0.50		0.00	0.00	1.00	5
Competitive Environment	14.51	16.78	15.57	5.98	.	4.00	16.00	28.00	1
n	*53*	*47*	*100*						

., *, **, and *** indicate significance at the 10%, 5%, 1% and 0.1% levels respectively.

Table 15: Descriptive statistics for all variables in 2016 (continued).

Table 16 reports the longitudinal development of mean, median and standard deviation (SD) of several firm characteristics. The retrospective data on these variables differ based on the age of the startups. Therefore, the statistics are based on 19 to 84 observations per year. The number of employees is smaller than in another startup study that reports a mean of 7.88 in the first year and 38.54 in the fifth year with medians of 5 and 27.5 respectively (Strehle et al., 2010, p. 35). After two years, startups conducted on average one funding round and acquired cumulative funds of 2.69 million CHF. Nearly half of the companies generated revenues in their first year. International revenues exist in half of the startups in the third year.

Longitudinal Development of Firm Characteristics

Year	1	2	3	4	5	6	7	8
Employees								
Mean	2.67	7.67	12.83	17.94	16.50	21.54	20.02	19.84
Median	1.50	4.00	6.00	7.00	8.50	10.00	12.00	12.50
SD	4.82	14.19	31.88	39.15	31.10	39.09	21.24	21.98
Cumulative Funding Rounds								
Mean	0.48	0.94	1.37	1.80	1.92	2.08	2.71	2.05
Median	0.00	1.00	1.00	2.00	2.00	2.00	2.50	2.00
SD	0.55	0.77	0.96	1.24	1.46	1.58	2.14	1.93
Cumulative Funding Amount								
Mean	1.27	2.69	3.58	5.73	9.63	5.43	7.37	5.21
Median	0.00	0.50	0.85	1.25	1.50	2.40	4.27	1.90
SD	4.65	8.29	9.26	19.47	38.37	7.86	8.64	7.93
Intern. Office								
Mean	0.07	0.15	0.23	0.30	0.35	0.38	0.50	0.47
SD	0.26	0.36	0.42	0.46	0.48	0.49	0.51	0.51
Revenue								
Mean	0.46	0.68	0.73	0.79	0.82	0.87	0.86	0.95
SD	0.50	0.47	0.44	0.41	0.39	0.34	0.36	0.23
Intern. Revenue								
Mean	0.20	0.40	0.56	0.65	0.71	0.77	0.75	0.79
SD	0.40	0.49	0.50	0.48	0.46	0.43	0.44	0.42

Table 16: Longitudinal development of firm characteristics.

Several papers find that the presence of a VC in startups is a driver of MCS development and startups with VCs consequently show a higher MCS intensity (Davila, 2005; Davila

& Foster, 2005, 2007; Strehle et al., 2010). Figure 10 gives some support for this finding in the sample. The MCS intensity of startups with a VC (light gray line) is higher than the MCS intensity of startups without a VC (dark gray line). The difference is strongest in the first four years of the startup. After the fourth year, the difference is only minimal between the two lines. In section 5.4.2, it will be shown that the VC presence has no significant effect on the MCS development in Swiss and German startups.

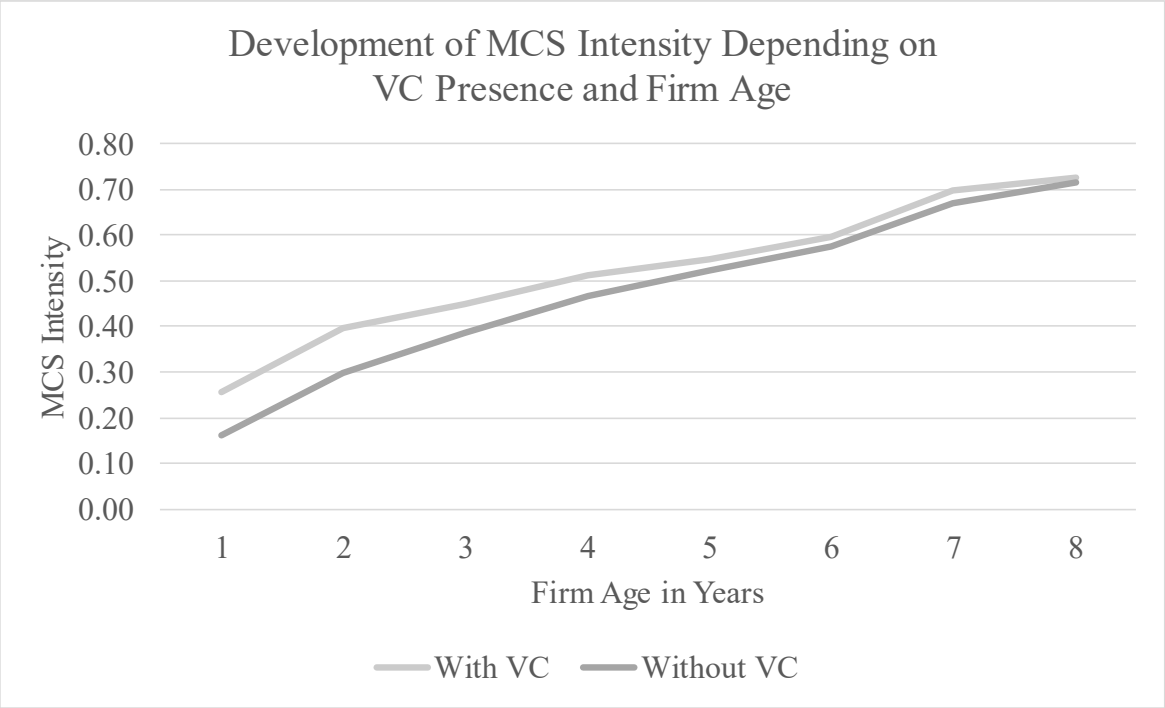

Figure 10: Development of MCS intensity with and without VC presence in startups.

In the following, the longitudinal developments of the intensities of the five MCS groups are presented and discussed. The adoption rate of every of the 32 individual MCS from the first to the eighth year of the startup is shown. The eighth year of the startup is used as a cutoff point because for later years, not enough observations exist in the sample for representative mean statistics to be calculated.

Table 17 shows that in their first year, startups introduce only very few controls. Most important are planning (35 percent). In the eighth year, more than 80 percent of traditional accounting controls (planning, cybernetic controls, reward and compensation) are adopted. Next, I will discuss the adoption rates of the individual MCS in each of the five groups, starting with cultural controls.

Longitudinal Development of MCS Intensity

Year	1	2	3	4	5	6	7	8
Cultural Controls	0.18	0.31	0.36	0.43	0.45	0.50	0.57	0.65
Administrative Controls	0.13	0.25	0.31	0.37	0.44	0.49	0.55	0.56
Planning	0.35	0.55	0.64	0.70	0.73	0.78	0.85	0.84
Cybernetic Controls	0.16	0.33	0.43	0.54	0.57	0.62	0.77	0.82
Reward and Compensation	0.11	0.27	0.36	0.46	0.52	0.57	0.75	0.86

Table 17: Longitudinal development of MCS intensity for the five groups.

Concerning cultural controls, startups mainly introduce social meetings (41 percent) and core values (26 percent) in their first year (see Table 18). Orientation programs for new employees and training programs show lower adoption rates. In their eight year, all individual cultural MCS are about equally present in startups except for dress codes, which are not very common in startups. Orientation programs for new employees show about the same adoption pattern as for US-based companies (Davila & Foster, 2007, p. 914). Core values show faster adoption rates in the first three years but lower in the fourth and fifth year to the same study.

Longitudinal Development of Cultural Controls

Year	1	2	3	4	5	6	7	8
Orientation program for new employees	0.12	0.27	0.43	0.54	0.55	0.64	0.75	0.79
Social meetings	0.41	0.57	0.61	0.68	0.65	0.74	0.82	0.79
Training program	0.07	0.21	0.24	0.32	0.47	0.51	0.57	0.74
Core values	0.26	0.42	0.44	0.48	0.47	0.49	0.54	0.79
Dress code	0.04	0.07	0.10	0.13	0.12	0.13	0.18	0.16

Table 18: Longitudinal development of cultural controls.

Administrative controls are discussed next (see Table 19). Written job descriptions and organizational charts are the earliest adopted administrative controls. They are present in more than three quarters of startups in their fifth year. Compliance and internal control systems as well as a sales process are the next most widely introduced MCS. Even in older startups, team composition guidelines, meeting guidelines, and a buddy/mentor system is not adopted. In Swiss and German startups, the adoption rate of written job

descriptions is about 10-20 percent higher than for comparable US-firms (Davila & Foster, 2007, p. 914). The other MCS show similar adoption rates compared to the study.

Longitudinal Development of Administrative Controls

Year	1	2	3	4	5	6	7	8
Team composition guidelines	0.05	0.08	0.08	0.11	0.12	0.10	0.07	0.05
Compliance & internal control systems	0.16	0.27	0.35	0.45	0.61	0.72	0.75	0.74
Meeting guidelines	0.12	0.20	0.27	0.25	0.29	0.33	0.43	0.32
Sales process	0.11	0.37	0.48	0.59	0.65	0.69	0.89	0.84
Codes of conduct	0.09	0.15	0.22	0.28	0.37	0.41	0.54	0.53
Partnership collaboration policies	0.02	0.13	0.19	0.23	0.31	0.41	0.43	0.42
Written job descriptions	0.37	0.49	0.62	0.69	0.76	0.85	0.96	1.00
HR development plans	0.06	0.18	0.23	0.25	0.35	0.41	0.46	0.58
Organizational chart	0.25	0.46	0.58	0.63	0.78	0.82	0.86	0.89
Buddy/Mentor system	0.09	0.12	0.13	0.18	0.14	0.15	0.11	0.26

Table 19: Longitudinal development of administrative controls.

Startups show very high adoption rates for planning MCS (see Table 20). In their first year, nearly half of the startups introduce milestone planning and cash-flow projections. All planning MCS except for partnership development planning are adopted by 89 percent or more of the startups in the seventh year. Swiss and German startups have remarkably higher adoption rates for planning MCS than US-based startups. The adoption rates for action planning MCS (cash-flow projections, sales projections, and milestone planning) are 10-30 percent higher in the first three years (Davila & Foster, 2007, p. 914). Product portfolio roadmap is adopted in 20-30 percent more startups in the first five years (Davila & Foster, 2007, p. 915).

Longitudinal Development of Planning

Year	1	2	3	4	5	6	7	8
Strategic planning	0.33	0.58	0.65	0.72	0.71	0.85	0.89	0.89
Partnership development planning	0.14	0.25	0.32	0.35	0.41	0.46	0.46	0.37
Product (portfolio) roadmap	0.28	0.58	0.65	0.70	0.69	0.74	0.89	0.89
Cash-flow projections	0.44	0.67	0.80	0.83	0.90	0.87	0.96	0.95
Sales projections	0.41	0.58	0.73	0.80	0.86	0.90	0.96	1.00
Milestone planning	0.49	0.62	0.70	0.76	0.78	0.85	0.93	0.95

Table 20: Longitudinal development of planning MCS.

The adoption rates between the individual cybernetic controls over the years of the startups are very similar (see Table 21). Project reports and sales reporting have lower introduction rates than the other MCS in the first four years. Routine analysis of financial performance against target is present in 95 percent of all companies by the eight year. The adoption pattern for the individual cybernetic controls is similar to the US-study. The only exception are customer relationship (CRM) systems that are adopted much quicker in Swiss and German startups: 59 percent vs. 29 percent in the fifth year (Davila & Foster, 2007, p. 915).

Longitudinal Development of Cybernetic Controls

Year	1	2	3	4	5	6	7	8
Project selection process and project budgeting	0.21	0.32	0.46	0.52	0.53	0.59	0.71	0.79
Operating budget and expense approval process	0.21	0.37	0.46	0.61	0.63	0.69	0.89	0.89
Capital investment budget and investment approval process	0.15	0.33	0.39	0.46	0.49	0.59	0.71	0.79
Routine analysis of financial performance against target	0.16	0.43	0.56	0.68	0.65	0.69	0.82	0.95
Product development reports	0.19	0.29	0.39	0.51	0.57	0.64	0.75	0.74
Customer relationship management system (CRM)	0.19	0.37	0.48	0.62	0.59	0.62	0.79	0.84
Project reports	0.09	0.25	0.32	0.44	0.51	0.51	0.75	0.68
Sales reporting	0.10	0.26	0.37	0.48	0.55	0.62	0.75	0.84

Table 21: Longitudinal development of cybernetic controls.

The three MCS to deal with reward and compensation are introduced at similar rates throughout the lifetime of a startup (see Table 22). By the fifth year, they are adopted by more than half of the companies in the sample. The adoption rates are very similar to the US-study. Next, the timing of important events in the startups is presented.

Longitudinal Development of Reward and Compensation

Year	1	2	3	4	5	6	7	8
Performance evaluation	0.12	0.27	0.37	0.45	0.51	0.59	0.79	0.89
Individual incentive programs	0.12	0.29	0.38	0.48	0.53	0.54	0.75	0.84
Management incentive programs	0.09	0.24	0.33	0.45	0.53	0.59	0.71	0.84

Table 22: Longitudinal development of reward and compensation.

The timing of five important events in startups is presented in Table 23. If a VC invests in a startup, it is on average after 1.47 years. This is later than in comparative studies where the time is 1.31 years (Strehle, 2006, p. 114) or even 1.08 years (Davila & Foster, 2005, p. 1095). Both studies report a median of one year as in this sample. The first replacement of the CEO, if ever, takes place after 3.28 years. This is two years earlier than in a comparable study: Strehle (2006) reports 5.27 years. Also, the introduction of a CFO after only 1.81 years is rather early. For the US-based companies 3.11 years (Davila & Foster, 2005, p. 1095) and for German startups 2.23 years (Strehle, 2006, p. 114) are reported. Those startups generating international revenue do this after 1.79 years on average. This is more than half a year earlier than in a comparable study (Strehle, 2006, p. 114). International operations through offices or production facilities outside their home countries are undertaken after 2.29 years in the sample firms.

Average Years Until Important Events in Sample Firms

	Mean	SD	Min	Median	Max
Time to VC	1.47	1.56	0.00	1.00	6.00
Time to replace CEO	3.28	2.40	0.00	3.50	9.00
Time to CFO	1.81	1.96	0.00	2.00	6.00
Time to international revenue	1.79	1.79	0.00	1.00	8.00
Time to international operations	2.29	1.86	0.00	2.00	6.00

Table 23: Event history of sample firms.

In conclusion, the descriptive statistics compare to other studies as follows: The startups in my sample are of similar age as in other studies. Yet, they are smaller and have acquired less funding in less funding rounds. The adoption patterns on MCS are similar to those reported for US-startups. Notable exceptions are 10 to 30 percent higher adoption rates for action planning MCS, product portfolio roadmaps, and CRM systems. Compared to the event history of a German study, the sample companies replace the CEO earlier and hire a CFO earlier.

5.2 Performance Impact of MCS

5.2.1 Introduction

In this section, I set out to test the performance impact of the adoption of MCS in startups. Two hypotheses-sets have been presented in section 3.3: the positive effects of MCS on early-stage startups and the positive effects of adopting traditional accounting controls on startups.

First, I analyze if an early adoption of MCS fosters the employee growth of startups (P1). Second, I test the relationship between early MCS adoption and the current overall performance of startups (P2). Third, the relationship between high intensity of traditional accounting MCS and higher funding amounts is tested (P3). Finally, I test if traditional accounting MCS have a positive impact on the performance of startups in high-growth and competitive environments (P4 and P5).

5.2.2 Employee Growth and Early MCS Adoption

First, I test whether the early adoption of MCS has a positive effect on the employee growth of startups (hypothesis P1). I divide the sample into two groups based on the median intensity for each MCS group and analyze their employee growth over the following years. The adoption rates are measured at the end of the first, second, and third year and the growth over a period of one to five years. The growth rates are annualized, e.g. the growth rates show the average growth in employees over the time. One-sided mean difference tests are conducted for the growth rates to test whether early MCS adoption has a positive impact on them (see section 4.3.2 for details).

Annualized Growth Rates - Startups Year 2

1-Year Growth	Low	High	t-value		W-value	
Administrative Controls	6.73	4.39	1.04		819	
Cultural Controls	5.63	5.77	-0.06		775	
Planning	5.82	5.47	0.15		749	
Cybernetic Controls	5.58	5.83	-0.11		735	
Reward and Compensation	4.57	6.90	-0.96		594	*
MCS Intensity	5.57	5.82	-0.10		726	
2-Year Growth	**Low**	**High**	**t-value**		**W-value**	
Administrative Controls	5.60	4.81	0.45		489	
Cultural Controls	5.97	4.08	1.10		561	
Planning	5.57	4.73	0.48		504	
Cybernetic Controls	5.22	5.40	-0.10		456	
Reward and Compensation	3.55	7.57	-2.09	*	258	***
MCS Intensity	5.16	5.48	-0.17		465	
3-Year Growth	**Low**	**High**	**t-value**		**W-value**	
Administrative Controls	7.03	3.81	1.60		361	
Cultural Controls	7.53	3.13	2.21		417	
Planning	6.72	4.44	1.08		338	
Cybernetic Controls	6.31	5.74	0.23		340	
Reward and Compensation	4.67	8.72	-1.37	.	217	**
MCS Intensity	6.25	5.83	0.16		337	
4-Year Growth	**Low**	**High**	**t-value**		**W-value**	
Administrative Controls	4.40	4.89	-0.22		88	
Cultural Controls	4.88	3.34	0.70		122	
Planning	4.32	5.22	-0.39		96	
Cybernetic Controls	4.30	5.10	-0.38		88	.
Reward and Compensation	3.95	5.98	-0.98		63	*
MCS Intensity	4.30	5.19	-0.42		74	.
5-Year Growth	**Low**	**High**	**t-value**		**W-value**	
Administrative Controls	5.57	4.20	0.50		57	
Cultural Controls	5.61	4.07	0.57		52	
Planning	5.13	5.80	-0.20		38	
Cybernetic Controls	5.27	5.13	0.05		42	
Reward and Compensation	4.84	6.50	-0.60		38	
MCS Intensity	5.48	4.47	0.38		49	

., *, **, and *** indicate significance at the 10%, 5%, 1% and 0.1% levels respectively.

Table 24: Annualized growth rates startups year 2.

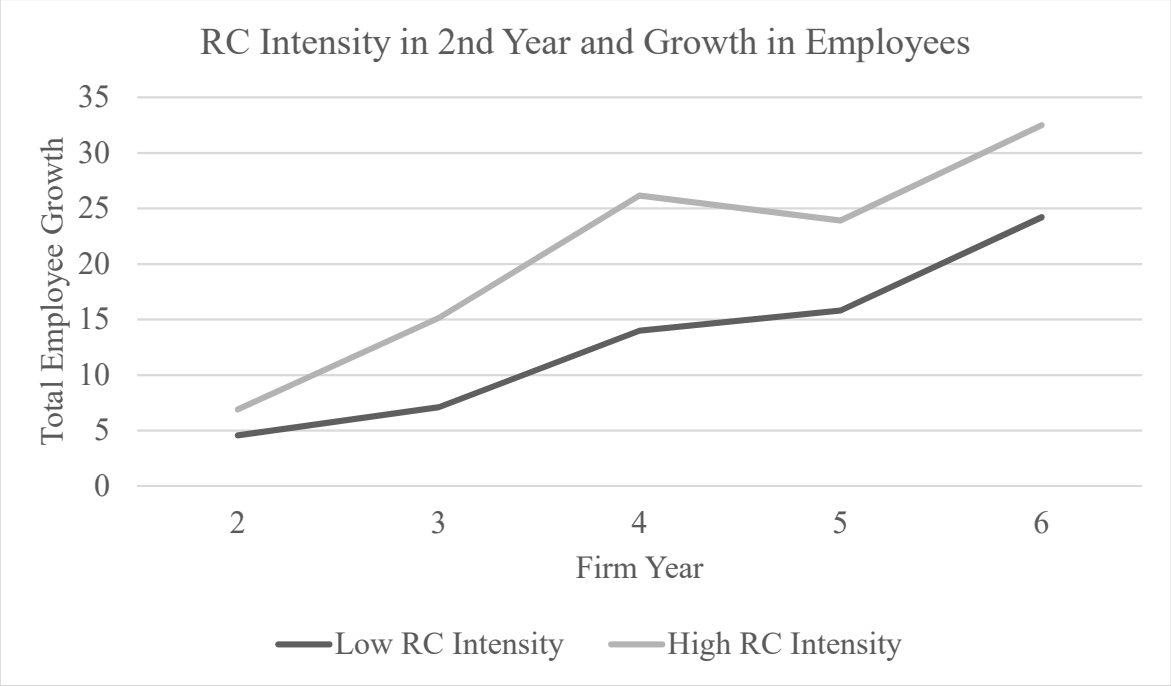

Figure 11: Total employee growth in second year between low and high RC intensity.

Table 24 shows the results for startups in year two and the annualized growth rates for the years two through six. The one-year growth rate represents the growth in employees in the second year of the startup. The five-year growth rate represents the annualized growth in employees between the beginning of the second and the end of the sixth year. None of the group comparison tests for the (total) MCS intensity are significant except for the four-year growth rate. The results do not support the general idea that an early adoption of MCS increases the growth in employees. The conclusion remains the same when analyzing the MCS intensity and growth rates for years one and three (see Table 65 and Table 66 in the Appendix).

Only the groups of low and high intensity of reward and compensation (RC) show a significant difference for most observed periods. Other MCS groups show sporadic but no general significant effect.

Startups with higher RC intensity in their first years show significant higher growth rates for the coming years. Figure 11 illustrates the growth for startups in their second year. Startups with a low RC intensity in their second year grow on average by 14 employees between the beginning of the second year and the end of the fourth year. Startups with high RC intensity grow on average by 26 employees in the same time frame. This significant difference remains for the whole analyzed period up to year six.

In conclusion, an early adoption of reward and compensation MCS in the first three years of the startup leads to significantly higher employee growth over the following years. None of the other MCS groups show a similar relationship.

5.2.3 Overall Performance and Early MCS Adoption

Startups that adopt MCS early are hypothesized to show higher performance (hypothesis P2). To test this hypothesis the following regression analysis is conducted: The dependent variable is overall performance, an item from the perceived performance construct described in 4.2.4. Early MCS adoption is measured as the MCS intensity of startups at the end of the second year (Sandino, 2007). The selection of control variables with the lasso regression resulted in two dichotomous variables (VC and B2B) and the total number of funding rounds. Further analysis identified a non-linear relationship of the total number of funding rounds with overall performance. Consequently, the square of the total number of funding rounds is used as a further control variable. All regressions are conducted with standardized variables.

Regression Results for
Overall Performance Impact of Early MCS Adoption[a]

Variables	CV only		Effect only	Effect+CV	
MCS Intensity			0.13 (.12)	0.21 (.11)	.
Intercept	0.76 (.25)	**	0.00 (.00)	0.85 (.25)	***
B2B	-0.60 (.24)	*		-0.75 (.25)	**
VC	-0.49 (.22)	*		-0.47 (.22)	*
Funding Rounds	0.62 (.32)	.		0.53 (.32)	.
Funding Rounds ^ 2	-0.90 (.32)	**		-0.82 (.32)	**
Adj. R^2	0.224	***	0.001	0.255	***

[a] Robust standard errors are reported in parentheses.
., *, **, and *** indicate significance at the 10%, 5%, 1% and 0.1% levels respectively.

Table 25: Regression results for the overall performance impact of early MCS adoption.

Table 25 shows the regression results for the overall performance impact of early MCS adoption. The effect alone is positive but not significant. In the full model including the control variables, the effect is positive and significant. Adding MCS intensity increases

the adjusted R^2 by more than three percent. These results indicate that higher adoption rates in the early phase of a startup increase the performance of the startup today.

As a robustness check, the analysis is replicated using additionally the squared MCS intensity. The results indicate no significant non-linear relationship between MCS intensity and performance. A second set of regressions is conducted to further analyze which MCS groups are important for the performance increase in startups.

The current overall performance of the startups is regressed against the intensity of the five MCS groups in the early phase of the startup. The results are shown in Table 26 and Table 27. Cultural control (CC) intensity and reward and compensation (RC) intensity show a significant positive relationship with overall performance (first and fifth model). In comparison to the control variable model the adjusted R^2 increases by more than seven and three percent respectively. Consequently, adding either of the intensities explains more than the baseline model and both have significant positive regression coefficients. The other three MCS groups have positive but insignificant regression coefficients.

Regression Results for Overall Performance Impact of Early MCS Adoption[a]

Variables	CC Intensity	AC Intensity	PC Intensity
Intensity	0.29 (.11) **	0.14 (.11)	0.06 (.12)
Intercept	0.88 (.24) ***	0.81 (.25) **	0.80 (.26) **
B2B	-0.79 (.24) **	-0.68 (.25) **	-0.66 (.26) *
VC	-0.47 (.21) *	-0.49 (.22) *	-0.49 (.23) *
Funding Rounds	0.62 (.31) *	0.58 (.32) .	0.59 (.33) .
Funding Rounds ^ 2	-0.88 (.31) **	-0.87 (.32) **	-0.87 (.33) **
Adj. R^2	0.296 ***	0.231 ***	0.215 **

[a] Robust standard errors are reported in parentheses.
., *, **, and *** indicate significance at the 10%, 5%, 1% and 0.1% levels respectively.

Table 26: Regression results for the overall performance impact of MCS adoption for different MCS groups.

Regression Results for Overall Performance Impact of Early MCS Adoption[a]

Variables	CY Intensity	RC Intensity
Intensity	0.18 (.11)	0.22 (.11) *
Intercept	0.79 (.25) **	0.76 (.24) **
B2B	-0.68 (.25) **	-0.58 (.24) *
VC	-0.45 (.22) *	-0.52 (.22) *
Funding Rounds	0.51 (.33)	0.64 (.32) *
Funding Rounds ^ 2	-0.81 (.33) **	-0.95 (.32) **
Adj. R^2	0.243 ***	0.261 ***

[a] Robust standard errors are reported in parentheses.

., *, **, and *** indicate significance at the 10%, 5%, 1% and 0.1% levels respectively.

Table 27: Regression results for the overall performance impact of MCS adoption for different MCS groups (continued).

In conclusion, a high adoption rate of MCS in the first two years of a startup increases its current overall performance. Here, the adoption of MCS from cultural controls and reward and compensation is of particular importance.

5.2.4 Impact of MCS on Funding Amount

In this section, I analyze whether a high intensity of traditional accounting MCS increases the subsequent funding amount for startups (hypothesis P3). For the analysis, the data set is constructed in the following way: The annual funding amount for each startup from the first up to the tenth year (if available) is gathered from the survey data. Firms with incomplete data are excluded. The MCS intensity in total and for each of the three groups is gathered for the prior years to the funding amounts. I use forward and backward stepwise selection for the control variables. I control for a set of financial and non-financial variables.

The presence of a VC is expected to increase the funding amount due to its signaling effect. Companies with an established CFO are expected to acquire higher amounts of funding due to their professionalism. Firm size is included for two reasons. First, startups with a higher headcount are expected to have higher financing needs. Second, in the absence of revenue numbers, headcount offers an appropriate measure for company size (Davila et al., 2015). The generation of revenues plays an important role in the valuation of startups (Armstrong, Davila, & Foster, 2006; Chandra & Ro, 2008;

Davila et al., 2015). I expect a positive effect on the funding amount when the startups generate (international) revenue. Theory suggests that startups internationalize to exploit their capabilities abroad (Davila et al., 2015; Oviatt & McDougall, 1994). Therefore, I expect a positive effect of international office on the financing amount. Finally, I include dummy variables for industry (B2B, ICT and life sciences) and region. In total, 315 observations are constructed in this way. Their descriptive statistics are presented in Table 28.

Descriptive Statistics for Funding Amount Analysis

Variables	Mean	SD	Min	Median	Max
Funding Amount	1.92	8.44	0.00	0.00	105.00
Intensities from previous year					
PC Intensity	3.58	2.09	0.00	4.00	6.00
CY Intensity	3.38	2.91	0.00	3.00	8.00
RC Intensity	1.06	1.24	0.00	0.00	3.00
Control variables					
VC	0.45	0.50	0.00	0.00	1.00
CFO	0.20	0.40	0.00	0.00	1.00
Firm Size	15.68	31.57	0.50	8.00	300.00
Revenue	0.80	0.40	0.00	1.00	1.00
ICT	0.28	0.45	0.00	0.00	1.00
Life Sciences	0.25	0.43	0.00	0.00	1.00
Region DE	0.37	0.48	0.00	0.00	1.00

Table 28: Descriptive statistics for funding amount analysis.

The variable for annual funding amount has many zero entries since not every startup received funding in every year. Additionally, there are many low values and only few large ones. The variance of the variable is significantly higher than the mean. Therefore, a negative binomial distribution is used for the regression analysis to handle this over-dispersion in the data (Rao & Scott, 1999).

A stepwise selection of control variables is conducted based on the full set of variables. The backward stepwise procedure leads to the selection of VC, CFO, firm size, revenue,

ICT, life sciences, and region as control variables. The forward stepwise procedure results in firm size, life sciences, revenue, and CFO. The regression analysis is conducted with both sets of control variables.

The goodness of fit measured by the log-likelihood ratio test and the Wald test indicate that all model specifications are significant (see Table 29 and Table 30). The adjusted pseudo-R^2 is 0.075 for the control-variable model (forward selection). All three MCS groups are tested individually. The planning (PC) intensity in the year prior to the funding shows a significant positive impact on the funding amount. The adjusted pseudo-R^2 increases to 0.079, which is higher than for the control variable (CV) model. The same effect is present for the cybernetic control (CY) intensity. Adding reward and compensation (RC) intensity lowers the adjusted pseudo-R^2. The regression coefficients are positive but not significant. The results indicate that a higher adoption of planning and cybernetic controls prior to a funding round increases the amount of funding, the startup receives.

Regression Results for Funding Amount (Negative Binomial Model) - Forward Selection of CV

Variables	CV only		PC Intensity	
Intensity			0.16 (.07)	*
Firm Size	0.90 (.16)	***	0.87 (.16)	***
Life Sciences	1.27 (.33)	***	1.21 (.33)	***
Revenue	-1.11 (.37)	**	-1.06 (.37)	**
CFO	0.95 (.36)	**	0.82 (.36)	*
Log-likelihood	-368.84	***	-366.08	***
Wald test	16.47	***	13.96	***
Adj. McFadden pseudo R^2	0.075		0.079	

., *, **, and *** indicate significance at the 10%, 5%, 1% and 0.1% levels respectively.

Table 29: Regression results for funding amount with negative binomial model (control variables from forward selection).

Regression Results for Funding Amount (Negative Binomial Model) - Forward Selection of CV

Variables	CY Intensity		RC Intensity	
Intensity	0.12 (.05)	*	0.07 (.07)	
Firm Size	0.86 (.16)	***	0.87 (.17)	***
Life Sciences	1.19 (.33)	***	1.23 (.33)	***
Revenue	-1.17 (.37)	**	-1.11 (.38)	**
CFO	0.86 (.36)	*	0.86 (.36)	*
Log-likelihood	-366.22	***	-368.68	***
Wald test	13.79	***	12.88	***
Adj. McFadden pseudo R^2	0.079		0.073	

., *, **, and *** indicate significance at the 10%, 5%, 1% and 0.1% levels respectively.

Table 30: Regression results for funding amount with negative binomial model (control variables from forward selection) - continued.

Several robustness checks are carried out. As pointed out above, all regressions are replicated using the set of control variables based on backward stepwise selection (results see Table 67 on page 167 in the Appendix). The results for the effects remain the same in magnitude and statistical significance. A subsample based on non-zero funding data with 137 observations showed the same results. An alternative regression method for this type of data similar is a zero-inflated model with a Poisson distribution. The results with this method show no difference compared to the ones presented above. The checks indicate a high robustness of the results.

In conclusion, a higher intensity of planning and cybernetic controls prior to a funding round shows a positive relationship with higher funding amounts for the startup. The intensity of reward and compensation MCS has no effect on the subsequent funding.

5.2.5 Traditional Accounting MCS in High-Growth and Competitive Environments

Hypotheses P4 and P5 state that startups with high growth rates and startups in highly competitive environments benefit from a higher intensity of traditional accounting MCS, namely planning (PC), cybernetic controls (CY), and reward and compensation (RC). Therefore, I expect the interaction effect of high-growth and the three MCS intensities as well as the interaction effect of competitive environment (CE) and the three

MCS intensities to be positive. High-growth is assumed to have a positive effect and competitive environment a negative effect on performance.

The following regression analysis is conducted to test these hypotheses: The dependent variable is the current performance of the startup measured by the perceived performance construct described in section 4.2.4. The three independent variables are the adoption rates of the traditional accounting MCS groups in the previous year. I include age, firm size, VC, CEO change, CFO presence, (international) revenue generation, industry dummy variables, and a regional variable as controls. The reasoning is described in the following paragraph.

Size and age have been found to have an association with performance (Sandino, 2007). Older firms have higher survival rates than younger firms and achieve higher performance (J. Freeman, Carroll, & Hannan, 1983; Hannan & Freeman, 1989). Lower performance in smaller compared to larger firms has been documented (Fama & French, 1995), partly attributable to missing economies of scale. Therefore, I expect a positive relationship between size as well as age and perceived performance. The literature on the change of CEO and performance is inconclusive. Some authors find evidence for a significant positive relationship (Certo, Covin, Daily, & Dalton, 2001) while others find no significant influence (Willard, Krueger, & Feeser, 1992). I assume a positive relationship based on the first study and therefore include a CEO dummy for those companies who changed their founding CEO. Similarly, I predict that the hiring of a CFO increases the performance of the startup due to increased outside knowledge (Sandino, 2007). The same argumentation holds for the VC, which is also assumed to show a positive association with performance. As pointed out above, the generation of revenue is important for the valuation of startups (Armstrong et al., 2006; Chandra & Ro, 2008; Davila et al., 2015). I expect that startups with (international) revenue exhibit a higher perceived performance. Finally, I include dummy variables for industry (B2B, ICT and life sciences) and region similar to the set in the previous section 5.2.4. The lasso regression to select the control variables results in a set of three dichotomous variables: VC, life sciences and revenue. All regressions are conducted with standardized variables.

The results of the regression analysis are presented in Table 31 below. The first model presents the results for the regression of control variables (CV) and performance. All

control variables are significant. In contrast to the prediction, the regression coefficient for VC shows a significant negative sign. Revenue generation is positively associated with performance as predicted. The adjusted R^2 is 15 percent and the model shows a significant F-statistic with a p-value below 0.001. The following three models present the regression results of the three traditional accounting MCS groups in interaction with the high-growth variable and the competitive environment (CE) variable on the performance construct. None of the three intensities shows a significant estimator. The high-growth indicator is positive and significant for all regressions. This indicates that startups with high employee growth rates have a higher perceived performance as anticipated. The coefficient estimate for CE is negative in all regressions as expected but only significant in the last regression with RC intensity as independent variable. The negative coefficient indicates that startups in highly competitive environments show a lower perceived performance.

Regression Results for Performance Impact of Traditional Accounting MCS in High-Growth and Competitive Environments (CE)[a]

Variables	CV only	PC Intensity	CY Intensity	RC Intensity
Intensity		-0.03 (.17)	-0.06 (.15)	-0.13 (.13)
High-Growth		0.54 (.21) **	0.60 (.20) **	0.40 (.18) *
CE		-0.10 (.10)	-0.13 (.09)	-0.21 (.09) *
Intensity x High-Growth		0.13 (.22)	0.31 (.20)	0.40 (.19) *
Intensity x CE		-0.07 (.10)	0.24 (.10) *	0.35 (.10) ***
Intercept	-0.35 (.32)	-0.76 (.36) *	-0.82 (.35) *	-0.69 (.33) *
VC	-0.43 (.20) *	-0.41 (.20) *	-0.38 (.19) *	-0.45 (.18) *
Life Sciences	-0.56 (.23) *	-0.46 (.23) .	-0.46 (.22) *	-0.43 (.21) *
Revenue	0.84 (.30) **	1.01 (.31) **	1.02 (.30) ***	1.00 (.28) ***
Adj. R^2	0.150 ***	0.196 ***	0.252 ***	0.309 ***

[a] Robust standard errors are reported in parentheses.
., *, **, and *** indicate significance at the 10%, 5%, 1% and 0.1% levels respectively.

Table 31: Regression results for the performance impact of traditional accounting MCS in high-growth and competitive environments.

The interaction term between high-growth and the intensities is positive for all three regressions. The results reveal a significant interaction effect of RC intensity and high-growth on the performance of startups. This supports the hypothesis that startups with high growth rates benefit from adopting reward and compensation MCS. The other two interactions are not significant.

The interaction term of PC intensity and CE is negative but insignificant. The intensity of planning therefore shows no impact on performance in a competitive environment. The interaction term with CY intensity is positive and significant as expected. This supports the hypothesis that cybernetic controls in a competitive environment improve the performance of a startup. The last model shows a positive and significant interaction between RC intensity and CE. This supports the hypothesis, that reward and compensation improve the performance of startups in a competitive environment.

As a robustness check, all regressions are conducted without the control variables. The results largely remain the same except that there is a significant interaction effect of cybernetic controls and high-growth on performance. A third set of regression only with large startups (10 or more employees or freelancers) shows that the reward and compensation interaction effect remains robust whereas the interaction between cybernetic controls and competitive environment is not significant (see Table 68 in the Appendix).

In conclusion, cybernetic controls and reward and compensation MCS show a positive relationship with the performance of startups that operate in highly competitive environments. Additionally, a high intensity of reward and compensation MCS has a positive impact on the startup performance in high-growth environments.

5.2.6 Concluding Remarks

In this section, I analyzed the five performance hypotheses proposed in section 3.3. The results can be summarized as follows:

First, startups with higher adoption rates of reward and compensation MCS in the first three years have a significantly higher employee growth over the following years. None of the other MCS groups show a significant impact on employee growth.

Second, startups with a high adoption rate of MCS in the first two years have a higher current overall performance. This relationship is driven mainly by the adoption rate of cultural controls and of reward and compensation MCS.

Third, startups with a higher intensity of planning and cybernetic controls prior to a funding round receive higher funding amounts. Reward and compensation MCS do not show a similar relationship.

Fourth, startups in high-growth environments have a positive relationship between the intensity of reward and compensation MCS and performance. Fifth, startups in highly competitive environments have a positive relationship between the intensity of cybernetic controls and performance as well as between the intensity of reward and compensation MCS and performance.

5.3 Configurations of Control

5.3.1 Introduction

I set out to identify homogenous, mutually exclusive configurations of MCS in startups in this section. The cluster analysis as described in section 4.3.1 is the appropriate technique for analyzing these configurations. The result of the cluster analysis should be four to six distinct groups of configurations of control for maximum practical interpretability as argued in the same section. For validation purposes, I follow the approach of Bedford & Malmi (2015) and employ predictive discriminant analysis to predict group membership. The remainder of this section discusses the clustering variables and the prerequisites of cluster analysis.

Two possible sets of clustering variables exist for the analysis based on the available data: MCS intensity and MCS sophistication. The five MCS intensity variables enable a cluster solution on a large data that is representative for startups in different stages of their development since the variables are available for many years for each startup. The solution would show common configurations of intensities amongst startups, e.g. whether startups from one cluster introduce more administrative and cultural controls together. The MCS sophistication variables are only available for the current state in the startups and the sample size is therefore limited. The results would help to understand more about the implementation status of individual MCS within the different clusters.

Both sets provide an opportunity to build a taxonomy of MCS clusters in startups. Before the cluster analysis is conducted, the prerequisites are tested.

The prerequisites to perform a cluster analysis need to be present as outlined in section 4.3.1: a high enough sample size for the number of clustering variables and no high correlation between those variables. The MCS framework has five groups which are used as clustering variables. A minimum of 32 respectively 350 observations is necessary for the cluster analysis based on the recommendations outlined in section 4.3.4.1. Other studies in the field use less than 80 observations to cluster 10 or more variables (Chenhall & Langfield-Smith, 1998; Moores & Yuen, 2001). The full sample used in the analysis for the intensity variables contains 465 observations. The subsets for Swiss and German startups contain 274 and 189 observations respectively.[7] The data set for 2016 comprises 95 observations.[8] The sample size of all sets is far above the recommended 32 observations and above or around the minimum requirement based on similar studies.

All correlations between variables are below the threshold of 0.9 (Sarstedt & Mooi, 2014, p. 279). The intensity of planning and cybernetic controls shows the highest correlation with 0.70 for the full data set (see Table 32). The highest correlation among the sophistication variables is 0.62 between planning and cybernetic controls as well (see Table 33).

Correlation Table - MCS Intensity (full data)

No.	Variable	1	2	3	4	5
1	AC Intensity	1.00				
2	PC Intensity	0.62	1.00			
3	CY Intensity	0.66	0.70	1.00		
4	RC Intensity	0.49	0.42	0.56	1.00	
5	CC Intensity	0.69	0.55	0.57	0.48	1.00

All correlations larger or equal to 0.2 are significant at p=0.05.

Table 32: Correlation table for MCS intensity variables (full data).

[7] The analysis revealed some outliers in the subsets which are removed. Those are not classified as outliers in the full sample. Therefore, the number of observations of the two subsamples do not add up to 465.

[8] Five observations have been identified as outliers and are excluded from the total of 100 observations in the sample.

Correlation Table - MCS Sophistication (2016 only)

No.	Variable	1	2	3	4	5
1	AC Sophistication	1.00				
2	PC Sophistication	0.42	1.00			
3	CY Sophistication	0.52	0.62	1.00		
4	RC Sophistication	0.33	0.20	0.40	1.00	
5	CC Sophistication	0.47	0.32	0.35	0.29	1.00

All correlations larger or equal to 0.2 are significant at p=0.05.

Table 33: Correlation table for MCS sophistication variables (2016).

In conclusion, the sample sizes are sufficiently high and the correlations sufficiently low to conduct a cluster analysis for the MCS intensity and MCS sophistication variables.

5.3.2 Cluster Solutions

I conduct a two-step clustering analysis to find stable cluster solutions for the different subsets as outlined in section 4.3.1. First, I identify the number of clusters for each subset with the hierarchical clustering procedure using Ward's method. Second, I use k-means clustering as a non-hierarchical clustering procedure to identify the final cluster membership. The cluster solutions for each of the datasets are then validated with a comparison of the cluster membership between the methods (see Table 34 below). A predictive discriminant analysis with contextual factors and with the final clustering solution is conducted.

The full data set with the intensity of the five groups of MCS for all startups and all available years is the first dataset analyzed. After conducting the hierarchical clustering procedure using Ward's method, the dendrogram is analyzed for the potential number of clusters. The analysis reveals potential solutions with two, four or five clusters (see Figure 12). To statistically verify the number of cluster I use several indices as outlined in section 4.3.4.3. 11 of the 28 indices favor a five-cluster solution, seven favor a three-cluster solution. A three-cluster solution is not part of the ideal range of four to six clusters. In conclusion, I use five clusters for the k-means clustering because it is a potential number of the dendrogram analysis, favored by majority rule between the indices, and is within the ideal range.

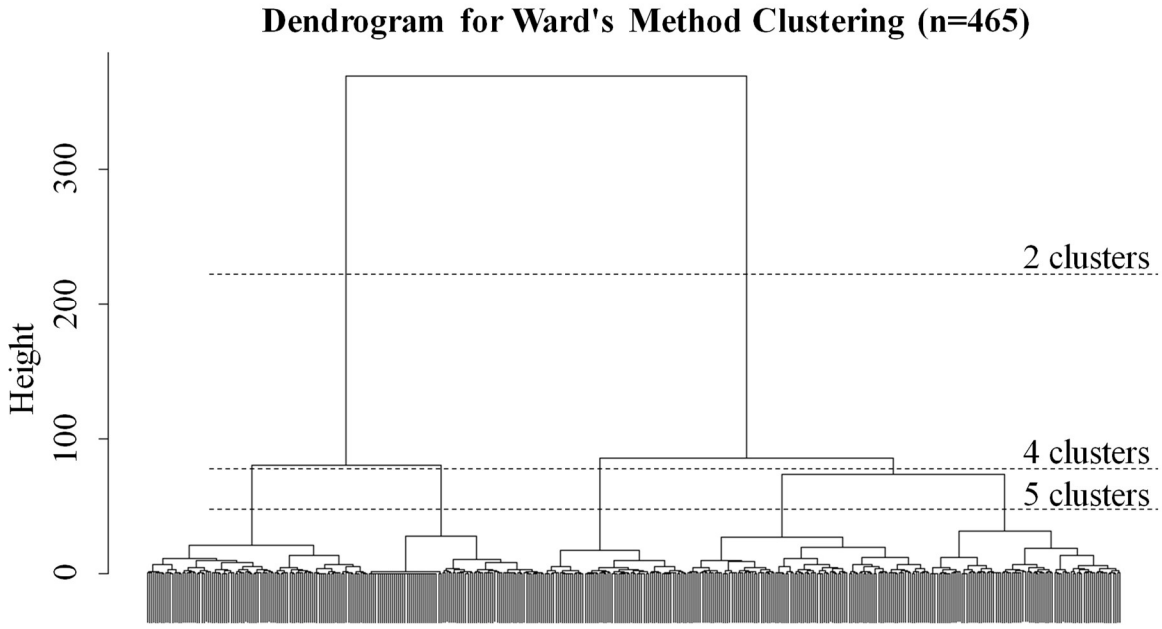

Figure 12: Dendrogram using Ward's method for clustering (full data set).

I validate the cluster membership of the k-means clustering solution by comparing it to the results of the hierarchical clustering procedure with Ward's method and average linkage respectively (see Table 34). Corresponding cluster membership should exceed 80 percent for the solution to be statistically stable (Sarstedt & Mooi, 2014). Consensus between k-means clustering and clustering with Ward's method is 81.9 percent, which exceeds the critical value. The consensus between k-means clustering and clustering using average linkage is 72.3 percent. The agreement between the two hierarchical methods is only 60.6 percent. Both are far below the critical value.

Consequently, the five-cluster solution for the full dataset cannot be validated by common cluster membership between different methods and is not stable enough to be used further in the analysis. As an alternative, I split the sample into Swiss and German startups and rerun the cluster analysis using the intensity of the five MCS groups for both datasets. The results are described in the following.

Clustering Solutions for the Different Datasets

Clustering Steps	Intensity	Intensity (CH)	Intensity (DE)	Sophistication
Number of observations	465	274	189	95
Number of clusters by dendrogram analysis	2, 4 or 5	4 or 5	2, 4 or 5	3, 4 or 5
Nnumber of clusters by indices	5 (3)	5 (3 or 7)	3 (5)	3 (6)
Number of clusters used for k-means clustering	5	5	5	none
Correspondings cluster membership				
Ward's method with k-means solution	81.9%	83.2%	84.7%	n.a.
Average linkage with k-means solution	72.3%	80.3%	64.6%	n.a.
Ward' method and average linkage	60.6%	89.4%	61.4%	n.a.
Critical value according to Sarstedt & Mooi (2004)		80.0%		
Final number of clusters for validated solution	**none**	**5**	**none**	**none**

Table 34: Clustering solutions for the different subsets.

The dendrogram analysis for the Swiss dataset implies a four- or five-cluster solution. The indices favor a five-cluster solution and alternatively three or seven clusters equally. Both alternative solutions are outside the target range and are not part of the dendrogram result. Therefore, the k-means clustering is conducted using five clusters. The agreement for cluster membership between all three methods exceeds the critical value of 80 percent for all pairs (see Table 34). The five-cluster solution for the Swiss dataset is therefore statistically validated and will be used in the further analysis.

For the German dataset, the identification methods favor five clusters. The cluster membership is very unstable between the k-means procedure and average linkage method (64.6 percent). It will therefore not be used further. Other numbers of clusters are not favored by the agreement of dendrogram analysis and indices. The German dataset will not be used for the further identification of configurations of control.

The dataset using the MCS sophistication variables is the final dataset for the cluster analysis. The dendrogram analysis suggests three, four or five clusters. The indices favor three clusters and alternatively six. Three clusters are the only possible solution between the two methods. It offers no practical interpretability since the results only reveal three clusters with low, medium and high sophistication. The four, five and six cluster solutions all were checked for stability of cluster membership between the methods. All results were unstable with consensus levels far below the critical value of 80 percent. Therefore, no cluster solution is further analyzed for the sophistication dataset. A split of the sophistication set into Swiss and German startups is not deemed useful since the number of observations would be too small for cluster analysis to be conducted.

Of the four analyzed datasets, only the data on Swiss startups with the intensity of the five MCS groups as clustering variables led to a statistically valid solution based on dendrogram analysis, indices for identifying the number of clusters, and consensus on the cluster membership between different clustering procedures. The analysis of variance (ANOVA) shows statistically significant differences in the clustering variables between the five clusters (see Table 36 below). The Games-Howell post-hoc multiple comparison procedures (MCP) show statistically significant differences as well. Before the interpretation of these differences between the clusters in the next section, one final validation step is conducted.

		Predicted Group Membership					
	Group	**1**	**2**	**3**	**4**	**5**	**Total**
Count	1	35	3	10	1	0	49
	2	5	34	9	2	3	53
	3	16	4	44	2	1	67
	4	8	0	8	25	3	44
	5	5	6	6	10	34	61
%	1	71.4	6.1	20.4	2.0	0.0	100.0
	2	9.4	64.2	17.0	3.8	5.7	100.0
	3	23.9	6.0	65.7	3.0	1.5	100.0
	4	18.2	0.0	18.2	56.8	6.8	100.0
	5	8.2	9.8	9.8	16.4	55.7	100.0

Table 35: Quadratic discriminant analysis results for the prediction of group membership.

The predictive discriminant analysis is the final test to validate the clustering solution and increase the interpretability of the results. The quadratic discriminant analysis based on the contextual variables (see Table 37) is conducted to predict group membership. The prediction results can be seen in Table 35. The diagonal represents the correctly classified groups by quadratic discriminant analysis. The overall correct classification rate is 62.8 percent based on 172 correctly classified observations. The rate varies between 55.7 and 71.4 percent for the five groups. The results of the statistical tests as introduced in section 4.3.4.3 are as follows: The MCC is 24.5 percent and the PCC is 20.5 percent. This results in a threshold of 30.6 percent (1.25 * MCC) for the classification rate to be better than chance. The overall classification rate of 62.8 percent far exceeds this minimum threshold of 30.6 percent. The Press's Q statistic based on five clusters, 274 observations and 172 correctly classified cases is 313.3. The Press's Q statistic exceeds the critical value of 10.83. Therefore, the contextual variables show a high statistical power to predictive cluster membership based on these two tests.

In this section, cluster analysis was conducted on four datasets to find clustering solutions that are statistically stable and interpretable. Only the five-cluster solution for the MCS intensity variables of Swiss startups met these requirements. I present those five clusters and an interpretation in the next section in detail.

5.3.3 Analysis of Results

5.3.3.1 Overview

The results of the k-means clustering procedure for five clusters are presented in Table 36. It contains the means of each MCS group for every cluster. Multiple ANOVA Games-Howell post hoc multiple comparison procedures (MCP) indicate statistically significant differences between all cluster for each clustering variable. The five clusters are named as follows: planning focus (C1), incentive focus (C2), simple controls (C3), process focus (C4), and mature controls (C5). The naming is based on the characteristics of the configurations as described below. Simple controls (C3) is most common among startups in their first two years while more than half of the startups belong to mature controls (C5) by their seventh year. The remaining three groups are common amongst startups from all ages. The groups are analyzed in detail within this section.

The context variables of the clusters are given in Table 37. The multiple ANOVA shows significant differences between the clusters for almost all context variables. Only B2B and ICT show no significant differences. The Games-Howell post hoc MCP shows significant differences between the clusters for the individual variables. No differences are found for VC, total funding amount, and firm growth rate although the ANOVA indicates differences between the clusters. The context variables are used in the predictive discriminant analysis as described in the previous section. They are further used to explain differences between the clusters. Next, the five solutions are presented starting with simple controls (C3) followed by the three focus configurations (C1, C2, C4), and mature controls (C5).

Groups for k-means Clustering Procedure

MCS Groups	C1 Planning Focus	C2 Incentive Focus	C3 Simple Controls	C4 Process Focus	C5 Mature Controls	ANOVA F-stat	ANOVA p-value	MCP[a] Games-Howell
Cultural Controls	0.15	0.40	0.10	0.55	**0.72**	131.03	0.0000	5>4>2>1,3
Administrative Controls	0.20	0.36	0.06	0.53	**0.61**	150.03	0.0000	4,5>2>1>3
Planning	0.73	0.74	0.15	0.83	**0.92**	187.05	0.0000	5>1,2,3; 4>3
Cybernetic Controls	0.33	0.56	0.05	0.73	**0.92**	189.00	0.0000	5>4>2>1>3
Reward and Compensation	0.07	0.91	0.11	0.13	**0.99**	508.64	0.0000	5>2>1,3,4
Cluster Membership	*49*	*53*	*67*	*44*	*61*			

[a] Pairs are significant for p=0.05 or better

Underlined figures denote the lowest value on each variable. Bold numbers denote the highest value on each variable.

Table 36: Final cluster solution for k-means clustering procedure.

Groups for k-means Clustering Procedure

Context Variables	C1 Planning Focus	C2 Incentive Focus	C3 Simple Controls	C4 Process Focus	C5 Mature Controls	ANOVA F-stat	ANOVA p-value	MCP[a] Games-Howell
Age	3.31	4.81	2.36	4.55	**5.95**	31.46	0.0000	5>4*; 2,4,5>3; 2,5>1;4>1*>3*
Average Firm Size	5.18	14.41	3.66	9.78	**20.07**	14.43	0.0000	2,5>1,3
Total Firm Size	6.61	17.03	4.42	12.03	**26.20**	17.64	0.0000	2,5>1,3; 5>4*
Freelancers	1.43	2.62	0.76	2.25	**6.13**	5.76	0.0002	4>3;2>3*
VC	0.14	**0.42**	0.28	0.23	0.41	3.54	0.0077	
Total Funding Rounds	0.76	1.96	0.70	1.64	**2.31**	17.43	0.0000	2,4,5>1,3
Total Funding Amount	1.45	4.13	0.56	2.96	**14.79**	4.74	0.0011	
Revenue Generating	0.67	**0.91**	0.51	0.70	0.87	8.81	0.0000	2,5>3
Intern. Revenue Generating	0.57	0.74	0.27	0.41	**0.79**	13.67	0.0000	5>3,4;2>3,4*; 1>3*
B2B	0.71	0.68	0.67	**0.77**	0.70	0.37	0.8270	
Intern. Office	0.12	0.43	0.07	0.23	**0.48**	11.29	0.0000	2,5>1,3
ICT	0.20	**0.34**	0.31	0.23	0.25	0.90	0.4654	
Life Sciences	0.31	0.25	0.15	0.20	**0.46**	4.53	0.0015	5>3
CFO	0.18	**0.32**	0.07	0.23	0.31	3.84	0.0047	2,5>3*
Firm Growth Rate	1.20	0.68	**1.75**	0.63	0.48	4.80	0.0010	
Cluster Membership	*49*	*53*	*67*	*44*	*61*			

[a] Pairs indicated by an asterisk (*) are significant at the 0.10 level. All others are significant at the 0.05 level or better
Underlined figures denote the lowest value on each variable. Bold numbers denote the highest value on each variable.

Table 37: Context variables across clusters.

5.3.3.2 Simple Controls (C3)

The emerging pattern of C3 is the lowest intensity for four out of five MCS groups. This configuration of control is most common among startups in their first year (63 percent). Individual MCS present in more than 20 percent of the startups are social meetings (30 percent) in cultural controls, written job descriptions (22 percent) in administrative controls, as well as strategic planning (25 percent) and milestone planning (22 percent) in planning MCS. No cybernetic control or reward and compensation MCS are present in over 20 percent of the startups of this cluster.

Context variables indicate that the startups employing simple controls (C3) are young and small firms. Their environment is not very complex yet as only one quarter generates international revenue and only seven percent have an international office. In the absence of a CFO (only seven percent employ one) the MCS package of these firms remains very simple.

5.3.3.3 Planning Focus (C1)

The most prominent pattern of C1 is the high adoption rate for planning MCS (73 percent) compared to all other MCS groups (7 to 33 percent). Startups belonging to this group have on average implemented 90 percent of short term planning MCS (cash flow projections, sales projections, and milestone planning). Two thirds implemented strategic planning and product (portfolio) roadmaps. 35 percent of the startups introduced partnership development planning to their MCS package. Similar to simple controls (C3) social meetings (39 percent), written job descriptions (45 percent), and organizational charts (37 percent) are the most common cultural and administrative controls. Additionally, 35 percent introduced a sales process. All individual cybernetic controls except for project reports (12 percent) are introduced in 35 to 40 percent of the startups. Virtually no reward and compensation MCS are present in firms of this cluster (seven percent).

Startups in this cluster are a bit older than those from simple controls (C3) but not significantly larger or more funded. In 57 percent of the cases they generate international revenue, which is significantly higher than for C3. The companies from this cluster consequently work in a more complex environment, which can explain the higher adoption rates of MCS.

5.3.3.4 Incentive Focus (C2)

Startups from the incentive focus cluster (C2) show significantly higher adoption rates for reward and compensation MCS compared to C1, C3 and C4. All three MCS are adopted in almost all startups: performance evaluation (89 percent), individual incentive programs (98 percent), and management incentive programs (85 percent).

Higher adoption rates are also present for cultural and administrative controls compared to clusters C1 and C3. The main difference in cultural controls is the high rate of introduction of core values (58 percent). Written job descriptions (79 percent), organizational charts (77 percent), and sales process (57 percent) remain the three most widely implemented administrative controls similar to C1 but with higher adoption rates. The overall adoption rate for planning MCS does not differ significantly from C1. However, action planning MCS show a 79 percent adoption rate and long range planning 69 percent, leading to a more even usage of planning MCS than in the C1. Cybernetic controls show no discernable pattern.

Startups in the incentive focus cluster are more than twice as large as those from the planning focus cluster and significantly older. They acquired about 4 million CHF in funding on an average of two funding rounds. Nearly all generate revenue with three quarters generating revenue outside of Switzerland. About one third of them employs a CFO, which is the highest value among all five clusters. In conclusion, startup with incentive focus operate in more complex environments and the finance department is established with a full-time CFO.

5.3.3.5 Process Focus (C4)

The configuration of control for C4 shows a higher focus on processes. The intensity of cultural, administrative, and cybernetic controls is significantly higher than in C1, C2 and C3. The startups show a similar pattern for planning as C1 and C2. The introduction rate of reward and compensation is low and similar to C1 and C3.

Notable amongst the cultural controls is the 95 percent for social meetings, which is the highest adoption rate amongst all clusters. Further, C4 show high adoption rates for core values (73 percent) and for orientation programs for new employees (66 percent). Administrative controls are much more implemented than in C1, C2 and C3. 73 percent of the startups with process focus adopted compliance and internal control systems (only

24 percent in C1 and 36 percent in C2) and 32 percent a buddy system, which is highest among all clusters.

Several cybernetic controls are implemented in the startups at high rates: project selection (80 percent), operating budget and expense approval process (82 percent), capital investment budget and investment approval process (84 percent), and routine analysis of financial performance against target (82 percent).

Although startups with a process focus configuration of control are of similar age as the ones with the incentive focus (C2), they differ in several context variables. Startups with process focus are smaller and less funded but not statistically significant. They are significantly less internationally oriented compared to incentive focus (C2) startups, since they generate less often international revenue (41 percent versus 74 percent) and have less often an international office (23 percent versus 43 percent).

5.3.3.6 Mature Controls (C5)

Startups in C5 have the highest intensity for all five MCS groups. The differences are significant for all groups expect the intensity of administrative controls, which is significantly larger only compared to C1, C2, and C3.

Startups within the cluster have the highest adoption rates for almost all individual MCS. Every startup within the cluster implemented written job descriptions, cash-flows projections, sales projections, and individual incentive programs. Social meetings (82 percent), team composition guidelines (16 percent), and a buddy/mentor system (11 percent) have lower introduction rates than for startups with process focus (C4).

The context variables indicate that this cluster has the oldest and largest firms although not significantly larger than C2. Almost all firms generate revenue (87 percent). The startups are also very international: 79 percent generate revenue outside of Switzerland and about half maintain an office or production site in another country which is the highest among all clusters.

5.3.3.7 Robustness Checks with Other Samples

The cluster analysis for the Swiss sample found five distinct configurations of MCS for startups. These identified types, their mean scores of the cluster variables, and their interpretation may be biased because it is based on one sample, e.g. the mean scores may

not reflect the means in the general population of startups (Auzair, 2015). Therefore, I apply the five-cluster differentiation to other samples as a robustness check. First, the German sample of startups functions as a test sample. Second, the full sample on the sophistication measures is used. I conduct the cluster analysis with the k-means procedure and a five-cluster solution in both cases. The results are then compared to the five previously identified configurations. As pointed out in section 5.3.2, the cluster solution for the German sample and the sophistication sample are not statistically stable. This fact is negligible, since they only function as a robustness check for the stable and interpretable solution from the Swiss sample.

The clustering of the German startups is conducted with the sample of 189 observations. The k-means clustering results are presented in Table 38. The resulting clusters show similar mean adoption rates and are named after the five clusters identified before.

Groups for k-means Clustering Procedure with Five Clusters (German Startups only)[a]

MCS Groups	C1 Planning Focus	C2 Incentive Focus	C3 Simple Controls	C4 Process Focus	C5 Mature Controls
Cultural Controls	0.15	0.37	0.11	0.67	**0.70**
Administrative Controls	0.17	0.30	0.08	0.48	**0.63**
Planning	0.70	0.56	0.09	0.81	**0.87**
Cybernetic Controls	0.31	0.36	0.06	0.47	**0.80**
Reward and Compensation	0.11	**0.82**	0.06	0.16	0.80
Cluster Membership	*40*	*26*	*40*	*43*	*40*

[a]Underlined figures denote the lowest value on each variable. Bold numbers denote the highest value on each variable.

Table 38: Groups for k-means clustering procedure with five-cluster solution based on German startups.

Table 39 shows the differences in the mean adoption rates for every MCS group and cluster between the German and Swiss sample. There are no significant differences for simple controls (C3) and planning focus (C1) between the two samples. The German incentive focus (C2) configuration shows significantly lower mean adoption rates for planning (-17 percent) and cybernetic controls (-20 percent). The process focus (C4) configuration exhibits two significant differences in higher mean adoption rates: cultural

controls (+13 percent) and cybernetic controls (-26 percent). The German mature controls (C5) configuration shows significantly lower mean adoption rates for all three traditional accounting controls (between -5 and -19 percent). In the German sample are more startups with a process focus configuration and less with an incentive focus.

Differences German vs. Swiss Startups (Five-Cluster Solution)[a]

MCS Groups	C1 Planning Focus	C2 Incentive Focus	C3 Simple Controls	C4 Process Focus	C5 Mature Controls
Cultural Controls	0.00	-0.03	0.01	**0.13**	-0.03
Administrative Controls	-0.03	-0.05	0.02	-0.06	0.02
Planning	-0.03	**-0.17**	-0.06	-0.01	**-0.05**
Cybernetic Controls	-0.03	**-0.20**	0.01	**-0.26**	**-0.12**
Reward and Compensation	0.03	**-0.09**	-0.06	0.03	**-0.19**
Cluster Membership in %	*3.3*	*-5.6*	*-3.3*	*6.7*	*-1.1*

[a]Bold figures denote significant difference at p=0.05.

Table 39: Differences for cluster means between Swiss and German startups.

Although there are a few significant differences between the mean adoption rates of the different clusters between Swiss and German startups, the taxonomy is relatively stable and valid also for startups in Germany.

In a second step, the cluster analysis with the five-cluster solution is repeated with the sophistication sample consisting of 95 observations of German and Swiss startups. The results are presented in Table 40. The five groups with their characteristic levels of sophistication compare well to the identified taxonomy. The two extreme configurations, simple controls (C3) and mature controls (C5), are clearly identifiable. Also, the incentive focus (C2) and planning focus (C1) configuration with high levels of reward and compensation respectively planning is differentiable. The average sophistication levels for process focus (C4) are not as expected. Compared to the identified taxonomy based on the intensity level of Swiss startups, I would have expected higher sophistication for planning and cybernetic controls and lower for cultural controls. Nevertheless, there is a difference between the intensity and sophistication of MCS in startups. Therefore, the identified taxonomy based on intensity may not be completely be transferred to the sophistication clusters.

Groups for k-means Clustering Procedure with Five Clusters (Sophistication)[a]

MCS Groups	C1 Planning Focus	C2 Incentive Focus	C3 Simple Controls	C4 Process Focus	C5 Mature Controls
Cultural Controls	2.10	3.05	1.00	**4.59**	3.82
Administrative Controls	1.87	1.99	1.29	2.68	**3.73**
Planning	4.81	4.29	1.99	3.61	**5.42**
Cybernetic Controls	2.78	3.39	1.27	2.55	**5.14**
Reward and Compensation	0.78	**5.90**	1.71	1.85	4.96
Cluster Membership	*18*	*21*	*14*	*16*	*26*

[a]Underlined figures denote the lowest value on each variable. Bold numbers denote the highest value on each variable.

Table 40: Groups for k-means clustering procedure with five-cluster solution for sophistication measures on the full sample.

Both solutions for different samples show, that the found taxonomy for MCS configurations in startups is replicable to some extent. In the next section, the evolution path of Swiss startups through the configurations is analyzed.

5.3.4 Path Analysis of Startups

Next, the cluster membership over the life of the startup is analyzed to generate further insights about the importance of the identified configurations of control. Based on the historic data generated from the survey it is possible to analyze the path of each startup over the last seven years. The most common configurations of control for startups of different ages are derived.

First, the year-over-year changes are analyzed (see Figure 13). The configurations written on the x-axis indicate the configuration in the year *t*. The bars in the figure indicate the percentage of configurations the startups change to in the following year *t+1*. Darker bars show the percentage of startups staying with the previous configuration. Startups with incentive focus (C2) or simple controls (C3) keep that configuration in two thirds of the cases from one year to the next. Startups with a planning focus (C1) and process

focus (C4) configuration keep this in more than half of the cases. Once the firms implemented the mature controls (C5), there is no going back.[9]

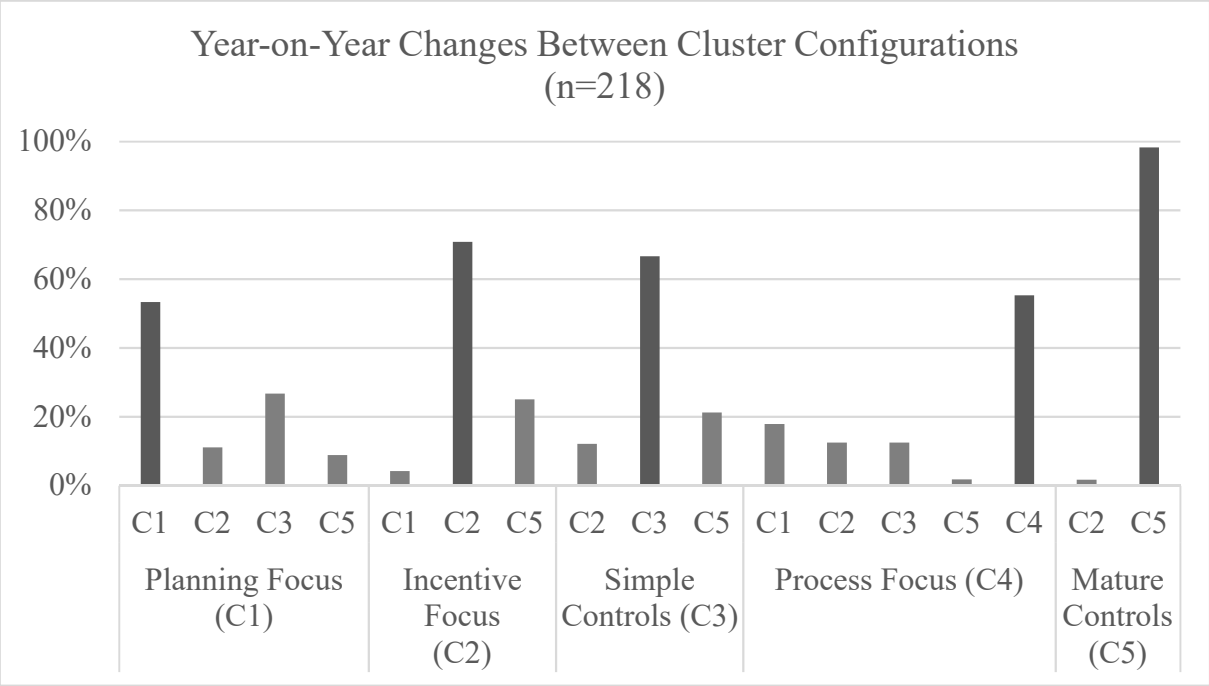

Figure 13: Year-on-year changes between cluster configurations.

Second, the change after three years is analyzed (see Figure 14). Startups with simple controls (C3) develop to mature controls (C5) in 64 percent of the time. Only 21 percent keep the original configuration of control over the period of three years. Planning focus (C1) startups change about equally to mature controls (C5), incentive focus (C2) and simple controls (C3) while only 12 percent stay with the configuration. Startups using an incentive focus (C2) configuration have equal odds of implementing a mature controls (C5) configuration and staying with the current mode. The process focus (C4) configuration is the most unstable. Only 11 percent have the same configuration of control after three years. Startups nearly equally move to any of the four other configurations.

[9] The logic of the survey questions does not allow for the abandoning of MCS. Therefore, it is not possible to reduce the MCS intensity of any dimension.

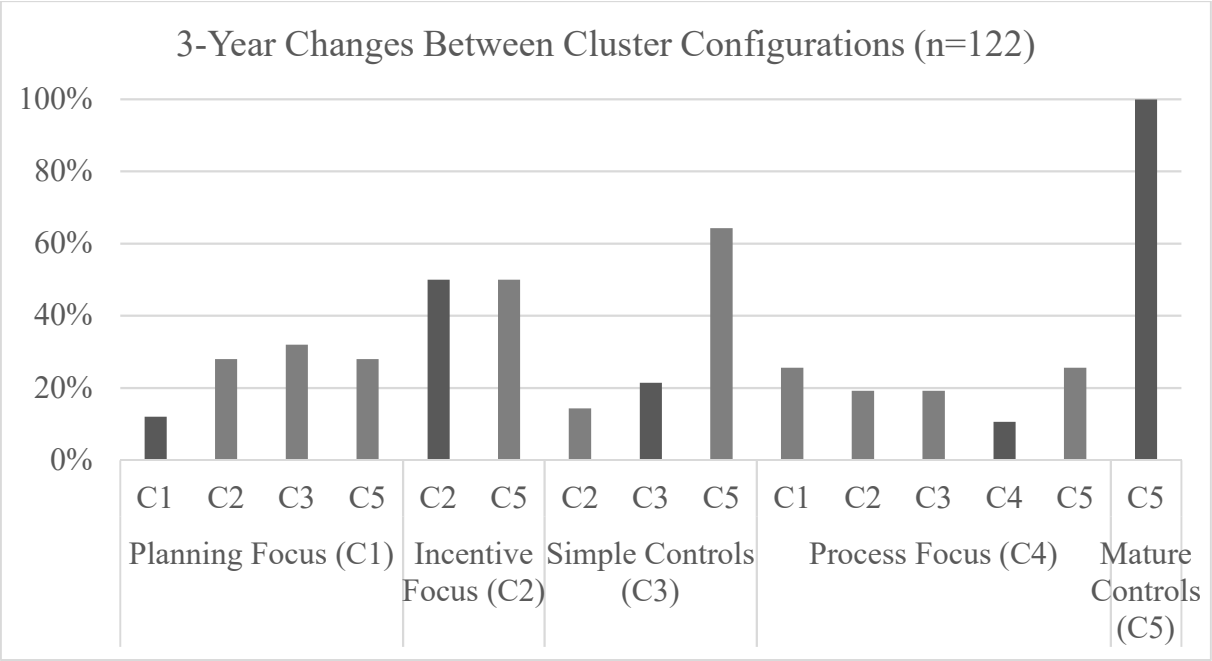

Figure 14: 3-year changes between cluster configurations.

Third, the most common configurations of control for different age groups are analyzed (see Figure 15). Simple controls (C3) is most common for startups up to three years since their founding date (43 percent). Another 24 percent implement a planning focus (C1) set of controls. Between the age of four to six years no discernable pattern emerges. Most of the companies (25 percent) have mature controls (C5) but all other configurations are about equally implemented. For companies seven years and older, more than half set up mature controls (C5) while 26 percent have an incentive focus (C2) and 18 percent a process focus (C4) configuration of control. No company at this age has simple controls (C3) and only very few a MCS package with planning focus (C1).

Startups develop their configuration of control over the lifetime of the firm (see Figure 15). Most startups use simple controls (C3) in their first year but some already develop more advanced configurations and adopt a larger number of individual MCS at the very beginning. Even at the age of seven years or older, startups need not to develop to a complete MCS package represented by mature controls (C5). A large number stays with an incentive focus (C2) or process focus (C4) configuration of control.

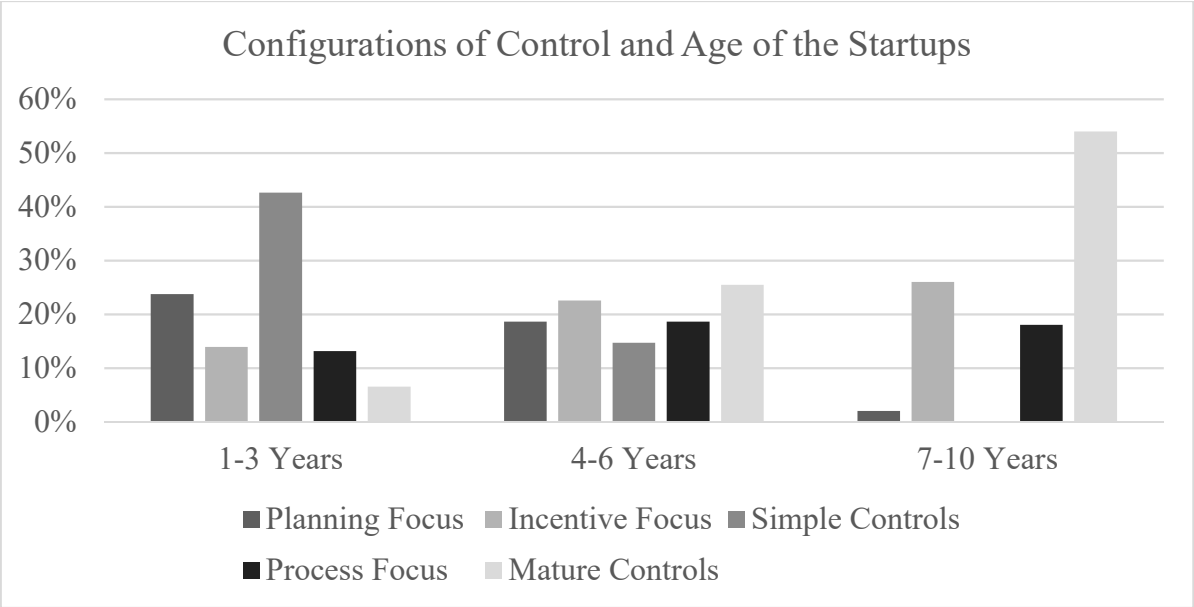

Figure 15: Configurations of control and age of the startups.

5.3.5 Concluding Remarks

Three steps were taken in this section to identify and understand configurations of control in startups. First, cluster analysis was conducted on different datasets to find configurations of control which are statistically stable and interpretable from a practical perspective. The five-cluster solution for the MCS intensity variables based on the Swiss dataset meets these requirements.

Second, the differences between the five clusters were analyzed and appropriate names given. The configurations of control in startups are planning focus (C1), incentive focus (C2), simple controls (C3), process focus (C4), and mature controls (C5). Each type has its unique features described in the section 5.3.3 above.

Third, the development of the configurations of control over the lifetime of startups was analyzed. Although most startups use simple controls (C3) in the first year, other configurations are also common. Older startups choose different configurations and do not necessarily develop the MCS package towards mature controls (C5) but continue to use an incentive focus (C2) or process focus (C4) configuration of control.

5.4 Stakeholders' Influence

5.4.1 Introduction

In this section, I analyze the influence of stakeholders on the development of the MCS package in startups and test several hypotheses that I developed in section 3.5. The dependent variables contingent on the hypotheses are the intensity and sophistication measures of the five different MCS groups of the framework: cultural controls, administrative controls, planning, cybernetic controls, and reward and compensation. Data is available for all 100 observations for the year 2016. The independent variables depending on the hypothesis is an influence measure from one of the four stakeholder groups: investors, employees, customers, and founders.

The remainder of the section is structured as follows: First, the appropriate control variables are selected. Second, I discuss the descriptive statistics on the relevant variables. Third, group comparison tests are conducted as a first test of the hypotheses. Finally, I conduct multivariate regression analysis with OLS.

5.4.2 Selection of Control Variables

The list of control variables is based on the literature on the emergence of MCS. Due to the limited number of observations the regression analysis cannot be conducted with all control variables. Therefore, the final set of control variables is selected with the *lasso* (see section 4.3.3). The selection procedure is described at the end of this section. The final set of control variables contains age and average firm size as continuous variables as well as B2B and international office as dichotomous variables. The complete list of control variables is discussed next.

The two most widely analyzed influences on the adoption of MCS based on the review of the literature from section 3.1.2 are whether the startup is backed by a VC and the size of the startup. VCs have specific demands on financial and nonfinancial information which requires certain result controls, namely financial planning and variance analysis (Davila, 2005). Most studies find a positive relationship between the presence of a VC and the adoption and intensity of MCS (Davila, 2005; Davila & Foster, 2005, 2007; Strehle et al., 2010) while some papers find no significant influence (Cassar, 2009; Davila et al., 2015; Sandino, 2007). Firm size is the second most common influence

studied. As companies grow and become more complex, their coordination and monitoring costs increase which then drives the adoption of MCS (Davila & Foster, 2007). The number of employees as a complexity measure is therefore used in a number of studies. A positive and significant relationship with the adoption of different MCS is found in all articles using firm size as a driver (Davila, 2005; Davila & Foster, 2007; Davila et al., 2015; Strehle et al., 2010). In conclusion, both variables will act as control variables in this study.

Knowledge and learning within the startup can drive the adoption of MCS. The age of the startup, hiring a financial manager, and the replacement of the founder by an outside CEO are three ways of measuring this process used by a number of studies (Davila, 2005; Davila & Foster, 2005, 2007; Davila, Foster, & Li, 2009; Strehle et al., 2010; Wijbenga et al., 2007). Age can be a proxy for learning within an organization, which can translate into the improvement of MCS (Davila, 2005; Greiner, 1972). All studies show a positive significant influence of the age of the firm on MCS adoption (Davila, 2005; Strehle et al., 2010; Wijbenga et al., 2007). Hiring of a full time financial manager (CFO) is another driver of MCS adoption. With the necessary prior knowledge the new manager increases the capability of the firm to employ MCS (Davila, Foster, & Li, 2009). The relationship in all studies is positive and in most cases significant (Davila & Foster, 2005; Davila, Foster, & Li, 2009; Strehle et al., 2010). The replacement of the founder by a CEO showed mixed results in the four articles it was investigated (Davila, 2005; Davila & Foster, 2005, 2007; Strehle et al., 2010). A positive significant impact on the adoption of MCS is found only in one out of four articles, which test for this relationship (Davila & Foster, 2005).

The complexity of the environment leads to the adoption of MCS (Davila & Foster, 2005). Therefore, the international presence of the startup is used as a complexity measure. Research shows a positive impact on the development of MCS (Davila & Foster, 2005, 2007; Strehle et al., 2010). International presence is measured by accounting for international revenues and for operating offices or production sites outside the home country of the startup. Additionally, the existence of revenue is used as a control.

The competitive environment in which the startup operates showed a positive impact on the development of MCS in two studies (Cassar, 2009; Davila et al., 2015). The more

competitive, the more MCS were developed in the startups. Consequently, I use the competitive environment construct described in section 4.2.5 as a control variable.

Industry is used as a control in a number of studies (Davila & Foster, 2005, 2007; Wijbenga et al., 2007). In this study, ICT and life sciences are the two main industries. Dichotomous variables for both industries are used to capture any potential differences in the emergence of MCS. Additionally, the companies are distinguished on whether they operate in B2B or not. A dichotomous variable to differentiate the region (Switzerland or Germany) is added to account for any differences between those countries.

The full set of control variables initially used is as follows: VC, firm size, firm age, CFO, CEO change, international office, international revenue, revenue, competitive environment, ICT, life sciences, B2B, and region. As mentioned above, the number of observations is not high enough to use all control variables in the regression analysis. Therefore, the lasso is used as a variable selection procedure in the following way (see section 4.3.3 for details).

First, one lasso regression per dependent variable (five each for intensity and sophistication of the MCS) with all thirteen control variables is conducted. Second, the number of none-zero coefficients per control variable in those 10 regression results is added together. Third, the control variables with the highest count are chosen.

The full results of all 10 regressions are found in Table 69 in the Appendix. Table 41 shows the count for the different control variables. Notably, the regression coefficient for VC is only once non-zero in the lasso results although the existence of a VC has been found to be a major driver of MCS adoption in startups in other studies. Age, B2B, average firm size, and international office are significant control variables in at least half of the lasso regressions. Therefore, those four variables are used as control variables in the following regressions. The number of variables is limited to four to provide enough degrees of freedom for the regression analysis. As a robustness check, all regressions are additionally conducted with all control variables in a lasso regression.

Lasso Results for Control Variables

Control Variables	Total Count	Intensity Count	Sophistication Count
Age	8	4	4
B2B	7	4	3
Firm Size	6	3	3
Intern. Office	5	3	2
CEO Change	4	2	2
Competitive Environment	3	-	3
Region Switzerland	2	1	1
ICT	2	1	1
Life Science	1	1	-
VC	1	1	-
CFO	-	-	-
Revenue	-	-	-
Intern. Revenue	-	-	-

Table 41: Count data on lasso results for control variables.

5.4.3 Descriptive Statistics on Stakeholders' Influence

The descriptive statistics are shown in Table 42. The five MCS intensity variables are count variables with discrete values to increase the interpretability of regression coefficients in the following analysis. Administrative controls (AC) have a total of 10 elements but with a maximum of nine controls present in startups in the sample. All four other maximums at the same time represent the total number of individual MCS within the MCS groups. The MCS sophistication variables are coded on a seven-point Likert scale. Additionally, zero-values are used to represent the case that the system is not introduced (intensity dummy variable is zero) and therefore no sophistication can be measured. A value of one indicates that MCS have been introduced but are not used by anyone in the startup. A value of seven for the MCS sophistication indicates that all individual MCS have been introduced and are fully used by all employees of the company.

The startups report a very high influence of the founders on the development of MCS: 6.33 on a seven-point scale. The maximum influence of seven is reported by 72 percent of the firms. The average influence of investors and employees is similar (4.14 and 4.26 respectively). Customers have the lowest influence with an average of 2.81.

Significant correlations between the dependent and independent variables exist for the influence of employees and administrative controls, both for the intensity and sophistication variable (see Table 43). Additionally, between the influence of employees and reward and compensation (RC). Between the independent variables, a positive correlation of 0.30 exists between the influence of employees and customers.

Descriptive Statistics - Stakeholders' Influence

	Mean	SD	Min	Median	Max
Dependent Variables					
AC Intensity	4.92	2.04	1	5.00	9
CC Intensity	2.82	1.31	0	3.00	5
PC Intensity	4.93	1.2	1	5.00	6
CY Intensity	5.19	2.13	0	5.00	8
RC Intensity	1.81	1.21	0	2.00	3
AC Sophistication	2.53	1.19	0.20	2.40	5.70
CC Sophistication	3.10	1.58	0.00	3.40	7.00
PC Sophistication	4.29	1.53	0.67	4.33	7.00
CY Sophistication	3.36	1.69	0.00	3.31	7.00
RC Sophistication	3.35	2.56	0.00	3.33	7.00
Independent Variables					
Influence Founders	6.33	1.44	1.00	7.00	7.00
Influence Investors	4.14	2.00	1.00	4.50	7.00
Influence Employees	4.26	1.71	1.00	4.00	7.00
Influence Customers	2.81	1.91	1.00	2.00	7.00
Control Variables					
Age	5.01	2.44	1.00	4.00	10.00
Firm Size	21.34	30.89	2.00	10.50	240.00
B2B	0.67	0.47	0.00	1.00	1.00
Intern. Office	0.34	0.48	0.00	0.00	1.00

Table 42: Descriptive statistics for stakeholders' influence variables.

Correlation Table - Stakeholders' Influence

No.	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	AC Intensity	1.00																	
2	CC Intensity	0.46	1.00																
3	PC Intensity	0.35	0.37	1.00															
4	CY Intensity	0.48	0.41	0.44	1.00														
5	RC Intensity	0.22	0.34	0.08	0.33	1.00													
6	AC Sophistication	0.87	0.42	0.36	0.48	0.25	1.00												
7	CC Sophistication	0.43	0.90	0.34	0.34	0.31	0.47	1.00											
8	PC Sophistication	0.29	0.30	0.74	0.43	0.12	0.42	0.32	1.00										
9	CY Sophistication	0.43	0.37	0.43	0.88	0.36	0.52	0.35	0.62	1.00									
10	RC Sophistication	0.26	0.32	0.13	0.33	0.94	0.33	0.29	0.20	0.40	1.00								
11	Influence Investors	0.04	0.07	0.05	0.12	0.09	0.10	0.07	0.12	0.15	0.06	1.00							
12	Influence Employees	0.31	0.16	0.17	0.17	0.25	0.27	0.15	0.23	0.17	0.26	0.00	1.00						
13	Influence Customers	0.18	0.12	0.11	0.17	0.08	0.19	0.13	0.17	0.18	0.10	0.19	0.30	1.00					
14	Influence Founders	0.08	0.14	0.11	0.06	-0.17	0.02	0.16	0.17	0.03	-0.18	-0.12	0.15	0.04	1.00				
15	Age	0.28	0.23	0.14	0.47	0.38	0.29	0.13	0.20	0.45	0.38	0.19	0.20	-0.12	-0.09	1.00			
16	Average Firm Size	0.24	0.20	-0.05	0.09	0.28	0.30	0.22	0.03	0.16	0.33	0.09	0.17	0.17	-0.21	0.14	1.00		
17	B2B	0.17	0.21	0.32	0.18	-0.02	0.16	0.24	0.26	0.15	-0.02	0.34	-0.09	0.12	0.06	0.08	-0.20	1.00	
18	Intern. Office	0.29	0.20	0.06	0.24	0.29	0.30	0.19	0.06	0.25	0.28	-0.02	0.04	-0.02	-0.03	0.23	0.34	0.05	1.00

All correlations larger or equal to 0.2 are significant at p=0.05.

Table 43: Correlation table for the variables for the stakeholders' influence analysis.

The average influence of the stakeholders on the MCS development differs with firm age (see Figure 16). For the years one and 10 only four observations each exist. Therefore, the average influences cannot be taken as representative and should only be interpreted with this fact in mind. The average influence of founders remains constant over the lifetime of the startup except for lower level in year five (mean score = 5.4) and year 10 (mean score = 5.5). Startups three years and older are under a higher investors' influence than younger startups. The average influence of employees is volatile with a trend toward more influence the older the startup. Surprisingly, customers show higher levels for the years two to five and lower levels of influence for six years and older. A ranking of the stakeholders according to their influence for every year reveals that founders are always in first place except for the tenth year. Customers are always last except for the second year. Investors and employees rank in between but in changing positions for each year without a consistent trend. In conclusion, no clear pattern of the development of the influence of stakeholders over the life of the startup emerges from the data except for the ranking.

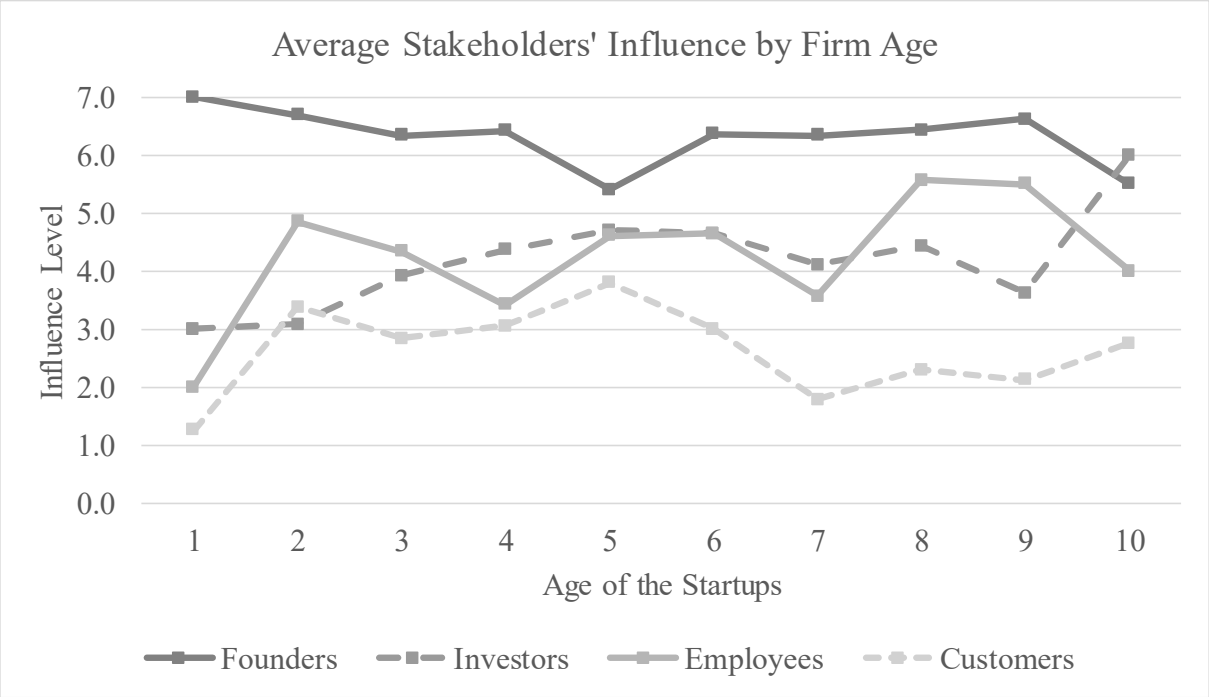

Figure 16: Average stakeholders' influence levels by the age of the startups.

5.4.4 Group Comparison Tests

In this section, I conduct group comparison tests to initially test the relationships about stakeholders' influence on the development of MCS, before using regression analysis to test the hypotheses. The four different stakeholder groups are discussed in the following order: investors, employees, customers, and founders.

The hypothesis S1 on the influence of investors on the MCS development states that high investor influence leads to higher intensity and sophistication of planning (PC), cybernetic controls (CY), and reward and compensation (RC). First a graphical analysis is conducted and afterwards the group comparison tests to find support for the hypothesis.

Analyzing the level of MCS sophistication depending on the influence of investors shows no discernable pattern (see Figure 17). The hypothesis is not supported by the evidence. I split the sample into Swiss and German startups and analyze the sophistication for the three MCS groups for the Swiss sample in Figure 18. There is some evidence that the higher the investors' influence on the MCS development, the higher the sophistication of the three MCS groups. Similar patterns for the intensity of the three groups exist in the full sample and the Swiss sample.

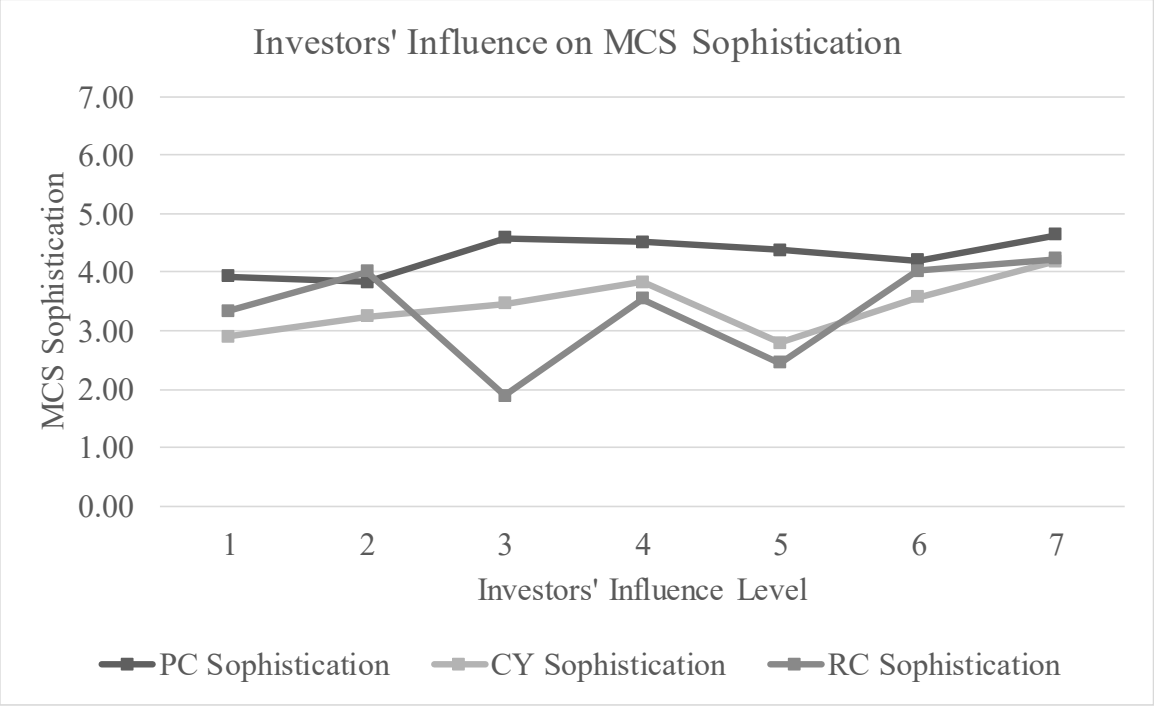

Figure 17: Investors' influence on MCS sophistication (full sample).

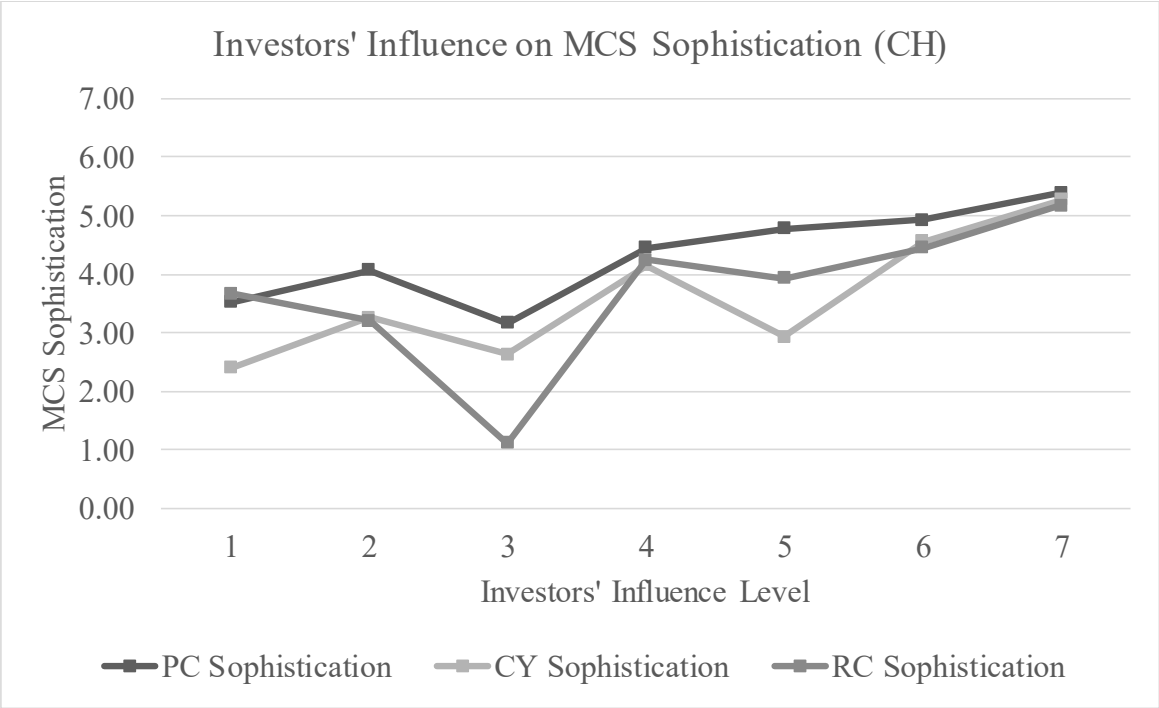

Figure 18: Investors' influence on MCS sophistication (Swiss startups).

The group comparison tests on the extreme groups of lowest and highest influence for the full sample show some significant differences (see Table 44). The results of the parametric t-test and the non-parametric Mann-Whitney-White test support a significant relationship between the sophistication of cybernetic controls and the influence of investors. In the Swiss sample, significant differences are found by both tests for planning and cybernetic controls. Their intensity as well as their sophistication is higher when the investors' influence is high. No significant differences are found for the intensity and sophistication of reward and compensation.

The results of the group comparison tests indicate that in Swiss startups with high investors' influence on the development of MCS planning and cybernetic control are more developed and more used. These first results will be verified by a regression analysis in the next section.

Investors' Influence - Group Comparison Tests

Mean	low (1)	high (7)	t-statistic	W-statistic
Full sample				
PC Intensity	0.81	0.87	0.96	86
CY Intensity	0.60	0.78	1.81 .	82
RC Intensity	0.57	0.79	1.76 .	81
PC Sophistication	3.93	4.63	1.16	89
CY Sophistication	2.90	4.18	1.79 .	74 .
RC Sophistication	3.33	4.23	1.02	91
n	*18*	*13*		
CH only				
PC Intensity	0.82	0.97	2.80 *	13 *
CY Intensity	0.57	0.92	3.25 **	12 *
RC Intensity	0.61	0.89	1.69	20
PC Sophistication	3.52	5.39	2.56 *	14 .
CY Sophistication	2.40	5.27	3.33 **	8 *
RC Sophistication	3.67	5.17	1.36	25
n	*11*	*6*		

., *, **, and *** indicate significance at the 10%, 5%, 1% and 0.1% levels respectively.

Table 44: Investors' influence - group comparison tests.

I hypothesized before that employees positively influence the development of administrative controls (AC) and cultural controls (CC). Again, a graphical analysis is conducted and afterwards the group comparison tests to analyze both relationships (hypotheses S2 and S3).

Figure 19 shows a positive slope for the intensity of administrative controls as well as cultural controls with increasing employees' influence. Figure 20 also shows a positive slope for the development of sophistication of the two MCS groups depending on the influence of employees. Both graphs provide some support for the hypotheses.

The group comparison tests for startups with low and high employees' influence on the development of MCS show a clear difference for administrative controls both in intensity and sophistication (see Table 45). Both the parametric as well as the non-parametric tests show a significant difference at the five percent level. There are no signs of a difference for cultural controls except for sophistication indicated by the results of the non-parametric test.

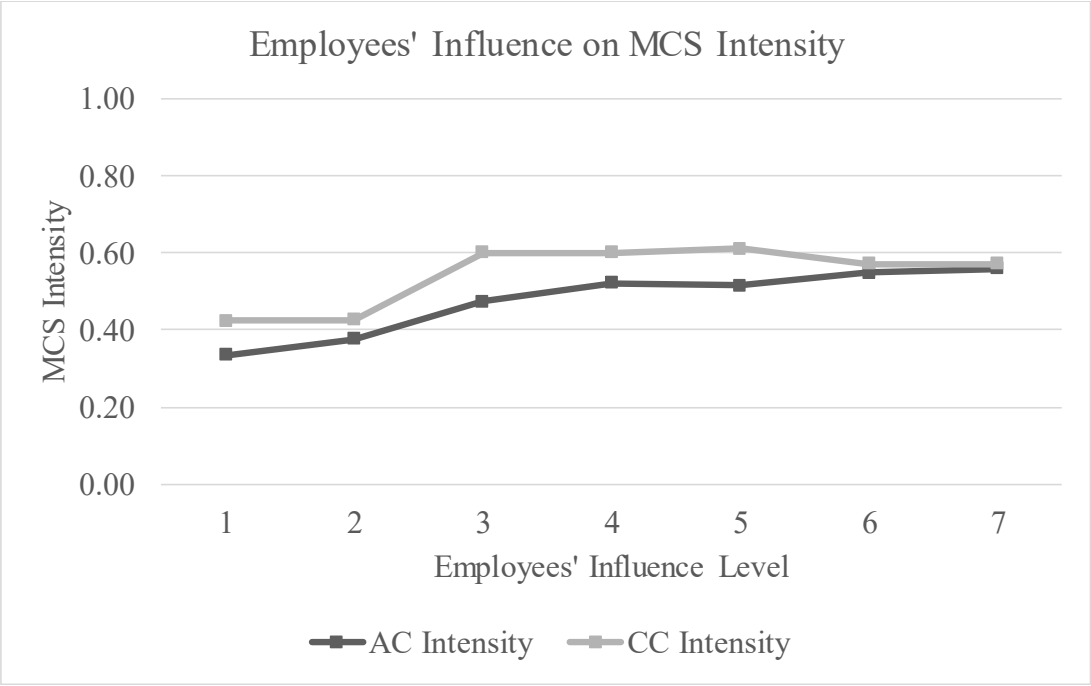

Figure 19: Employees' influence on MCS intensity.

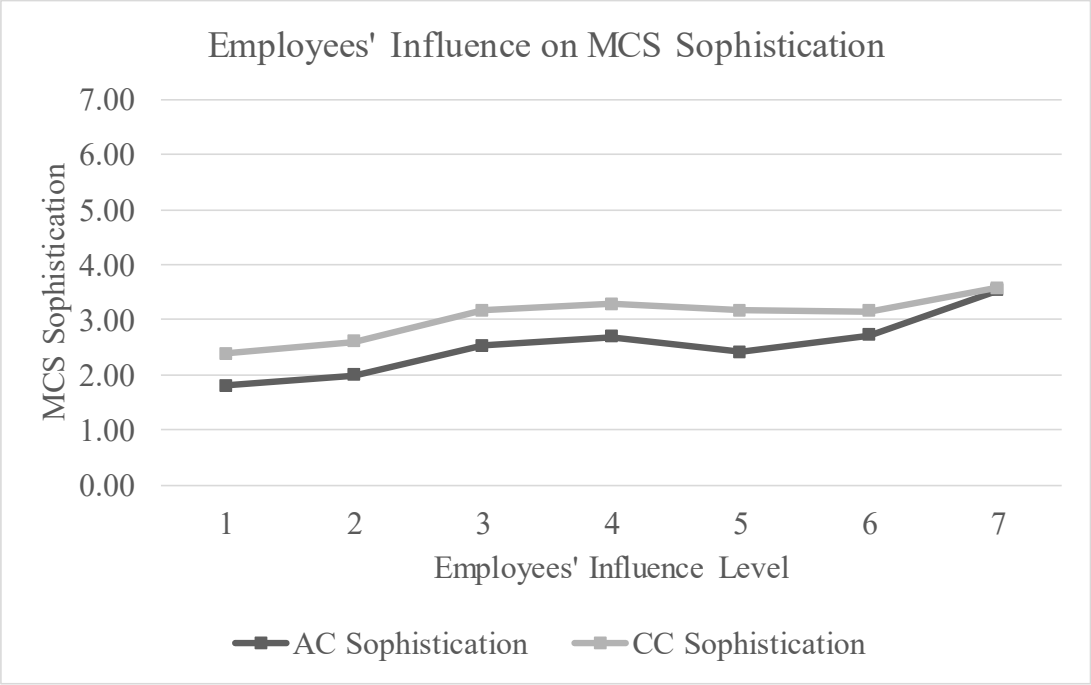

Figure 20: Employees' influence on MCS sophistication.

Employees' Influence - Group Comparison Tests

Mean	low (1)	high (7)	t-statistic	W-statistic
AC Intensity	0.33	0.56	2.51 *	12 *
CC Intensity	0.42	0.57	0.98	20
AC Sophistication	1.80	3.53	3.51 **	9 *
CC Sophistication	2.38	3.57	1.20	16 .
n	*9*	*7*		

., *, **, and *** indicate significance at the 10%, 5%, 1% and 0.1% levels respectively.

Table 45: Employees' influence - group comparison tests.

Higher customers' influence on the MCS development is hypothesized to increase the intensity and sophistication of administrative controls (AC). The same relationship is hypothesized for the effect on cybernetic controls (CY). From the two figures (Figure 21 and Figure 22), no discernable patterns emerge to support this hypothesis.

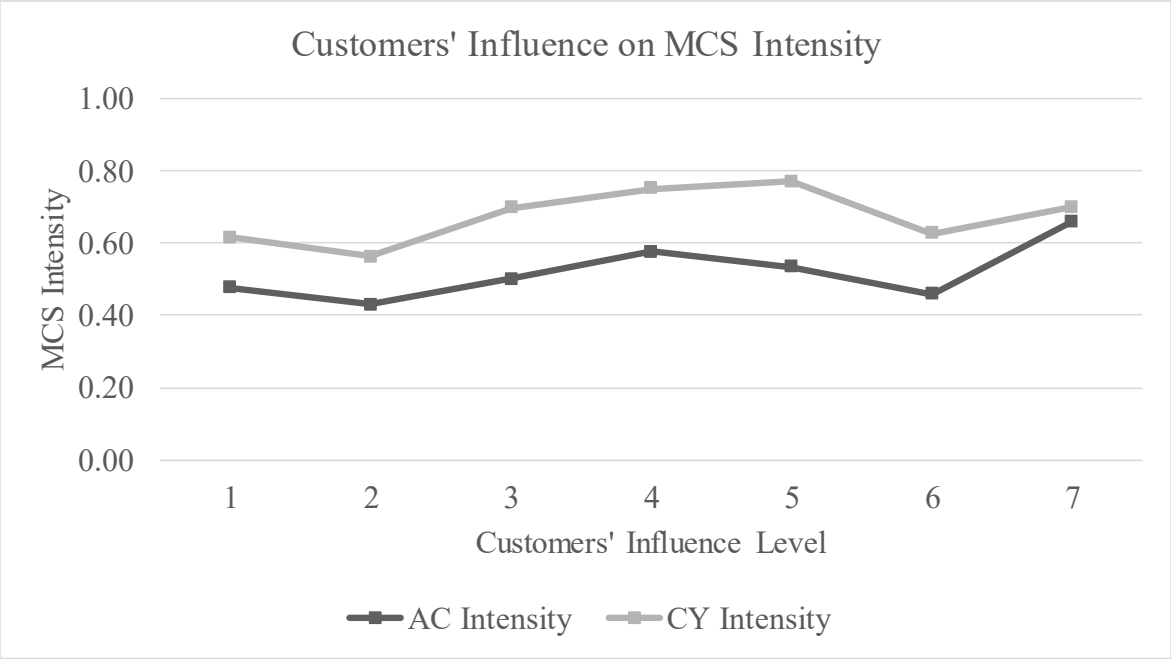

Figure 21: Customers' influence on MCS intensity.

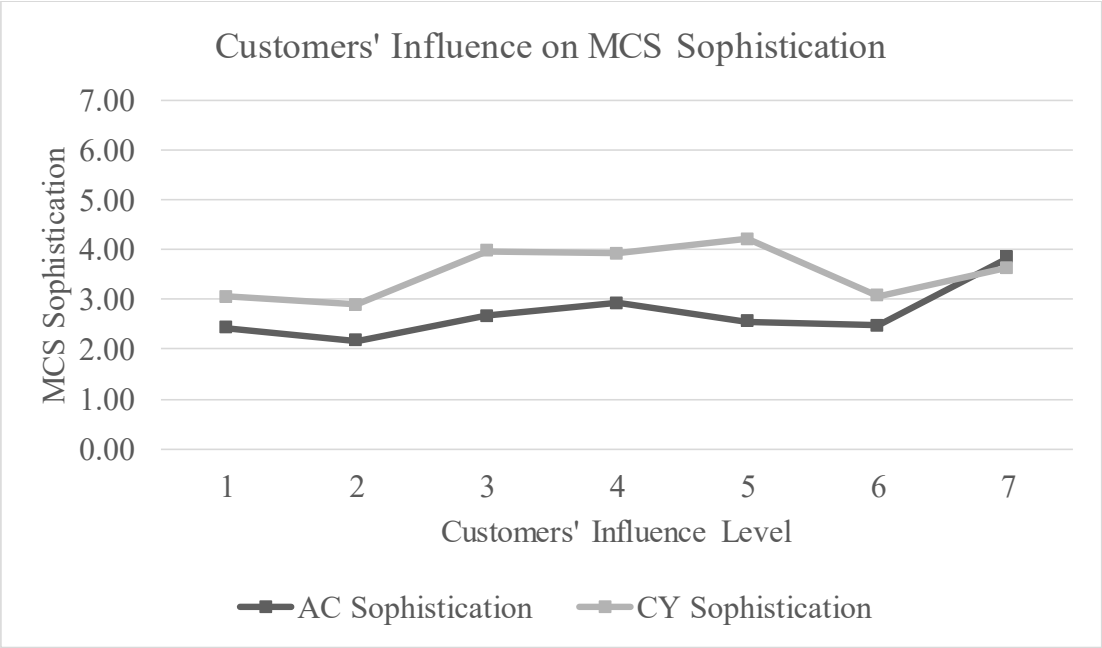

Figure 22: Customers' influence on MCS sophistication.

The group comparison tests show little evidence for a significant relationship. Only the non-parametric Mann-Whitney-White test indicates some support for the hypothesis that higher customers' influence leads to a higher intensity and sophistication of administrative controls. The tests have been repeated using the full sample and splitting it with the median. The results are similar for the non-parametric test. The t-test shows a significant difference at the 10 percent level.

For the influence on cybernetic controls the group comparison of the extreme groups does not indicate any significant differences (see Table 46). The differences for both tests are significant at the five percent level when using the median to split the full sample (see Table 47).

Customers' Influence - Group Comparison Tests

Mean	low (1)	high (7)	t-statistic	W-statistic
AC Intensity	0.48	0.66	1.98	47 .
CY Intensity	0.61	0.70	1.06	81
AC Sophistication	2.43	3.84	2.05	40 .
CY Sophistication	3.05	3.63	0.69	78
n	*36*	*5*		

., *, **, and *** indicate significance at the 10%, 5%, 1% and 0.1% levels respectively.

Table 46: Results of group comparison for customers' influence on administrative and cybernetic controls.

Customers' Influence - Group Comparison Tests (Median)

Mean	Low	High	t-statistic	W-statistic
AC Intensity	0.46	0.53	1.83 .	961 .
CY Intensity	0.60	0.72	2.37 *	945 *
AC Sophistication	2.33	2.78	1.86 .	969 .
CY Sophistication	2.99	3.84	2.54 *	898 *
n	*56*	*44*		

., *, **, and *** indicate significance at the 10%, 5%, 1% and 0.1% levels respectively.

Table 47: Results of group comparison for customers' influence on administrative and cybernetic controls (median split).

Founders have a strong influence on almost all aspects of a startup. The average influence level of founders is very high as reported in the previous section. 72 percent of the startups report founders to be very influential (7) – see Figure 23. Due to the low number of only 28 observations outside this group, drawn inference should be handled with caution. I conduct a group comparison with all variables from the dataset between those startups with very influential founders (7) and the rest (1-6). The only statistical difference is that those startups with high founders' influence have a lower investors' influence. No differences otherwise could be found, especially not for size, age, VC presence, funding, etc.

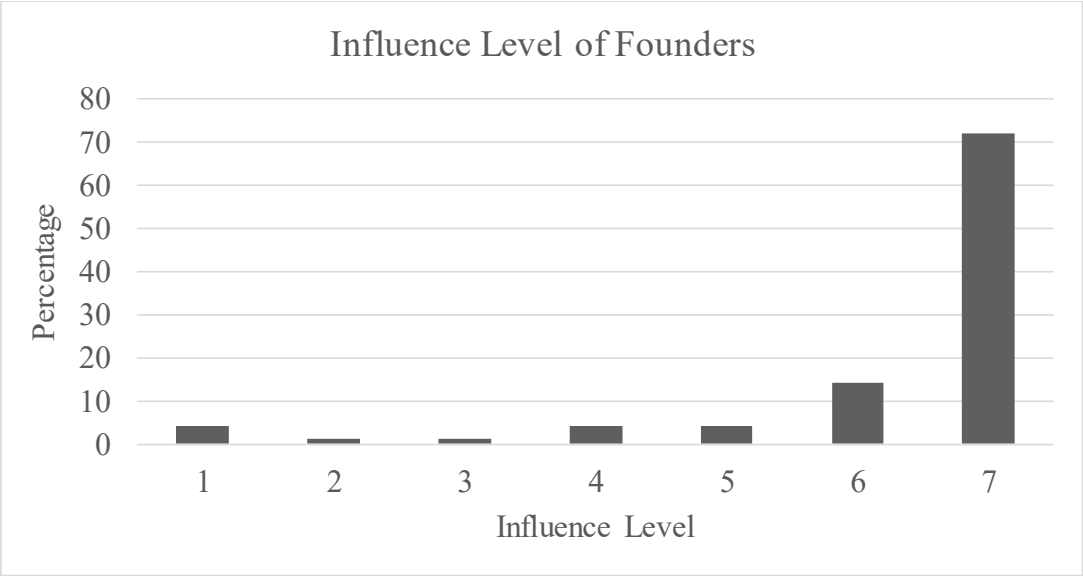

Figure 23: Influence level of founders on the development of MCS.

Only one observation each exists for influence level 2 and 3. Therefore, the average cultural control intensity (Figure 24) and sophistication (Figure 25) for these values are not defined. The analysis of the figures gives no support for the hypothesis that higher founders' influence leads to higher adoption rates and sophistication of cultural controls (CC). Also, the group comparison tests report no significant differences between the two groups split by the median (see Table 48).

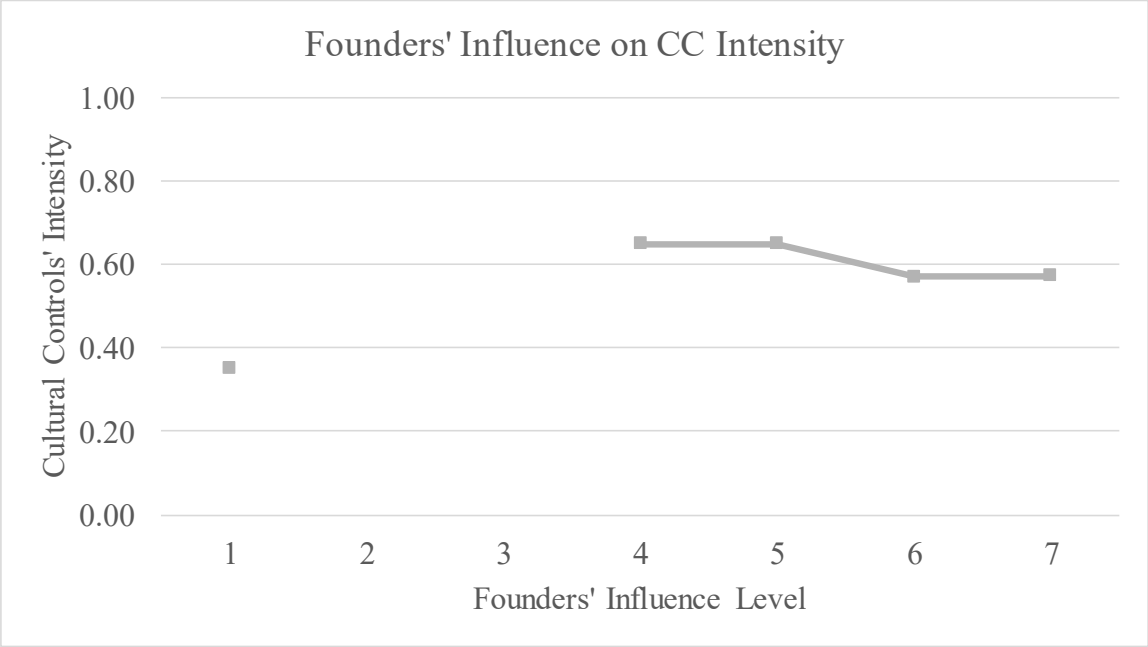

Figure 24: Founders' influence on cultural control intensity.

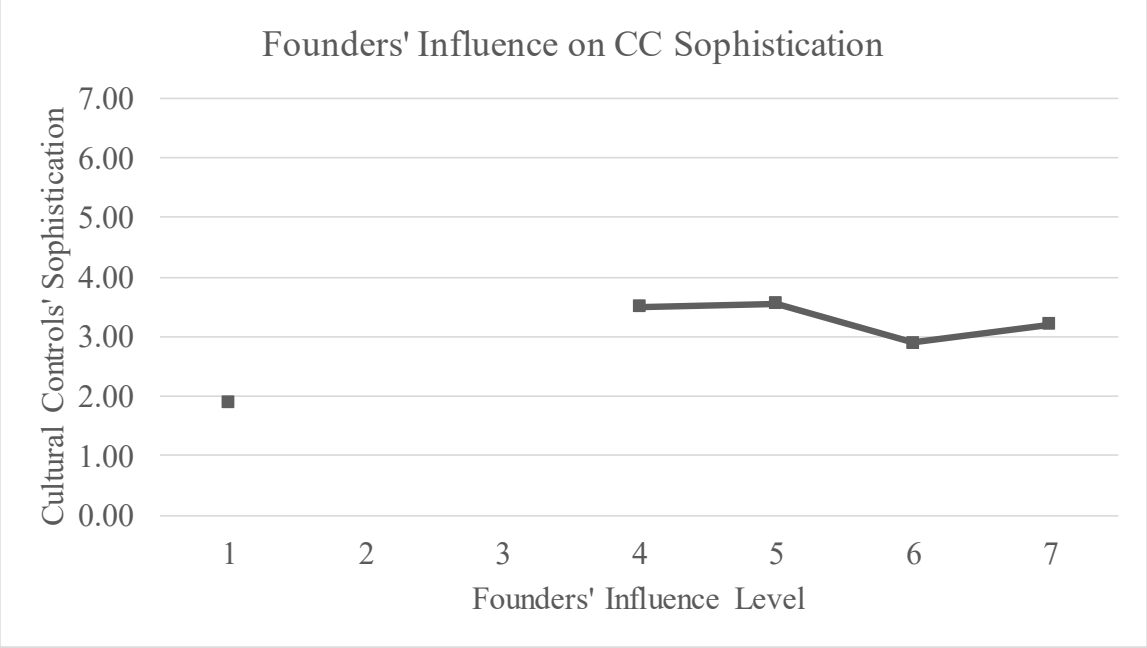

Figure 25: Founders' influence on the cultural control sophistication.

Founders' Influence - Group Comparison Tests (Median)

Mean	Low	High	t-statistic	W-statistic
CC Intensity	0.54	0.57	0.48	939
CC Sophistication	2.84	3.20	1.03	860
n	*28*	*72*		

., *, **, and *** indicate significance at the 10%, 5%, 1% and 0.1% levels respectively.

Table 48: Results of group comparison for founders' influence on cultural controls (median split).

In conclusion, group comparison tests provide first support for some of the hypotheses. When investors have a strong influence on the development of MCS, planning and cybernetic controls show a higher intensity and a higher sophistication for Swiss startups. There are no signs of an influence on reward and control by this stakeholder group. Influential employees seem to be connected with an increase in administrative controls. A positive impact on cultural controls is not supported. The analysis of the figures and the group comparison tests finds only little support for the hypothesis that customers' influence leads to higher administrative control intensity and sophistication. Similarly, the evidence for the influence on the cybernetic controls is weak. None of the tests provides support for a relationship between founders' influence and cultural controls. As a

robustness check, extreme group comparison tests have been replicated using the median as a differentiator between groups. The results are largely the same. In the next section, all hypotheses are tested with regression analysis.

5.4.5 Regression Results

5.4.5.1 Investors and Traditional Accounting Controls

The first hypothesis (S1) states that the higher the influence of investors on the MCS development of a startup, the higher the intensity and sophistication of traditional accounting controls, namely planning, cybernetic controls, and reward and compensation. In this section, all of these relationships are tested using OLS regressions with robust standard errors. Starting point is the influence of investors on cybernetic controls.

Table 49 reports the regression results of the investors' influence on cybernetic controls. In the first regression model (CV only) the dependent variable is regressed against the control variables. The adjusted R^2 of 0.231 for the intensity of cybernetic controls and 0.213 for the sophistication of those controls show an acceptable explanatory power of the control variables. A comparable study with regressions based on the intensity of different MCS groups as the dependent variables report R^2 between 0.16 to 0.37 (Davila et al., 2015, pp. 231–232). Those values represent adjusted R^2 between 0.13 and 0.34. The second model reports the effect of the investors' influence without any control variables (Effect only). The effect is not significant. The complete model with the investors' influence variable and the control variables has a lower adjusted R^2 than the CV-only-model. The coefficient for the independent variable is insignificant. The results of all three regressions combined indicate that there is no significant influence of investors on the intensity and sophistication of cybernetic controls in startups.

The results have been replicated using the lasso with all control variables as well as regressions on the subset of large startup firms (average size over 10 employees or freelancers) with similar results. When I test for the other relationships by using the MCS groups for planning and reward and compensation, the results are largely the same. The results do not support the hypothesis S1.

The group comparison tests in section 5.4.4 indicated that investors' influence exists only in Swiss startups. Therefore, the regression analysis is conducted using the subsample of Swiss startups with 53 observations.

Regression Analysis for Cybernetic Controls and Investors[a]

	CV only			Effect only			Effect + CV		
DV: Intensity of Cybernetic Controls									
Influence Investors				.13		(.12)	-.01		(.10)
Intercept	2.56	***	(.70)	4.66	***	(.55)	2.59	***	(.75)
Firm Size	.19		(.23)				.07		(.23)
Age	.07	***	(.08)				.37	***	(.08)
B2B	.06		(.40)				.66		(.43)
Intern. Office	.22		(.46)				.55		(.46)
Adj. R^2	.231	***		.004			.223	***	
DV: Sophistication of Cybernetic Controls									
Influence Investors				.13		(.09)	.03		(.08)
Intercept	1.27	*	(.54)	2.83	***	(.41)	1.21	*	(.59)
Firm Size	.11		(.19)				.10		(.19)
Age	.27	***	(.06)				.27	***	(.06)
B2B	.41		(.32)				.37		(.32)
Intern. Office	.45		(.38)				.47		(.38)
Adj. R^2	.213	***		.013			.205	***	

[a] Robust standard errors are reported in parentheses.
., *, **, and *** indicate significance at the 10%, 5%, 1% and 0.1% levels respectively.

Table 49: Regression results for investors' influence on cybernetic controls.

The results of the Swiss sample are given in Table 50. The regression coefficient of investors' influence on the intensity of cybernetic controls is only significant in the effect-only model but not in the full model with the control variables. The adjusted R^2 in the full model is lower than in the CV only model. This indicates that adding the influence of investors to the model does not increase the explanatory power of the model.

In contrast, the sophistication of cybernetic controls is positively affected by the influence of investors. The effect is only significant at the 10 percent level in the full model but the adjusted R^2 increases from 0.312 to 0.339 by adding the investors' influence to the control variables. The lasso regression as a robustness check supports the result that investors have a significant and positive influence on the sophistication of cybernetic controls in Swiss startups.

Regression Analysis for Cybernetic Controls and Investors (Switzerland)[a]

	CV only			Effect only			Effect + CV		
DV: Intensity of Cybernetic Controls									
Influence Investors				.34	*	(.15)	.10		(.13)
Intercept	2.74	**	(.98)	4.20	***	(.71)	2.62	**	(.99)
Firm Size	-.15		(.31)				-.18		(.31)
Age	.43	***	(.11)				.40	***	(.11)
B2B	.57		(.57)				.45		(.59)
Intern. Office	.93		(.59)				.97	.	(.58)
Adj. R^2	.241	**		.081	*		.232	**	
DV: Sophistication of Cybernetic Controls									
Influence Investors				.40	***	(.11)	.20	.	(.10)
Intercept	.84		(.69)	2.03	***	(.47)	.61		(.68)
Firm Size	.01		(.26)				-.04		(.25)
Age	.33	***	(.10)				.27	**	(.09)
B2B	.87	*	(.44)				.65		(.42)
Intern. Office	.72		(.44)				.80	*	(.41)
Adj. R^2	.312	***		.184	***		.339	***	

[a] Robust standard errors are reported in parentheses.
., *, **, and *** indicate significance at the 10%, 5%, 1% and 0.1% levels respectively.

Table 50: Regression results for investors' influence on cybernetic controls in Switzerland.

The regression results for the intensity of planning show that the model specification with control variables is not significant (see Table 51 – no indication for F-test significant at 10 percent or better). The effect only model reports an F-test that is significant at the 10 percent level, which is very low. The robustness check with the lasso reports an F-test that is not significant. The goodness of fit test of the full model shows insignificant results. Consequently, a positive influence of investors on the intensity of planning is not supported by the regression results.

Similar to cybernetic controls, the sophistication level of planning is positively influenced by investors. The effect-only model shows a significant estimator of .30 at the one percent level. The combined model shows an increase of more than 5 percent for the adjusted R^2 from adding the investors' influence to the control variables (0.177 vs. 0.124). Together with the significance of the regression coefficient of 0.21 this indicates

that investors have a positive influence on the sophistication of planning in startups. The lasso regressions with similar results support this hypothesis. The results for large startups (more than 10 employees or freelancers) indicate that investors have an influence on both the intensity and sophistication of planning.

Regression Analysis for Planning and Investors (Switzerland)[a]

	CV only			Effect only			Effect + CV		
DV: Intensity of Planning									
Influence Investors				.14	*	(.06)	.12	*	(.06)
Intercept	4.94	***	(.50)	4.64	***	(.32)	4.80	***	(.52)
Firm Size	-.12		(.17)				-.15		(.16)
Age	.00		(.06)				-.03		(.06)
B2B	.70	*	(.37)				.57		(.37)
Intern. Office	.16		(.35)				.21		(.35)
Adj. R^2	.035			.053	.		.061		
DV: Sophistication of Planning									
Influence Investors				.30	**	(.10)	.21	*	(.09)
Intercept	2.96	***	(.72)	3.18	***	(.45)	2.71	***	(.75)
Firm Size	-.07		(.24)				-.12		(.22)
Age	.15	.	(.09)				.09		(.08)
B2B	.89	.	(.47)				.66		(.45)
Intern. Office	.40		(.49)				.48		(.46)
Adj. R^2	.124	*		.159	**		.177	**	

[a] Robust standard errors are reported in parentheses.
., *, **, and *** indicate significance at the 10%, 5%, 1% and 0.1% levels respectively.

Table 51: Regression results for investors' influence on planning in Switzerland.

No effect of investors is found on the intensity and sophistication of reward and compensation, neither in the full Swiss data set nor for large Swiss startups (see Table 70 in the Appendix). A combined scale of all three traditional accounting control groups show a positive and significant influence on sophistication but no influence on the intensity.

All regressions are repeated for the subsample of German startups (47 observations). Most of the model specifications show a F-tests with a p-value of more than 0.1. Consequently, the variables do not explain the intensity and sophistication of the different

MCS groups. None of the models with significant F-tests show significant estimators for the influence of investors. Therefore, the hypothesis that investors positively influence the intensity and sophistication of traditional accounting controls is not supported for the German startup sample.

5.4.5.2 Employees and Cultural Controls

The second hypothesis (S2) states that a high employees' influence on MCS development has a positive impact on the intensity and sophistication of cultural controls. The effect on cultural controls is again analyzed using three different models for both measures (Table 52). Both control variable models with an adjusted R^2 of 0.134 and 0.151 respectively show medium explanatory power of the control variables. The regression coefficients of the effect are not significant in the effect-only and the full model.

Regression Analysis for Cultural Controls and Employees[a]

	CV only		Effect only		Effect + CV	
DV: Intensity of Cultural Controls						
Influence Employees			.12	(.08)	.08	(.08)
Intercept	1.11 *	(.43)	2.31 ***	(.37)	.87	(.57)
Firm Size	.38 **	(.13)			.35 **	(.12)
Age	.07	(.05)			.06	(.05)
B2B	.58 *	(.26)			.61 *	(.27)
Intern. Office	.08	(.28)			.10	(.27)
Adj. R^2	.134 **		.015		.134 **	
DV: Sophistication of Cultural Controls						
Influence Employees			.14	(.10)	.10	(.10)
Intercept	1.06 *	(.52)	2.51 ***	(.46)	.75	(.66)
Firm Size	.58 ***	(.15)			.54 ***	(.14)
Age	.00	(.06)			-.01	(.06)
B2B	.83 **	(.31)			.87 **	(.32)
Intern. Office	.05	(.32)			.08	(.31)
Adj. R^2	.151 ***		.013		.153 ***	

[a] Robust standard errors are reported in parentheses.
., *, **, and *** indicate significance at the 10%, 5%, 1% and 0.1% levels respectively.

Table 52: Regression results for employees' influence on cultural controls.

Robustness checks with the lasso regression with all control variables and a regression only using large startups have the same results. There are no differences between the Swiss and German subsamples. No significant effect on the intensity or the sophistication exists. Consequently, the hypothesis that employees' influence on the MCS development positively impacts cultural controls is not supported.

5.4.5.3 Employees and Administrative Controls

The third hypothesis (S3) predicts that in startups with a high influence of employees on the development of MCS the administrative controls show a higher intensity and sophistication. The regression results in Table 53 show a significant regression coefficient for the influence of employees for both MCS measures in all models. The effect size largely remains the same after adding the control variables in the full model.

Regression Analysis for Administrative Controls and Employees[a]

	CV only			Effect only			Effect + CV		
DV: Intensity of Administrative Controls									
Influence Employees				.37	**	(.11)	.32	**	(.11)
Intercept	2.68	***	(.60)	3.36	***	(.48)	1.68	**	(.63)
Firm Size	.31		(.21)				.20		(.21)
Age	.15	.	(.09)				.12		(.08)
B2B	.65	.	(.37)				.77	*	(.35)
Intern. Office	.73		(.45)				.83	*	(.41)
Adj. R^2	0.131	**		0.085	**		0.192	***	
DV: Sophistication of Administrative Controls									
Influence Employees				.19	**	(.07)	.15	*	(.06)
Intercept	1.17	**	(.38)	1.73	***	(.27)	.69	.	(.41)
Firm Size	.20		(.13)				.15		(.12)
Age	.10	*	(.05)				.08	.	(.05)
B2B	.35		(.22)				.40	.	(.21)
Intern. Office	.43	.	(.24)				.48	.	(.23)
Adj. R^2	0.145	***		0.064	**		0.184	***	

[a] Robust standard errors are reported in parentheses.
., *, **, and *** indicate significance at the 10%, 5%, 1% and 0.1% levels respectively.

Table 53: Regression results for employees' influence on administrative controls.

The adjusted R^2 shows an increase from the control variable model to the full model (six and four percent respectively). Both results indicate that the influence of employees explains part of the variance of the intensity and the sophistication of administrative controls. The robustness checks with the lasso regression and the large firm sample support these results. Consequently, the hypothesis that employees' influence on the MCS development is positively associated with the intensity and the sophistication of administrative controls is supported.

5.4.5.4 Customers and Administrative Controls

The fourth hypothesis (S4) states that the influence of customers on the development of MCS has a positive influence on administrative controls, both in intensity and sophistication.

Regression Analysis for Administrative Controls and Customers[a]

	CV only			Effect only			Effect + CV		
DV: Intensity of Administrative Controls									
Influence Customers				.19	.	(.11)	.19	.	(.10)
Intercept	2.68	***	(.60)	4.39	***	(.36)	2.24	***	(.58)
Firm Size	.31		(.21)				.25		(.20)
Age	.15	.	(.09)				.18	*	(.09)
B2B	.65	.	(.37)				.54		(.37)
Intern. Office	.73		(.45)				.78	.	(.44)
Adj. R^2	.131	**		.021	.		.154	***	
DV: Sophistication of Administrative Controls									
Influence Customers				.12	.	(.07)	.12	*	(.06)
Intercept	1.17	**	(.38)	2.19	***	(.20)	.88	*	(.37)
Firm Size	.20		(.13)				.16		(.12)
Age	.10	*	(.05)				.11	*	(.05)
B2B	.35		(.22)				.28		(.22)
Intern. Office	.43	.	(.24)				.46	.	(.24)
Adj. R^2	.145	***		.028	.		.176	***	

[a] Robust standard errors are reported in parentheses.
., *, **, and *** indicate significance at the 10%, 5%, 1% and 0.1% levels respectively.

Table 54: Regression results for customers' influence on administrative controls.

The group comparison tests showed only weak support for this hypothesis. The results of the regression analysis in Table 54 show that the effect alone is significant at the 10 percent level. Adding the effect to the full model for the intensity of administrative controls increases the adjusted R^2 by more than two percent. This implies only little added explanatory value. Nevertheless, the regression coefficient remains significant in the full model with a stable effect size of 0.19. Adding the effect to the regression model for the sophistication of administrative controls increases the adjusted R^2 by three percent. The lasso regression is robust whereas the relationship does not hold for sample of large startups. All results together support the hypothesis of a positive influence of customers on the intensity and sophistication of administrative controls.

5.4.5.5 Customers and Cybernetic Controls

Hypothesis S5 states that the higher the customers' influence on the MCS development the higher the intensity and sophistication of cybernetic controls. The group comparison tests reported above provide no support for this relationship. In contrast, the regression analysis contains significant results (see Table 55).

The estimator for the regression coefficient in the full model for intensity is significant at the one percent level. Adding the effect to the control variables increases the adjusted R^2 by nearly four percent. The estimator in the sophistication model is significant at the five percent level. It leads to a similar increase in adjusted R^2 between the control-variable-only model and the full model. The lasso regressions show significant estimators as well. For large startups, the results can be replicated. Consequently, the regression analysis supports the hypothesis that higher customer influence on MCS development positively influences the intensity and sophistication of cybernetic controls in startups.

Regression Analysis for Cybernetic Controls and Customers[a]

	CV only			Effect only			Effect + CV		
DV: Intensity of Cybernetic Controls									
Influence Customers				.19	.	(.10)	.24	**	(.09)
Intercept	2.56	***	(.70)	4.66	***	(.40)	2.02	**	(.77)
Firm Size	.06		(.23)				-.02		(.23)
Age	.37	***	(.08)				.40	***	(.07)
B2B	.64		(.40)				.51		(.40)
Intern. Office	.56		(.46)				.63		(.42)
Adj. R^2	.231	***		.018	.		.268	***	
DV: Sophistication of Cybernetic Controls									
Influence Customers				.16	.	(.09)	.19	*	(.08)
Intercept	1.27	*	(.54)	2.93	***	(.30)	.83		(.61)
Firm Size	.11		(.19)				.05		(.18)
Age	.27	***	(.06)				.30	***	(.06)
B2B	.41		(.32)				.30		(.32)
Intern. Office	.45		(.38)				.50		(.34)
Adj. R^2	.213	***		.021	.		.251	***	

[a] Robust standard errors are reported in parentheses.
., *, **, and *** indicate significance at the 10%, 5%, 1% and 0.1% levels respectively.

Table 55: Regression results for customers' influence on cybernetic controls.

5.4.5.6 Founders and Cultural Controls

The last hypothesis (S6) states that if founders are very influential on the development of MCS than the cultural controls show a higher intensity and sophistication. The results of the group comparison tests show no support for this hypothesis. The regression results find some evidence as discussed next. The effect-only model is not significant (see Table 56). Adding the effect to the control variables in the full model leads to significant estimators for the founders' influence on intensity as well as sophistication of cultural controls. The additional estimators increase the R^2 by nearly three percent in both regressions. Robustness checks with the large firm sample support both findings. The

lasso regression finds a significant effect only for the sophistication model. Taken altogether, this indicates that the influence of founders has a significant impact on the intensity and sophistication of cultural controls in startups.

Regression Analysis for Cultural Controls and Founders[a]

	CV only			Effect only			Effect + CV		
DV: Intensity of Cultural Controls									
Influence Founders				.13		(.10)	.17	*	(.08)
Intercept	1.11	*	(.43)	1.99	***	(.66)	-.02		(.72)
Firm Size	.38	**	(.13)				.41	***	(.12)
Age	.07		(.05)				.07		(.05)
B2B	.58	*	(.26)				.55	*	(.26)
Intern. Office	.08		(.28)				.06		(.26)
Adj. R^2	.134	**		.011			.159	***	
DV: Sophistication of Cultural Controls									
Influence Founders				.17		(.12)	.21	*	(.10)
Intercept	1.06	*	(.52)	2.02	***	(.77)	-.35		(.82)
Firm Size	.58	***	(.15)				.61	***	(.14)
Age	.00		(.06)				.01		(.06)
B2B	.83	**	(.31)				.79	**	(.30)
Intern. Office	.05		(.32)				.03		(.29)
Adj. R^2	.151	***		.014			.179	***	

[a] Robust standard errors are reported in parentheses.
., *, **, and *** indicate significance at the 10%, 5%, 1% and 0.1% levels respectively.

Table 56: Regression results for founders' influence on cultural controls.

5.4.5.7 Regression Results Including Dependencies with Other MCS Groups

As pointed out in section 3.5, the development of the MCS groups is contingent also on each other. Therefore, all hypotheses are tested using the MCS group intensities and sophistication levels as further control variables. Table 57 reports the significant influences of the MCS groups on each other. E.g. the intensity of cultural controls can partly be explained by the intensity of administrative controls (AC), of planning (PC), and of reward and compensation (RC). The influences of each MCS group are similar between intensity and sophistication except for cultural controls and cybernetic controls.

Significant Influences between MCS Groups[a]

MCS Groups	Intensity	Sophistication
CC Cultural Controls	AC, PC, RC	AC
AC Administrative Controls	CC, CY	CC, CY
PC Planning Controls	CY	CY
CY Cybernetic Controls	AC, PC	AC
RC Reward and Compensation	PC	PC

[a]All shown influences are significant at a p-value of 0.1.

Table 57: Significant influences between MCS groups.

Table 58 shows the results for the hypothesis testing including the significant MCS group relationships and the prior control variables. Hypothesis S1 has been tested in the same manner as in section 5.4.5.1, that is only based on the Swiss startup sample. The results support the hypothesis that investors' influence on the MCS package lead to a higher intensity of planning. There is no evidence for any other influence of investors, since none of the regression coefficients is significant (S1). The influence of employees shows a significant positive impact on administrative controls (S3) in a similar magnitude as reported in section 5.4.5.3. There is no significant effect for cultural controls (S2). Significant influences of customers on the development of the MCS package are only found for the intensity of cybernetic controls (S5). In contrast, all four relationships showed significant positive effects without the other MCS groups as reported in sections 5.4.5.4 and 5.4.5.5. The final hypothesis that founders have a positive impact on the development of cultural controls is supported by the results.

Regression Analysis for Stakeholders' Influences with MCS Groups[a]

Hyp.	IV	DV	Intensity			Sophistication		
			Effect Size		Adj. R^2	Effect Size		Adj. R^2
S1	Investors	PC	.10 .	(.06)	0.223 **	.12	(.09)	0.393 ***
S1	Investors	CY	-.01	(.13)	0.418 ***	.08	(.08)	0.513 ***
S1	Investors	RC	.05	(.09)	0.269 **	-.03	(.21)	0.289 **
S2	Employees	CC	-.04	(.08)	0.304 ***	.01	(.14)	0.199 *
S3	Employees	AC	.26 *	(.10)	0.334 ***	.11 .	(.06)	0.364 ***
S4	Customers	AC	.10	(.10)	0.298 ***	.07	(.06)	0.351 ***
S5	Customers	CY	.16 .	(.09)	0.407 ***	.10	(.09)	0.518 ***
S6	Founders	CC	.14 *	(.06)	0.325 ***	.18 *	(.09)	0.297 ***

[a] Robust standard errors are reported in parentheses.
., *, **, and *** indicate significance at the 10%, 5%, 1% and 0.1% levels respectively.

Table 58: Regression analysis of stakeholders' influence including further MCS groups and control variables.

5.4.6 Concluding Remarks

The regression analysis provides support for most of the hypotheses (see Table 59). When the investors' influence on the development of MCS is high, the Swiss startups are more likely to have widespread use of planning and cybernetics controls (sophistication). No effect is found for reward and compensation. Additionally, no effect for any of the three MCS groups in the total sample is present. The effect was only found for Swiss startups.

Employees' influence on MCS is positive on the intensity and sophistication of administrative controls whereas a positive effect on cultural controls could not be found in the sample. Like employees, customers have a positive significant effect on the development of administrative controls in a startup. They further have a positive effect on the adoption rates and the sophistication level of cybernetic controls in startups. It has been shown that founders have a positive influence on the intensity and sophistication of cultural controls. A discussion of all results is provided in section 6.2.3.

Summary of Stakeholders' Influence Results

Hypothesis	Influence by	On MCS Group	Intensity	Sophistication
		Planning Controls	n.s.	+ for CH only
S1	Investors	Cybernetic Controls	n.s.	+ for CH only
		Reward and Compensation	n.s.	+
S2	Employees	Cultural Controls	n.s.	+
S3	Employees	Administrative Controls	+	+
S4	Customers	Administrative Controls	+	+
S5	Customers	Cybernetic Controls	+	+
S6	Founders	Cultural Controls	+	+

+ = Hypothesis supported by the evidence; n.s. = Hypothesis not supported by the evidence.

Table 59: Summary of stakeholders' influence results (without interdependencies between MCS groups).

6 Discussion and Conclusions

6.1 Reflections on Research Questions

With this thesis, I set out to answer three research questions on management control in startups. First, how the adoption of MCS impacts the performance of startups. Second, how startups configure their MCS. Third, how stakeholders influence the development of MCS in startups. The basis to answer those questions is the self-developed MCS framework for startups (see section 3.2) and the survey among Swiss and German startup managers (see section 4).

The motivation to study the performance impact of MCS adoption in Swiss and German startups had different origins. Past research found evidence for a positive performance impact of MCS adoption on different levels. The adoption is a sign of managerial quality (Davila et al., 2015) and a basis for future growth through the improvement of managerial decisions (Davila et al., 2010; Greiner, 1972). The findings are mainly based on US-studies. Since the performance effect of MCS is partly dependent on the cultural environment (Brinckmann et al., 2010; Schneider & de Meyer, 1991), I analyzed the relationship in the context of Swiss and German startups. I conducted regression analysis in section 5.2 to test five hypotheses for different performance indicators and adoption rates for MCS groups. The results are discussed in section 6.2.1 below.

How startups configure their MCS and what types of configurations exist across companies is the second research question this thesis answers. The motivation was to add to the theory of management accounting by developing a taxonomy of configurations of control in startups as a consistent classification and common ground for further conceptualization (Bedford & Malmi, 2015; Langfield-Smith, 1997; Otley, 2003, 2016), since no taxonomy exists (Sandelin, 2008; Strauss et al., 2013). The taxonomy was developed in section 5.3 based on cluster analysis and the analysis of contextual factors. Five configurations were found that exist across startups. Their path development over the lifetime of the startups was analyzed. The findings are presented in section 6.2.2 below.

The last research question is concerned with the stakeholders' influence on the development of MCS in startups. It is motivated by moving beyond the mere description of case

study evidence on the relationship to the prediction and empirical validation of the phenomena (Zimmerman, 2001). The configuration of the MCS package is not stable over the lifetime of the startups (Malmi & Brown, 2008) and stakeholders are often the cause for a change through their influence and pressure (Jurkštiene et al., 2008; Strauss et al., 2013; Zilber, 2008). In section 5.4, I tested six hypotheses on the influence of the four central stakeholders in startups (investors, employees, customers, and founders). The results are discussed in section 6.2.3.

After the findings of the study are presented in the next section, the contributions of the study are given. The chapter closes with a discussion on the limitations and suggestions for further research avenues.

6.2 Findings of the Study

6.2.1 Performance Impact

In order to answer the research question, how MCS influence the performance of startups, I tested five hypotheses. Two are related to the early adoption of MCS and three to the influence of traditional accounting controls on performance measures.

It was argued that MCS facilitate growth and are even necessary for companies to continue on a growth path (Davila & Foster, 2007; Flamholtz & Randle, 2007; Greiner, 1972; Simons, 1995). The adoption of MCS can overcome the limitations of an informal management style in the early stage of startups (Davila & Foster, 2007). Two hypotheses were developed to test this claim. The first hypothesis states that higher adoption rates of MCS in the early stage of startups have a positive influence on employee growth. The results support this relationship only for the group of reward and compensation MCS. Startups with higher adoption rates of these MCS in the first three years show significantly higher employee growth over the following years. None of the other MCS groups show a similar relationship. The above claim that MCS facilitate growth therefore needs a differentiated view. A pure increase in the adoption rates of MCS is not necessarily the basis for future growth in startups. As seen in the results above, even older companies can function with a limited MCS package. Only the adoption of reward and compensation MCS, e.g. management and individual incentive programs, shows a positive relationship with future growth rates. The conclusion is that startups should invest early in the introduction of incentive programs to align the goals of the organization on

the one side and employees' and managers' behavior on the other side for enabling future growth.

The second hypothesis states that higher adoption rates of MCS in the early stage of startups have a positive influence on the current performance in startups. The results support this claim. Startups with higher adoption rates of MCS after the second year show a higher current overall performance. At first glance, the results support the claim that the adoption of more individual MCS is always better. However, when looking at the MCS groups that determine the positive relationship between MCS intensity and current performance, the evidence is weakened since only two groups of MCS are the important drivers of this relationship. Reward and compensation MCS are again very important as discussed before. They are not only a foundation for future employee growth but have a positive impact on the total performance of startups. At the same time, the cultural controls are important, too, as their adoption shows a positive impact on performance. Social meetings, trainings, and orientation programs for new employees help to spread the entrepreneurial spirit in a startup and increase the motivation of the employees. The conclusion for the results of the second hypothesis is that both incentive based controls and cultural controls should be balanced and early adopted in startups to support future performance.

The three further hypotheses all relate to the impact of traditional accounting controls on performance measures. The third hypothesis states that higher adoption rates of traditional accounting controls have a positive relationship with the funding amount the startups receive. The results support this claim for prior developed planning and cybernetic controls. A higher intensity of reward and compensation MCS has no effect on the subsequent funding. An international study suggests that investors value the adoption of MCS (Davila et al., 2015). My results provide further evidence for this relationship. Based on my analysis, the positive effect of MCS is based on the increased adoption of planning and cybernetic controls such as variance analysis, sales reporting, budgeting for projects, operational expenses, and capital investments, etc. With these controls put in place, startups can signal proficiency in management accounting controls. My results suggest that investors value this as funding is significant positively correlated with higher adoption rate of planning and cybernetic controls. The conclusion is that not the pure increase of MCS adoption in startups is valued by investors but the adoption of

specific MCS groups, here planning and cybernetic controls. This differentiation adds to the literature of MCS and financing in startups.

The last two hypotheses state that startups with more traditional accounting controls exhibit higher performance in high-growth and competitive environments. The results show that not all MCS groups have a significant positive impact. Only a high intensity of reward and compensation MCS has a positive impact on the startup performance in high-growth environments. Higher adoption rates of cybernetic controls as well as reward and compensation MCS show a positive relationship with the performance of startups that operate in highly competitive environments. Both findings support the important role of MCS in high-growth and competitive environments. Already Davila et al. (2015) showed that MCS have a significant positive impact on valuation in these contexts. In contrast to their study, I investigated different types MCS in this context to contribute to the literature.

The findings on performance are summarized as follows: Early adoption of incentive systems is the basis for future growth and current overall performance. Also, high levels of cultural controls in the early years show a positive relationship with current overall performance. Balancing the adoption of both MCS groups is necessary for startups to grow and perform well. The development of planning and cybernetic controls has a signaling effect to investors and is positively associated with funding amounts. The results did not support the claim, that the pure adoption of more individual MCS has a positive impact on performance. Rather the context factors are important. In high-growth startups, higher adoption rates of incentive systems are associated with higher performance. In competitive environments, incentive systems and cybernetic controls show this positive relationship.

From a management control perspective, startups should invest time and resources in the adoption of incentive systems as well as cultural controls in the early years to positively influence growth and performance. To attract more funding to fuel this growth, the adoption of planning and cybernetic controls is needed. In high-growth and competitive environments, again, incentive systems are an important performance factor. Additionally, cybernetic controls help to increase performance in situations of high competition.

6.2.2 Configurations of Control

In the second research question, I ask how startups configure their MCS. In order to answer this question, a cluster analysis was conducted in section 5.3 with further analysis of the contextual factors. The result is a five-cluster taxonomy of configurations of control in startups. A synthesis of this solution is given in Table 60 with indicators for different levels of adoption rates. In the remainder of this section, I discuss this synthesis and the contextual factors of the different configurations. Further, I compare the taxonomy to another existing study and discuss the generalizability of the results. The section closes with an examination of the development of the MCS package over the life of a startup.

Synthesis of Five-Cluster Solution

MCS Groups	C1 Planning Focus	C2 Incentive Focus	C3 Simple Controls	C4 Process Focus	C5 Mature Controls
Cultural Controls	+	+	+	++	++
Administrative Controls	+	+	+	++	++
Planning	++	++	+	+++	+++
Cybernetic Controls	+	++	+	++	+++
Reward and Compensation	+	+++	+	+	+++
Cluster Membership (in percent)	*17.9*	*19.3*	*24.5*	*16.1*	*22.3*

"+", mean score <= 0.5; "++", mean score > 0.5 and <= 0.8, "+++" mean score > 0.8

Table 60: Synthesis of five-cluster solution.

My analysis shows that the configuration most startups have in their early years is simple controls (C3). All five MCS groups are not very developed within this configuration. Most startups develop their MCS package towards one of the focus-configurations over the next years. The three focus-configurations are planning focus, incentive focus, and process focus. The planning focus (C1) configuration is characterized by high adoption rates of planning MCS. Nearly all startups with this configuration adopted all action planning MCS (cash flow projections, sales projections, and milestone planning). The incentive focus (C2) configuration is very common among older startups. It shows high adoption rates for all reward and compensation MCS. In fact, almost all startups with this configuration have adopted all reward and compensation MCS (performance evaluation, management incentive programs, individual incentive programs). The third

configuration of this group is process focus (C4). Startups with a process focus configuration show the highest adoption rates of administrative and cybernetic controls between all focus-configurations. At the same time, those startups use reward and compensation MCS very little. Mature controls (C5) is the configuration most older startups develop their MCS package into. It is characterized by high adoption rates for all MCS groups. It represents the MCS package of a mature company where most of the known individual MCS are implemented to some degree. It is most common among older startups. None of the startups older than 6 years has a simple control (C3) configuration.

Next, several contextual factors characterizing the clusters are discussed. As pointed out above, startups with simple controls are usually very young and startups with mature controls older (see Figure 26). The average age of the focus cluster configurations lies between those two types. The total firm size (employees and freelancers) of the startups follows the same ranking as the age (see Figure 27).

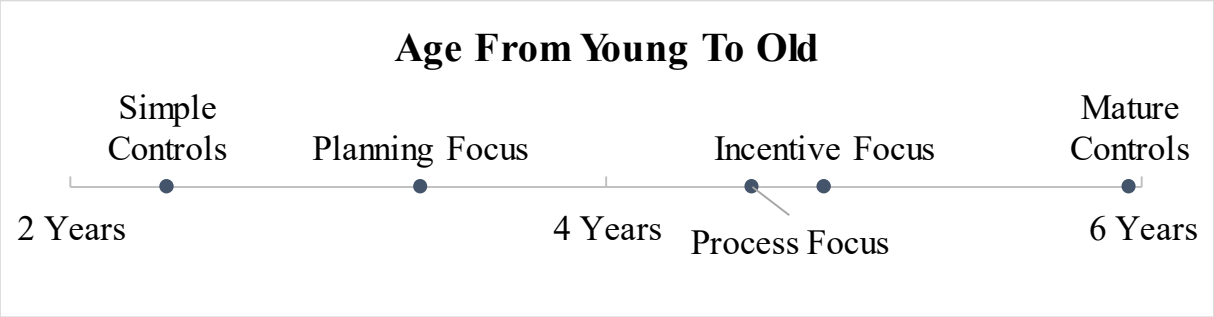

Figure 26: Average age in the clusters.

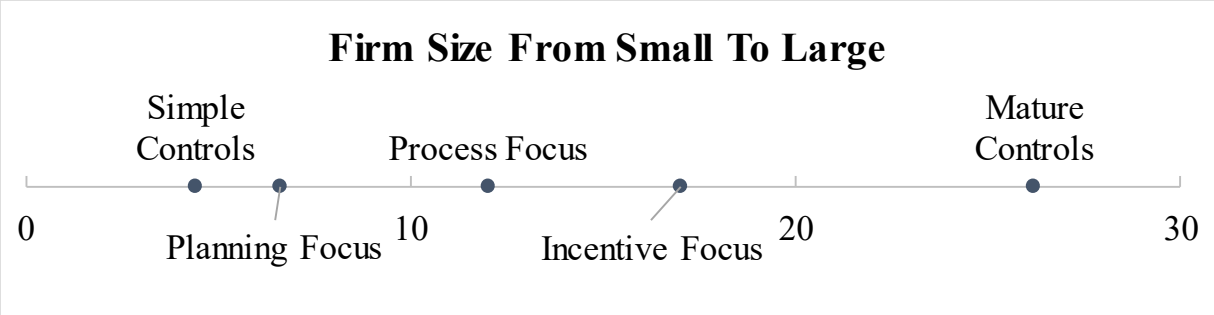

Figure 27: Average total firm size (number of employees and freelancers) in the clusters.

The number of funding rounds for startups with simple controls and planning focus is very similar (see Figure 28). All startups with other configurations have significantly more funding rounds. More than 30 percent of the startups with mature controls or an

incentive focus employ a CFO (see Figure 29). The internationalization in form of international offices is also much higher with these two types of configurations (see Figure 30).

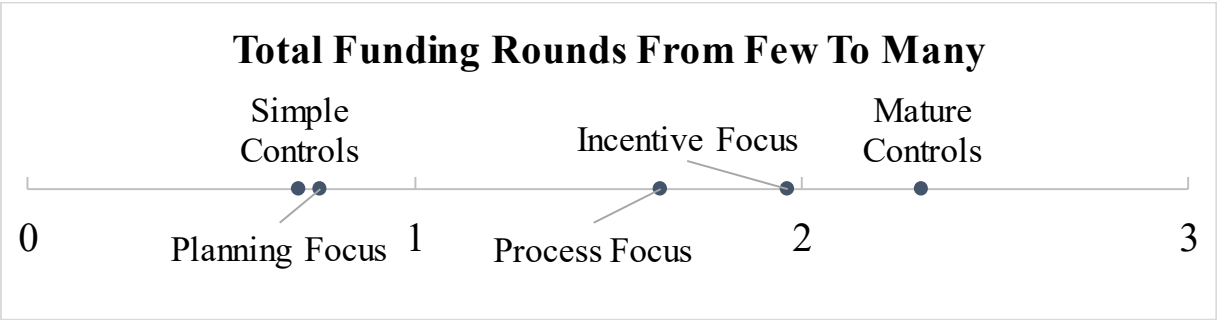

Figure 28: Average number of funding rounds in the clusters.

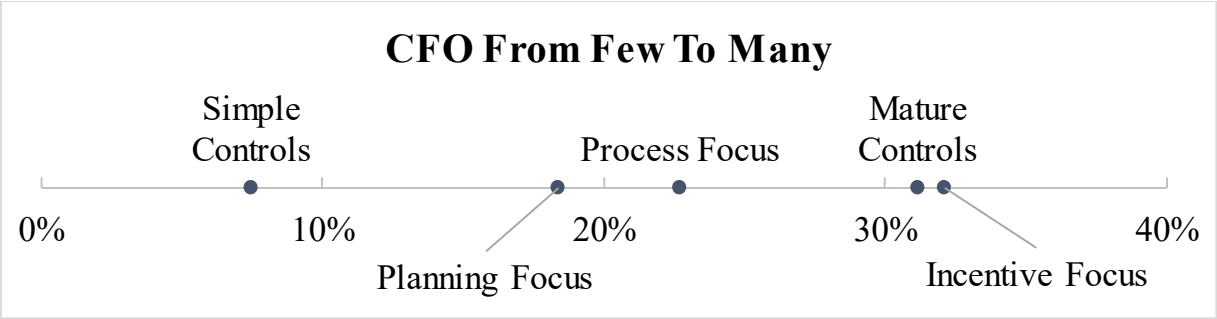

Figure 29: Average share of startups with a CFO in the clusters.

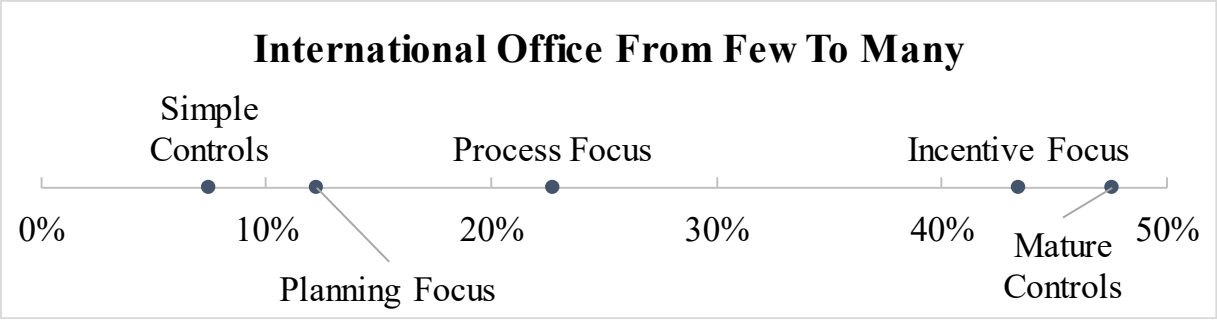

Figure 30: Average share of startups with international offices in the clusters.

Next, the identified configurations are compared to the five-cluster solution on configurations of control found by Bedford & Malmi (2015) for Australian companies. This study is used as a comparison because it has the broadest view on the MCS package from the studies described in section 3.4.

Bedford & Malmi (2015) use the same M&B framework with the five groups as done in this thesis but with different constructs to measure the intensity of each group. They also identify a configuration called *simple* which is characterized by the lowest values

for almost all measures. Firms with this configuration are also of smaller size and younger than those in the other clusters. At the other end of the scale, the authors identify a configuration called *hybrid*, which represents the most elaborate configuration with bureaucratic structures. It is present in older firms of larger size. Between these two extremes exist three other configurations: results, action, and devolved. The *results* configuration is characterized by output and administrative controls and shows very high levels for performance pay. It is comparable to the incentive focus cluster identified for startups. The *action* configuration ranks high in formal planning and hierarchical accountability. This is similar to the identified planning focus configuration because of its high adoption rates of planning MCS. The *devolved* configuration does not compare to any of the identified types for startups. In conclusion, there are multiple similarities between the configurations of control for startups identified in this thesis and the configurations of control of mature firms found by Bedford & Malmi (2015).

Most of the identified archetypes (simple controls, mature controls, incentive focus, planning focus) can be generalized not only for startups but for all types of companies as the comparison with the taxonomy from Bedford & Malmi (2015) shows. It is notable to point out, that configurations with more focus on incentive systems or planning systems exist also in mature companies. Both samples, the startups and the mature companies, are diverse in the sense that they contain companies from different industries. Therefore, the resulting archetypes are to some degree generalizable across industries and life-cycle stages of the companies.

In section 5.3.4, I showed that startups develop their configuration of control over the lifetime of the firm. Most startups begin with simple controls in their first year although some already develop more advanced configurations and adopt a larger number of individual MCS. The development of the MCS package usually goes into the direction of one of the three focus configurations. Most older and larger startups develop their MCS configuration to mature controls. Nevertheless, many stay with an incentive focus or process focus configuration of control.

Similar to the research by Moores & Yuen (2001), my results partially support the claim that the development of the MCS package relates to the life-cycle of the startup. Moores & Yuen (2001) find this development for the stages birth, growth, and maturity. I only

investigate startups that are in their terminology in the birth stage.[10] This observation is also in accordance with Granlund & Taipaleenmäki (2005). They find that the MCS package of startups often develop on a track from "non-existent control tasks and totally undeveloped management accounting techniques" to "established control tasks and management accounting techniques" (Granlund & Taipaleenmäki, 2005, p. 40). They find that mature and large firms can show limited financial control resources as well as relatively little developed control tasks and management accounting techniques. I find further evidence for this claim since a number of startups stay with a focus configuration as they get older. My results underline the trend that the older and larger the startups are, the more advanced the MCS package becomes. Still, companies can function without the full-scale package; especially with an incentive focus configuration. The performance findings from the previous section support the idea that this limited package can have a positive impact on performance measures.

In conclusion, a taxonomy with five archetypes of configurations of control and their contextual factors were identified in this thesis. Other studies find similar archetypes which leads to the assumption that these exist in startups and in mature firm. The findings indicate a generalizability of the archetypes. The development of the MCS package over the life of a startup does only partly follow a predetermined path. Most startups begin with a simple control configuration and after many years develop their configuration of control into mature controls. Nonetheless, other configurations are plausible as well.

6.2.3 Stakeholders' Influence

Four stakeholder groups have been hypothesized to influence the development of the MCS package in startups (see section 3.5): investors, employees, customers, and founders. The development is measured by the intensity and by the sophistication of all five groups of the MCS framework (see section 3.2): cultural controls, administrative controls, planning, cybernetic controls, and reward and compensation. The results from section 5.4 support most of the formulated hypotheses. Figure 31 summarizes these results. In the following, the results of all six hypotheses are discussed.

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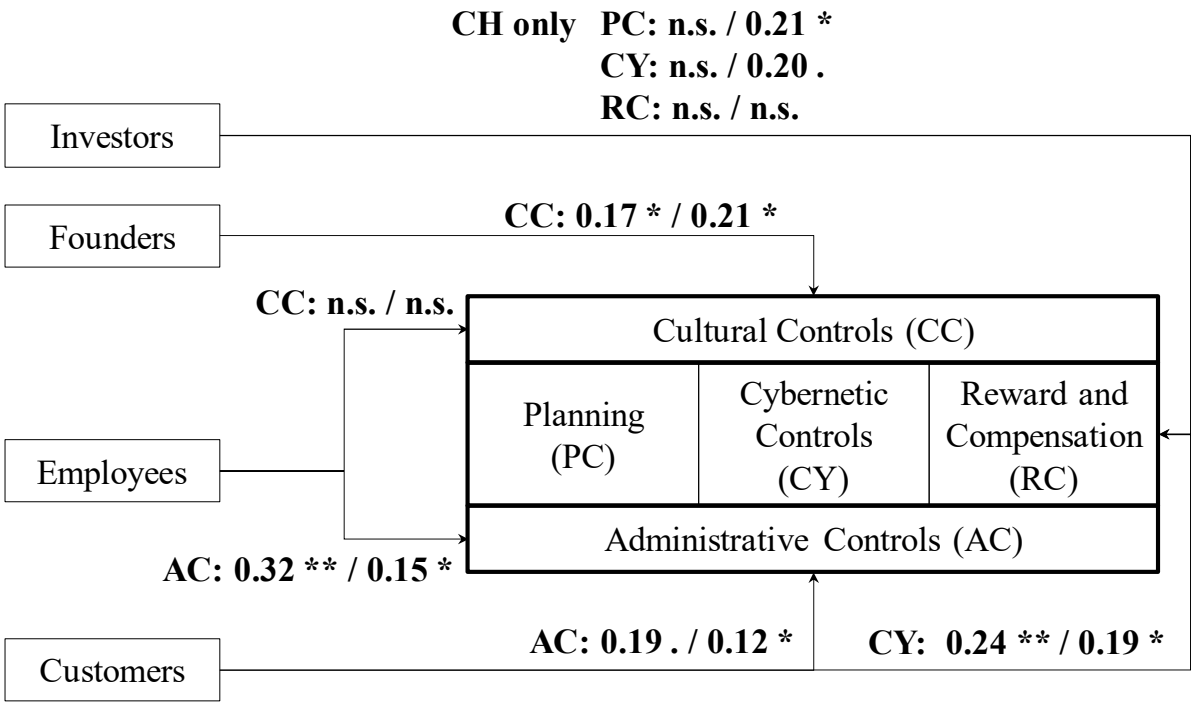
[10] Growth companies in Moores & Yuen (2001) had an average age of 13 years. Birth companies are younger but their average age is not defined in the study due to limited number of observations.



Regression coefficients stakeholders' influence on (1) intensity of MCS group and (2) sophistication of MCS group as dependent variable.
., *, **, and *** indicate significance at the 10%, 5%, 1% and 0.1% levels respectively.
n.s. = not significant

Figure 31: Results for stakeholders' influence on MCS groups in startups.

Hypothesis S1 states that investors influence the development of the three traditional accounting controls: planning, cybernetic controls, and reward and compensation. The results show, that the influence of investors on the development of the MCS package is weaker than expected. Although investor, especially VCs, are often identified as the key driver for the adoption of MCS in startups (Davila, 2005; Davila & Foster, 2005, 2007; Strehle et al., 2010), this is not supported by the results for Swiss and German startups. The influence of investors on the MCS package shows only significant results for the sophistication of planning and cybernetic controls in Swiss startups. When looking at the larger startups in the sample, the results change to some degree. For larger startups in Switzerland (those with 10 or more employees and freelancers) the influence of investors has not only a significant positive relationship with the sophistication but also with the intensity of planning and cybernetic controls. This indicates that in larger startups investors put pressure not only on the sophistication but also on the number of MCS introduced in those two MCS groups. A possible explanation is given as follows: On the one hand, startups already have knowledge about traditional accounting controls

and the positive impact is known to startup managers (Brinckmann et al., 2010; Davila et al., 2010; Delmar & Shane, 2003; Lee & Cobia, 2013). Therefore, no investor pressure is necessary for their introduction. On the other hand, investors rather drive the sophistication and use of already introduced planning and cybernetic controls according to the result for Swiss startups. This finding is in line with the argument that investors demand more sophisticated planning and monitoring of the activities in their startups (Granlund & Taipaleenmäki, 2005; Strauss et al., 2013). The influence is more prominent in larger startups according to the results. Investors demand further controls when the startup is large since they anticipate higher management control needs based on their experience.

In section 3.5, I hypothesized that employees' pressure on MCS leads to higher intensity and sophistication of cultural and administrative controls. The reasoning is that employees need integration into the firms' values and beliefs. Further, they expect some formal structure for the legitimacy of the startup. The results show no support for the claim that high levels of employees' influence lead to higher intensity or sophistication of culture controls. The development of these types of MCS seems to be independent of the pressure employees exert. In contrast, the second claim is supported by the results: Startups with higher influence of employees on the MCS development show higher adoption rates of administrative MCS and higher levels of their sophistication and their use. In startups with 10 or more employees and freelancers, the effect size of the influence is even higher. At the same time, the pure size of the firm measured in number of employees has no significant influence on the development of administrative controls. This is in contrast to the findings of other studies (Davila & Foster, 2005, 2007; Davila et al., 2015; Strehle et al., 2010; Wijbenga et al., 2007). In conclusion, not the pure number of employees has an impact on the development of administrative MCS in startups but the quality of their influence.

Customers can exert pressure on the startups and on the development of their MCS. They expect reliability, interfaces, and some formal structure (Strauss et al., 2013). As hypothesized, this leads to a higher intensity and sophistication of administrative and cybernetic controls in startups. This claim is mainly supported by the results. Startups with influential customers show higher levels of adoption as well as higher sophistication of administrative and cybernetic controls. The effect is stronger for cybernetic controls than for administrative controls. In larger startups, there is no significant effect

on administrative controls. The effect on cybernetic controls is significant but smaller than for the total sample. The results underline the importance of customers for the development of the MCS package in startups. They complement the findings of case studies based on German startups (Strauss et al., 2013). The hypotheses find only weak support when additionally modelling the dependencies between the MCS groups.

The last group of stakeholders investigated were the founders. Founders have a very high influence in startups on every aspect of management. The survey data showed that founders were rated "very influential" (maximum of the scale) in 72 percent of the startups. Even in older startups, the influence does not change significantly (see Figure 16 on page 116). The hypothesis that founders influence the intensity and sophistication of cultural controls is supported by the results. Founders are the only stakeholder group with significant influence on cultural controls. The effect is also significant for large startups and when modeling the dependencies with other MCS groups. Cultural controls help to maintain the entrepreneurial spirit and establish shared values and believes in startups. With strong and influential founders, these controls are intensively introduced and used.

All four identified stakeholder groups have a significant impact on parts of the MCS package in startups. Investors have a lower than excepted influence on the introduction and sophistication of traditional accounting controls based on the results. Only for Swiss startups could this influence for the sophistication levels of planning and cybernetic controls be found. The results showed that employees positively influence the development of administrative MCS in startups. The findings for the influence of customers complement existing case studies but are not as robust as the other results. Customers with higher influence on the MCS development show a positive relationship with higher levels of adoption as well as higher sophistication of administrative and cybernetic controls. The last stakeholder group investigated are founders and their influence on cultural controls. The findings are a positive, significant and stable relationship with introduction rates as well as with the sophistication and the use of those controls.

6.2.4 Differences between Switzerland and Germany

Throughout the thesis, the fact that there may be differences between the Swiss and German startups has been considered. The descriptive statistics (see Table 15 on page 72) show that Swiss startups in the sample are significantly older (5.74 vs 4.19 years)

and that German startups are more likely to be financed by a VC (79 vs. 43 percent). Further, some of the intensity and sophistication measures for the different MCS groups are significantly lower in German startups.

For the tested performance hypotheses, no systematic differences in the results were found between Swiss and German startups. The identified configurations of control are similar between Swiss and German startups when clustered individually. Yet, German startups in general have a lower cybernetic control intensity in most configurations as well as a lower intensity in planning and reward and compensation. For the stakeholders' influence hypotheses, no difference but one was found: The influence of investors show no statistically significant relationship with MCS development in German startups in contrast to Swiss startups. All other relationships demonstrated no sign of disparity.

Taking these insights together, I argue that the differences between startups in the two countries is not that large. Almost all hypotheses hold in both subsamples and differences in some of the variables are only of minor nature. This supports the notion that the samples can be pooled together as argued in the introduction.

6.3 Contributions to Theory and Practice

The implications for researchers and the contributions of this thesis to the field of management control research in startups are numerous. They cover data collection, framework development, a taxonomy for configurations of control as well as empirical evidence for the performance impact of MCS and stakeholder influences on MCS.

To my best of knowledge, this is the first time that data on MCS of Swiss startups was gathered. Data collection on MCS is always important because it is not publicly available (Otley, 2003).

The MCS framework for startup research developed in section 3.2 provides for the first time a synthesis between management control theory and startup research. The framework could be the ground for future research as it encourages a common language and consistent classification of controls (Langfield-Smith, 1997). The MCS framework for startups does not only provide a tool for research but is also designed to help managers of startups. It gives startup managers and investors a list of the different MCS they can put in place to direct and control their employees' behavior. An important learning is

that the MCS package consists not only of traditional accounting controls but also of cultural and administrative controls that align the organizational goals and employees' actions.

My further contribution to research consists of a five-cluster taxonomy for configurations of control in startups. I thereby answer the call for treating the individual MCS as a package and enhancing our understanding of their configurations (Malmi & Brown, 2008; Otley, 2016) as well as for conducting more international studies in this field (Bedford & Malmi, 2015; Malmi, 2013).

Evidence on the performance impact of MCS on startups was found for Swiss and German startups. Early adoption of MCS, especially those from the group of reward and compensation, is beneficial for the growth and current performance. The adoption of planning and cybernetic controls has a signaling function and increases the funding amount startups receive. These findings add to the body of research and increase the "critical mass" of studies in the field that is needed according to some authors (Chenhall, 2003; Malmi, 2013). For startup managers, this implies that MCS matter for performance. The results should encourage managers to implement and use them in their startups.

Finally, I test for the first time empirically the influence and pressure of stakeholders on the development of MCS in startups. I have shown that the four important stakeholder groups have a significant influence on the different aspects of the MCS package. This research focuses on the whole MCS package and not only environmental MCS as in other studies (Pondeville et al., 2013; Rodrigue et al., 2013). The results underline importance of stakeholders as key drivers for the development.

6.4 Limitations and Further Research Avenues

The findings and contributions of this study are subject to a few limitations. First, the four stakeholder groups are each taken as a *black box*. Founders' characteristics such as beliefs and attitudes towards MCS are not studied since they have been incorporated in other studies already, e.g. planning beliefs of the CEO (Davila & Foster, 2005). Also, the wide field of investors is not differentiated except for VCs. The reasoning is that within this thesis I set out to find statistical support for the influence of four important stakeholders on the development of MCS for the first time. Further studies should look

at the stakeholder groups more differentiated to confirm my findings and add more dimensions for each group.

Second, the data collection is done in retrospect which could distort the actual timing of the introduction of different MCS in the startups due to memory bias of the participants. Further, startups that went out of business are not part of the sample. I used this retrospective technique because of its wide spread practice in management control studies in startups (Davila & Foster, 2005, 2007; Davila et al., 2015; Sandino, 2007; Strehle et al., 2010). A longitudinal data collection ideally with triangulation over many years would not have been feasible within the timeframe of a thesis. However, it would represent a more reliable way of data collection since the adoption dates would be exact and the sample would include startups that went bankrupt during the data collection.

Third, the generalizability of the results always depends on the data sample collected. I acknowledge that there is always a survival and self-selection bias with the kind of sampling I conducted. I used two reminders and a benchmark incentive to increase the response rate as much as possible. For the Swiss sample a satisfying response rate of 18.3 percent was reached. The German response rate with less than 10 percent however is rather low. The generalizability of the results for German startups is therefore limited. More evidence should be collected to ensure the validity of the results for the tested hypotheses for German startups.

Fourth, some statistical limitations apply. The constructed measurements of the five MCS groups of the newly developed MCS framework for startups partly show low internal reliability based on Cronbach alphas. The statistics are sufficient enough for such exploratory research and for a first understanding of the relationships (Pondeville et al., 2013; Sponem & Lambert, 2016). Future research could optimize these measurements and analyze whether the constructs are more stable in other samples. In modeling the stakeholders' influence on different MCS groups I also tested whether other MCS groups have an influence on the development. I used a multivariate linear regression model for this purpose. Since the MCS simultaneously influence each other in their development, a structural equation model would have been more adequate. I refrained from using such a method because my sample size with only 100 observations is not sufficient for model of this complexity (Kline, 2016). With larger samples of 200 or

more observations, those complex models with dependencies between all five groups could be modeled.

Two further research opportunities beyond overcoming the limitations should be noted. First, the results of the cluster analysis provide a taxonomy of MCS configurations in startups. A research opportunity would be to validate the taxonomy for other countries since it is based on Swiss startups. Relevant sample areas could be London, Beijing, and Tel Aviv because they are the leading non-US cities with an important startup scene (Penzel & Gauthier, 2017). Additionally, now that this taxonomy exists, the relationships within the MCS package between individual MCS for the different archetypes could be investigated further as encouraged by Malmi & Brown (2008).

Second, the stakeholders' influence model with its hypotheses could be used for mature companies as well since no research except for the environmental MCS has been conducted so far. The stakeholder groups would need to be adjusted. More emphasize could be placed on external stakeholders such as auditors. In mature companies, founders are seldom owners. Further groups such as family owners could be added. The model could bring insights into how the whole MCS package in established companies is affected by the influence of the different stakeholder groups.

Appendix

Questionnaire (English Version for Switzerland)

I would like to invite you to the study "Management Control Systems in Startups". The study is part of my doctoral thesis at the University of St. Gallen (HSG) supervised by Prof. Dirk Schäfer and Prof. Thierry Volery.

Result feedback: As a thank-you for your participation I will send you the report of the results and additionally an individual benchmark report. The report will show among other things the use of different instruments in startups and how the use develops over the years. The benchmark will include comparisons of your use of management control systems and the use by other participants. Managers invited to the study are either from Top 100 Startup Award companies or companies included in the Swiss Venture Capital Report. With your participation, you substantially support startup research.

Content of the study: How is the introduction of management control system connected to the performance of startups? Which systems should be introduced at what time to affect performance positively? Which stakeholders influence the development of these systems?

Management control systems are defined as systems that align individual's activities with organizational goals. They consist of traditional accounting instruments such as budgets and financial measures, or administrative controls, for example organization structure and governance systems, along with more socially based controls such as values and culture.

Target group of the survey are managers of Swiss startups, especially CEOs and CFOs. Please contact me for another personal access code in case further people from your company are interested in the survey.

Your data is collected anonymously and will be treated as strictly confidential. Only aggregated data will be shown without any possibility to derive the members of the study.

Should you have any questions or comments please contact me at robert.ploss@student.unisg.ch.

Robert Ploss

General information about the startup

1. In what year was your company legally established (founding year, YYYY)?
2. Is your company independent, e.g.no subsidiary of another company?
    a. Yes, we are an independent company.
    b. No, we are a subsidiary of another company.
3. What best describes your role in the startup?
    a. CEO
    b. CFO
    c. CFO, VP Finance, Director of Finance, or similar
    d. Other, please specify

Cultural and Administrative Controls

4. Please indicate when your company formalized each system below. "Formalized" is defined as having documented a process and / or periodically and purposefully executing the process.

    Scale: Year / "Never"

    a. Orientation program for new employees
    b. Social meetings
    c. Training program
    d. Core values
    e. Dress code
    f. Team composition guidelines
    g. Compliance & internal control systems
    h. Meeting guidelines
    i. Sales process
    j. Codes of conduct
    k. Partnership collaboration policies
    l. Written job descriptions
    m. HR development plans
    n. Organizational chart
    o. Buddy/Mentor system

5. Please indicate the extent to which you believe that at this point in time the following management control systems (MCS) have been implemented throughout your company. Please consider the extent to which people in your company understand and integrate these MCS in their daily work.

    Scale from 1 to 7 with the following anchors:

    i. *1 - not at all used*
    ii. *4 - actively used by about half of the organization*
    iii. *7 - actively used by 100% of the organization*

    a. Same systems as above if they have been introduced

Company and Industry

6. These questions relate to the current top management team of your startup:
    a. How many founders are part of the top management team?
    b. How many non-founders are part of the top management team?
7. Is the current CEO the same since the company was founded?
    a. Yes.
    b. No, in what year did the first CEO leave (year, YYYY)?
8. Has your company employed a full time financial manager (CFO)?
    a. Yes, since when (year, YYYY)
    b. No.
9. To map the evolution of your company please specify the number of equivalent full time employees for each of the dates below.
    a. December 2016 (estimated)
    b. December 2015
    c. December 2014
    d. December 2013
    e. December 2012
    f. December 2011
    g. December 2010
    h. December 2009
10. To account for the use of outsourcing in your company please specify the average number of equivalent full time freelancers for each of the dates below.
    a. [same dates as previous question]
11. Is your main product a business-to-business (B2B) product?
    a. Yes.
    b. No.

12. The main industry of your company is:
    a. Information and Communication Technology (ICT)
    b. Life Sciences
    c. Products & Services
    d. Cleantech
    e. Hightech
    f. Other (please specify)
13. Is your company generating revenue?
    a. Yes, since when (year, YYYY)?
    b. No.
14. Is your company generating revenue outside Switzerland?
    a. Yes, since when (year, YYYY)?
    b. No.
15. Did you open international office or production site outside Switzerland?
    a. Yes, in what year did you open the first (year, YYYY)?
    b. No.
16. Please indicate how strong you agree or disagree with the following statements about the competitive environment of your company.

    Scale: "1 - Strongly disagree" to "7 - Strongly agree"

    a. Competition in our local market is extremely high.
    b. Competition in our local market is intense.
    c. Our company has relatively strong competitors.
    d. Price competition is a characteristic of our local market.

Planning, Cybernetic Controls, and Reward and Compensation

17. Please indicate when your company formalized each system below. "Formalized" is defined as having documented a process and / or periodically and purposefully executing the process.

    Scale: Year / "Never"

    a. Strategic planning
    b. Partnership development planning
    c. Product (portfolio) roadmap
    d. Cash-flow projections
    e. Sales projections
    f. Milestone planning
    g. Project selection process and project budgeting
    h. Operating budget and expense approval process
    i. Capital investment budget and investment approval process
    j. Routine analysis of financial performance against target (Variance analysis)

k. Product development reports
l. Customer relationship management system (CRM)
m. Project reports
n. Sales reporting
o. Performance evaluation
p. Individual incentive programs
q. Management incentive programs

18. Please indicate the extent to which you believe that at this point in time the following management control systems (MCS) have been implemented throughout your company. Please consider the extent to which people in your company understand and integrate these MCS in their daily work.

    Scale from 1 to 7 with the following anchors:

    i. 1 - not at all used
    ii. 4 - actively used by about half of the organization
    iii. 7 - actively used by 100% of the organization

    a. Same systems as above if they have been introduced

Stakeholder and Financing

19. How influential were the following stakeholder groups in the development of management control systems within the last 12 months? Influence includes direct influence through requests for the development of MCS and indirect influence through pressure on the choice of strategy or asking for information.

    Scale: "1 - not influential" to "7 - very influential"

    a. Founders
    b. Investors
    c. Employees
    d. Customers

20. Has the company received funds from a venture capital firm (VC)?
    a. Yes, when for the first time (year, YYYY)?
    b. No.

21. In what year was the first, second, third, and further financing for your company acquired (Year, YYYY)?
    a. First Round
    b. Second Round
    c. Third Round
    d. Fourth round
    e. Fifth Round
    f. Sixth Round
    g. Seventh Round

22. Please specify the financing amount for each round (in mCHF, e.g. 1.5).
    a. Same as previous question.
23. How would you assess your firm's development over the last 12 months relative to that of your competitors in terms of OVERALL PERFORMANCE?
    a. Scale: "1 – underperform" to "7 – overperform"
24. How would you assess your firm's development over the last 12 months relative to that of your competitors in terms of MARKET SHARE?
    a. Scale: "1 – smaller" to "7 – larger"
25. How would you assess your firm's development over the last 12 months relative to that of your competitors in terms of REVENUE GROWTH?
    a. Scale: "1 - are growing more slowly" to "7 - are growing faster"
26. How would you assess your firm's development over the last 12 months relative to that of your competitors in terms of PROFITABILITY?
    a. Scale: "1 - less profitable" to "7 - more profitable"
27. You have the opportunity to receive an individual benchmark compared to the other participating startups of the survey.
    a. Yes, I would like to receive an individual benchmark. Please send it to the following email address:
    b. No, I do not want an individual benchmark and will only receive a summary report of the survey.

Your questionnaire has been received.

Thank You for participating in the survey.

Should you have any questions or comments please contact me at robert.ploss@student.unisg.ch.

Group	Category	Description	Individual MCS	Source (most recent)	Found in Interviews
Cultural Controls	Clans	Collective rituals and ceremonies	Orientation program for new employees	Strehle, Katzy, & Davila (2010)	yes
			Company-wide newsletter	Strehle, Katzy, & Davila (2010)	yes
			Social (evening) meetings and events	Collier (2005)	yes
			Trainings program	Strehle, Katzy, & Davila (2010)	yes
			Feedback	Interview with startup managers M	yes
			Regular meetings with all employees	Interview with startup managers H+M	yes
	Values	Belief system, vision, mission statement	Core values	Strehle, Katzy, & Davila (2010)	yes
	Symbols	Dress codes and workspace designs	Dress code	Part of the M&B framework	no
Planning	Long range planning	Strategic planning	Strategic planning	Strauss, Nevries & Weber (2013)	yes
			Product (portfolio) roadmap	Strauss, Nevries & Weber (2013)	yes
			Customer development plan	Strehle, Katzy, & Davila (2010)	yes
			Headcount development planning	Strauss, Nevries & Weber (2013)	no
			Marketing and branding	Davila, Foster, & Jia (2015)	yes
			Partnership development planning	Davila, Foster, & Jia (2015)	no
	Action planning	Tactical planning (12 months)	Cash-flow projections	Strauss, Nevries & Weber (2013)	no
			Milestone planning	Strehle, Katzy, & Davila (2010)	yes
			Sales projections	Davila, Foster, & Jia (2015)	yes

Table 61: MCS framework (part 1).

Group	Category	Description	Individual MCS	Source (most recent)	Found in Interviews
Cybernetic Controls	Budgets	Standard setting as basis for feedback loop and adjustments of activities	Operating budget and expense approval process	Davila, Foster, & Jia (2015)	yes
			Capital investment budget and approval process	Davila, Foster, & Jia (2015)	no
			Project selection process and budgeting	Strehle, Katzy, & Davila (2010)	no
			Cost management	Wijbenga, Postma & Stratling (2007)	yes
	Measurement systems (Financial & non-financial)	Measurement of deviations (financial, non-financial and hybrids) and adaption of the system	Routine analysis of financial performance against target (Management reports)	Davila, Foster, & Jia (2015)	yes
			Customer profitability analysis	Strehle, Katzy, & Davila (2010)	no
			Product profitability analysis	Strehle, Katzy, & Davila (2010)	no
			Project reports	Strehle, Katzy, & Davila (2010)	yes
			Partnership development reports	Strehle, Katzy, & Davila (2010)	yes
			Product development report	Davila, Foster, & Jia (2015)	no
			CRM system	Davila, Foster, & Jia (2015)	yes
			Sales reporting	Strehle, Katzy, & Davila (2010)	yes
			Production controls	Strehle, Katzy, & Davila (2010)	yes

Table 62: MCS framework (part 2).

Group	Category	Description	Individual MCS	Source (most recent)	Found in Interviews
Reward and Compensation		For goal congruence between the organization and its employees	Company bonus	Collier (2005)	yes
			Performance evaluation	Davila, Foster, & Jia (2015)	no
			Individual incentive programs	Strehle, Katzy, & Davila (2010)	yes
			Sales force bonus system	Strehle, Katzy, & Davila (2010)	no
			Management incentive programs	Davila & Foster (2007)	yes
Administrative Controls	Governance Structure	Board structure, management and project team, lines of authority and accountability	Compliance & internal control systems	Interview with investor C	yes
			Meeting guidelines	Interview with startup managers H+M	yes
			Team composition guidelines	Strauss, Nevries & Weber (2013)	no
	Organisation Structure	Functional specialization and relationships within certain groups	Written job descriptions	Davila, Foster, & Jia (2015)	yes
			Organizational chart	Strauss, Nevries & Weber (2013)	yes
			HR development plans	Strauss, Nevries & Weber (2013)	yes
			Buddy/Mentor system	Interview with startup managers F	yes
	Policies and procedures		Code of conduct	Strehle, Katzy, & Davila (2010)	yes
			Partnership collaboration policies	Strehle, Katzy, & Davila (2010)	no
			Sales process	Strauss, Nevries & Weber (2013)	yes

Table 63: MCS framework (part 3).

Stakeholder	Nascent Stage	Start-up Stage	Post-start-up Stage
Initial Employees	Minimal MCS needs due to shared norms, values and beliefs of the initial founding team (p. 165).	Developing MCS needs: Evaluate prior MCS package as insufficient due comparison to established organizations.	Less important driver
(Initial) VC	Development of business plan for first financing round often leads to introduction of formal MCS components. Outside pressure to ensure alignment with new goals from other stakeholders (further financiers)	Increase demands to more formal MCS such as financial planning and evaluation/performance measurement (p. 167). "Increasing homogeneity of the MCS packages among start-ups." (p. 168)	Push for exit options leads to development of efficiency MCS for employees (p. 172), "codification and standardization of the founders' knowledge" through formal MCS (p. 173)
New and prospective Employees	Not existing	Expect formal controls which increases the legitimacy of the firm (p. 169)	Increasing number of employees and broadness of requirements leads to introduction of guidelines and roadmaps (p. 171).
Customers			Customers change from early adopters to "early majority" customers (p. 170): driver for the development of formal sales MCS (CRM system, sales process manuals, customer satisfaction questionnaire) and push for hiring of experienced managers who rely on more formal MCS (p. 173).

Table 64: Drivers of MCS development (own illustration based on Strauss et al., 2013).

Annualized Growth Rates - Startups Year 1

1-Year Growth	Low	High	t-value		W-value	
Administrative Controls	4.02	6.04	-1.86	*	383	**
Cultural Controls	4.10	7.13	-2.17	*	244	**
Planning	4.07	5.66	-1.38	.	461	**
Cybernetic Controls	3.37	6.22	-2.63	**	421	**
Reward and Compensation	3.88	7.94	-2.14	*	230	***
MCS Intensity	3.70	6.00	-2.05	*	431	**
2-Year Growth	**Low**	**High**	**t-value**		**W-value**	
Administrative Controls	5.17	4.27	0.73		512	
Cultural Controls	4.67	5.73	-0.54		333	
Planning	4.90	4.80	0.06		620	
Cybernetic Controls	3.91	6.00	-1.35	.	550	
Reward and Compensation	3.98	8.39	-1.49	.	266	*
MCS Intensity	4.79	4.97	-0.12		632	
3-Year Growth	**Low**	**High**	**t-value**		**W-value**	
Administrative Controls	5.26	4.27	0.78		319	
Cultural Controls	5.19	3.58	1.07		235	
Planning	5.74	3.71	1.55		427	
Cybernetic Controls	4.86	5.14	-0.18		378	
Reward and Compensation	4.95	5.08	-0.09		152	
MCS Intensity	5.70	3.68	1.56		430	
4-Year Growth	**Low**	**High**	**t-value**		**W-value**	
Administrative Controls	5.68	4.25	0.89		202	
Cultural Controls	5.74	2.64	2.30		177	
Planning	6.21	3.09	2.05		277	
Cybernetic Controls	4.36	6.91	-1.01		226	
Reward and Compensation	5.41	4.20	0.72		90	
MCS Intensity	6.17	2.96	2.14		279	
5-Year Growth	**Low**	**High**	**t-value**		**W-value**	
Administrative Controls	3.00	4.29	-1.16		42	.
Cultural Controls	3.47	1.60	3.23		31	
Planning	3.22	3.60	-0.34		62	
Cybernetic Controls	3.28	3.44	-0.16		63	
Reward and Compensation	3.09	5.27	-1.10		17	.
MCS Intensity	3.29	3.46	-0.14		57	

., *, **, and *** indicate significance at the 10%, 5%, 1% and 0.1% levels respectively.

Table 65: Annualized growth rates startups year 1.

Annualized Growth Rates - Startups Year 3

1-Year Growth	Low	High	t-value		W-value	
Administrative Controls	5.20	7.31	-0.94		677	
Cultural Controls	6.14	6.26	-0.06		573	
Planning	6.25	5.94	0.16		430	
Cybernetic Controls	6.36	5.94	0.19		668	
Reward and Compensation	4.76	8.96	-1.86	*	357	***
MCS Intensity	6.11	6.26	-0.07		677	
2-Year Growth	**Low**	**High**	**t-value**		**W-value**	
Administrative Controls	5.22	7.59	-0.88		521	
Cultural Controls	6.82	4.83	1.01		453	
Planning	6.52	4.71	0.92		321	
Cybernetic Controls	6.33	5.98	0.14		505	
Reward and Compensation	5.28	8.45	-1.17		300	*
MCS Intensity	6.74	5.53	0.51		549	
3-Year Growth	**Low**	**High**	**t-value**		**W-value**	
Administrative Controls	4.30	4.19	0.07		194	
Cultural Controls	4.18	4.44	-0.16		166	
Planning	4.23	4.38	-0.08		107	
Cybernetic Controls	4.05	4.63	-0.38		149	*
Reward and Compensation	3.53	6.19	-1.47	.	102	**
MCS Intensity	4.23	4.31	-0.06		173	
4-Year Growth	**Low**	**High**	**t-value**		**W-value**	
Administrative Controls	4.98	3.68	0.72		123	
Cultural Controls	4.70	4.31	0.19		107	
Planning	4.72	3.33	0.73		46	
Cybernetic Controls	4.97	3.82	0.65		123	
Reward and Compensation	4.22	5.81	-0.63		77	
MCS Intensity	4.90	3.88	0.57		103	
5-Year Growth	**Low**	**High**	**t-value**		**W-value**	
Administrative Controls	4.09	5.23	-0.43		71	
Cultural Controls	5.38	2.26	1.85		85	
Planning	4.27	5.87	-0.34		33	
Cybernetic Controls	4.04	5.33	-0.49		70	
Reward and Compensation	4.54	4.29	0.10		68	
MCS Intensity	3.91	5.58	-0.64		64	

., *, **, and *** indicate significance at the 10%, 5%, 1% and 0.1% levels respectively.

Table 66: Annualized growth rates startups year 3.

Regression Results for Funding Amount (Negative Binomial Model) - Backward Selection of CV

Variables	CV only	PC Intensity	CY Intensity	RC Intensity
Intensity		0.17 (.08) *	0.13 (.05) *	0.04 (.13)
Intercept	-1.95 (.47) ***	-2.47 (.54) ***	-2.23 (.49) ***	-1.94 (.48) ***
VC	1.06 (.33) **	1.03 (.33) **	1.05 (.32) **	1.05 (.33) **
CFO	1.16 (.36) **	1.13 (.36) **	1.18 (.36) ***	1.12 (.36) **
Firm Size	0.76 (.16) ***	0.70 (.16) ***	0.69 (.16) ***	0.74 (.17) ***
Revenue	-0.69 (.38) .	-0.74 (.37) *	-0.84 (.38) *	-0.70 (.38) .
ICT	-0.69 (.38) .	-0.67 (.38) .	-0.77 (.38) *	-0.67 (.38) .
Life Sciences	1.18 (.35) ***	1.07 (.35) **	1.03 (.35) **	1.16 (.35) ***
Region DE	-0.74 (.34) *	-0.58 (.34) .	-0.52 (.34)	-0.73 (.35) *
Log-likelihood	-363.76 ***	-361.11 ***	-360.69 ***	-363.72 ***
Wald test	11.36 ***	10.30 ***	10.50 ***	9.83 ***
Adj. McFadden pseudo R^2	0.080	0.084	0.085	0.078

., *, **, and *** indicate significance at the 10%, 5%, 1% and 0.1% levels respectively.

Table 67: Regression results for funding amount with negative binomial model (control variables from backward selection).

Regression Results for Performance Impact of Traditional Accounting MCS in High-Growth and Competitive Environments (CE) - Large Startups[a]

Variables	CV only	PC Intensity	CY Intensity	RC Intensity
Intensity		-0.19 (.20)	-0.13 (.18)	-0.16 (.16)
High-Growth		0.47 (.23) *	0.58 (.23) *	0.45 (.21) *
CE		-0.04 (.11)	-0.09 (.11)	-0.16 (.11)
Intensity x High-Growth		0.29 (.26)	0.33 (.23)	0.39 (.22) .
Intensity x CE		-0.15 (.12)	0.17 (.11)	0.35 (.11) **
Intercept	0.01 (.44)	-0.48 (.48) *	-0.65 (.49)	-0.51 (.45) *
RevGen	0.59 (.40)	0.76 (.39) .	0.89 (.40) *	0.81 (.37) *
VC	-0.61 (.24) **	-0.47 (.24) .	-0.44 (.24) .	-0.49 (.22) *
Life Sciences	-0.74 (.28) **	-0.50 (.28) .	-0.52 (.28) .	-0.47 (.26) .
Adj. R^2	0.158 **	0.214 **	0.229 **	0.313 ***

[a] Robust standard errors are reported in parentheses.

Table 68: Regression results for the impact of traditional accounting MCS on the performance in high-growth and competitive environments (CE) of large startups.

Lasso Results for Control Variables

	Intensity					Sophistication				
Control variables	**AC**	**CC**	**PC**	**CY**	**RC**	**AC**	**CC**	**PC**	**CY**	**RC**
Age	0.07	0.02		0.28	0.09	0.06		0.03	0.21	0.14
B2B	0.06	0.15	0.47	0.16			0.29	0.38	0.03	
Firm Size	0.13	0.25			0.29	0.05	0.38			0.74
Intern. Office	0.38			0.17	0.04	0.25			0.18	
CEO Change				0.32	0.24				0.09	0.42
Competitive Environment								0.01	0.01	0.03
Region Switzerland			0.21							0.49
ICT			-0.14							-0.08
CFO										
Life Science					0.09					
VC			-0.02							
Revenue										
Intern. Revenue										
Adj. R^2	0.066	0.090	0.110	0.211	0.213	0.087	0.128	0.051	0.182	0.269

Table 69: Complete lasso results for control variables for MCS intensity and sophistication.

Regression Analysis for Reward and Compensation and Investors (CH)[a]

	CV only		Effect only		Effect + CV	
DV: Intensity of Reward and Compensation						
Influence Investors			.14 .	(.07)	.06	(.10)
Intercept	.33	(.50)	1.48 ***	(.35)	.26	(.51)
Firm Size	.39 *	(.19)			.38 .	(.20)
Age	.10 .	(.06)			.08	(.06)
B2B	.00	(.30)			-.07	(.34)
Intern. Office	.34	(.34)			.36	(.34)
Adj. R^2	.207 **		.037 .		.200 **	
DV: Sophistication of Reward and Compensation						
Influence Investors			.25	(.16)	.07	(.20)
Intercept	-.03	(1.08)	2.92 ***	(.77)	-.10	(1.12)
Firm Size	1.08 *	(.44)			1.06 *	(.45)
Age	.19	(.14)			.18	(.15)
B2B	.02	(.66)			-.05	(.75)
Intern. Office	.34	(.72)			.37	(.74)
Adj. R^2	.222 **		.022		.207 **	

[a] Robust standard errors are reported in parentheses.
., *, **, and *** indicate significance at the 10%, 5%, 1% and 0.1% levels respectively.

Table 70: Regression results for investors' influence on reward and compensation in Switzerland.

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Work Experience

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