Preprint version: 27.08.2021

Management Control Systems and Innovation Strategies in Business-Incubated Firms

Jacobo Gomez-Conde[1]
Universidad Autónoma de Madrid

Ernesto Lopez-Valeiras
Universidad de Vigo

Ricardo Malagueño
University of East Anglia

Raúl Gonzalez Castro
Ayuntamiento de Ourense

[1] **Corresponding author:** Jacobo Gomez-Conde. Departamento de Contabilidad. Universidad Autónoma de Madrid. Fco Tomás y Valiente 5. 28049 Madrid (SPAIN). Tel. +34 91 497 3007. E-mail: jacobo.gomez@uam.es
We have benefited from comments and suggestions from the editor (Frank Hartmann), two anonymous reviewers, Mercedes Barrachina (discussant), Salvador Carmona (discussant), Beatriz Garcia, Gerhard Speckbacher (discussant), Frank Verbeeten (discussant) and seminar and conference participants at the 42nd EAA Annual Congress in Paphos (2019), the 11th New Directions in Management Accounting Conference in Brussels (2018), the Workshop on Accounting and Management Control "Memorial Raymond Konopka" (2019, 2017 and 2015), VI Research Forum on Challenges in Management Accounting and Control (2019), the IV Iberian Conference on Entrepreneurship (CIEM) in Pontevedra (2014), University of Burgos and University of Chile. We are grateful for the support of the INCYDE Foundation in conducting the study. We also acknowledge financial contribution from the FUNCAS Foundation (EF001-2018), the Santander Financial Institute (2020), the Spanish Ministry of Science and Innovation (PID2019-104163RA-I00), the Spanish Ministry of Education and Science (ECO2016-77579-C3-3-P), Catedra UAM-Auditores Madrid, the Spanish Ministry of Science, Innovation and Universities (CAS18/00374), and the Madrid Government (within the framework of the multi-year agreement with the Universidad Autónoma de Madrid on Line 3: Excellence for University Staff - PRICIT). This paper is based on the dissertation work of Raul Gonzalez at the Universidad Autonoma de Madrid. We are also grateful to the dissertation committee: Leandro Cañibano, Beatriz Garcia, and David Naranjo.

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Management Control Systems and Innovation Strategies in Business-Incubated Start-ups

ABSTRACT

We respond to recent calls for a better understanding of the effects of management control systems (MCS) in small start-ups. Using a sample of business-incubated start-ups, we examine the performance effects of the alignment between MCS and innovation strategies. Using regression analyses, we find higher performance when financial (non-financial) MCS are associated with an emphasis on exploratory (exploitative) innovation strategies. Overall, this study contributes to understanding the contingent effects of MCS and innovation strategies in business-incubated start-ups, as well as the consequences for their outcome and survival.

Keywords: *Management control systems; Incubated start-ups; Business incubators; Innovation; Strategy*

JEL codes: *M13 New Firms • Start-ups; M41 Accounting*

1. Introduction

We study whether the effects of the alignment between management control systems (MCS) and innovation strategy affects the performance of small incubated start-ups. Incubated start-ups are hosted by business incubation centres (hereafter incubators) during their very early stage of development. Incubators provide operational structures in the form of an integrated range of services. These services include subsidised office spaces and shared resources, in-house business coaching, monitoring, advice and training, and access to technological, professional and financial networks (Mrkajic 2017). The support received from incubators accelerates the learning curve and contains the costs of potential failures of incubated start-ups (Bruneel et al. 2012).

Studies in management control acknowledge concerns about the adoption of MCS in small early-stage start-ups. Based on the limited evidence available, the consensus in the literature seems to be that those start-ups frequently lack the necessary resources[2] that support the proper implementation of formal controls (Granlund and Taipaleenmäki 2005, Malagueño et al. 2018) or that informal controls might be enough to coordinate such simple organisational structures (Davila et al. 2009b). Hence, research on the adoption and consequences of the use of MCS in start-ups has mostly concentrated on start-ups that either have the minimum structure of medium-sized firms (e.g. Davila and Foster 2005, 2007, Davila et al. 2015, Crespo et al. 2019), that are in their growth stage and have more complex organisational structures (e.g. Sandino 2007, Rooney and Cuganesan 2013), or are venture-capital-backed firms, which represent a specific cooperation context (e.g. Wijbenga et al. 2007).[3] The evidence presented by these prior

[2] The possibilities for small firms to adopt MCS can be restricted by strictly constrained monetary resources and managerial financial literacy (Perren and Grant 2000, Lavia López and Hiebl 2015).

[3] Previous literature shows that venture-capital-backed firms adopt MCS induced by investors, who aim to safeguard their specific investments (Gomez-Mejia et al. 1990, Wijbenga et al. 2007). Agency problems can arise when the entrepreneurial firm's management has more or better information than the venture capitalist (asymmetric information). As a venture–capital-backed firm tends to have short-term and efficiency-oriented investors (Gomez-Mejia et al. 1990),

studies recognises strategy as a significant contextual factor in explaining the effectiveness of MCS (Davila et al. 2015). Prior work suggests that financial MCS are a better fit to strategies involving low levels of uncertainty (e.g. cost/low price or exploitative) and non-financial MCS are a better fit for strategies involving high levels of uncertainty (e.g. differentiation or exploratory) (Sandino 2007).

Against this backdrop, an emerging literature questions the suitability of extrapolating results found in non-incubation settings to incubated start-ups. As an example, Amezcua et al. (2013) demonstrate that the interactions between MCS and contextual factors in incubated start-ups can vary considerably from other start-ups because the contingencies faced by those start-ups are different. Incubated start-ups face resource constraints like most other small early-stage start-ups, however, they are supported and encouraged by incubators to innovate, to implement strategic agendas and to adopt MCS from birth (Hill and Birkinshaw 2008, Soetanto and Jack 2013, Crespo et al. 2019).[4] In addition, incubated start-ups are not in the same stage of development nor present the complexity, structure, or resources identified in prior literature on the interface between MCS and strategy. Hence, we argue that the fit between MCS and strategy in incubated start-ups is different from the one reported in previous research (Sandino 2007, Davila et al. 2015), due to the specific characteristics of incubated start-ups and the supportive environment in which they are born and grow.

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they usually promote the adoption of more financially focused MCS. Hence, contrary to the broad support offered by incubators, venture-capital-backed firms provide a very specific support to new ventures in terms of financial control and monitoring (see Chen 2009). In this sense, the focus of previous studies is different from ours.

[4] Following Simons (1995) we define MCS as the set of formal processes, procedures, and routines used by management to achieve organisational goals. Previous research has shown that incubators invest strongly in creating a controlled environment by monitoring and assisting incubated start-ups in planning and control activities (Baraldi and Havendid 2016). This is expected since the low survival rate among start-ups is regularly attributed to the scarce attention paid or the improper development of these management functions (Peters et al. 2004). In this regard, "business support services provided by incubator management can help bridge the traditional market failure in the provision of business support services to the small business market" (EU 2002, p. 51). Thus, incubated start-ups are different from other small firms in that they are assisted in the adoption and use of MCS and are more aware of the importance of these practices for firm survival.

As innovation strategy is at the centre of the incubated start-ups' activities from the time of conception (Hughes et al. 2007a), our hypotheses are built around associations between MCS attributes and performance outcomes under two well-differentiated innovation strategies, namely exploitative and exploratory. In this study, we first hypothesise that financial MCS are expected to be positively associated with firm performance in incubated start-ups emphasising an exploratory innovation strategy (i.e. long production cycles and risky products). Considering the lack of a monetary safety net, we expect that financial MCS, with the advise and support of the incubator, will guide managers through the problems that arise when exploratory initiatives proliferate (e.g. cash flow mismatches, short-term financial constraints, or resource allocation). Second, we hypothesise that non-financial MCS are positively associated with the firm performance of incubated start-ups emphasising an exploitative innovation strategy (i.e. shorter production cycles and predictable products). For these start-ups, non-financial MCS allow managers to focus on the future strategic adjustment outside the protected environment provided by the incubator, ensuring their continuity in the medium and long term.

Overall, our results are consistent with the theoretical model and predictions. Using a sample of 94 incubated start-ups, we respond to recent calls for a better understanding of the effects of management control in small start-ups (Davila et al. 2015). First, we add to the management control literature, and more specifically to work related to MCS in start-ups and small firms, by examining new firms born in incubators, a relevant setting not well understood (Messeghem et al. 2017). This provides the opportunity to gain insights into the process of MCS adoption and choice in small firms at early stages of their life cycle, as well as its subsequent impact on performance. Moreover, we extend and complement the growing literature on the links between MCS and strategy. We show

that, among incubated start-ups, financial (non-financial) MCS are associated with higher performance in incubated start-ups emphasising exploratory (exploitative) innovation strategy. Our findings are novel, as prior research focuses on start-ups in their growth and stability stages, operating outside the safe environment provided by the incubators and with more complex organisational structures and fewer constrained resources. Given the growing interest in understanding the characteristics of small innovative firms (Filip et al. 2021), these findings open the door to future research about the conditions under which exploratory and exploitative start-ups may benefit from different MCS.

Second, this study concentrates on the incubated start-ups, rather than on the incubator itself, therefore responding to calls for more research examining the firm characteristics that explain the survival, growth, and innovation of incubated start-ups (e.g. Albort-Morant and Oghazi 2016). Prior work argued that the mere support of incubators does not guarantee the survival of incubated start-ups, but is contingent on the fit of different factors (Amezcua et al. 2013). Our study provides a better understanding of how the firm characteristics and choices in very early stages have consequences on firm outcomes within incubators.

2. Prior Literature and Hypotheses Development

2.1. Incubated start-ups

About half of all start-ups do not survive the first five years of their life (Calvino et al. 2015). For the last six decades, public-private collaborations among universities, industry, and all levels of government worldwide have developed firm assistance programmes, such as incubators (Mian et al. 2016). In Europe and the USA, incubators are often a part of broader government strategies to support firms in their early stage and improve their survival rates (Hughes et al. 2007a, Albort-Morant and Oghazi 2016). These programmes

aim at regional economic development, the settlement of the population, and the diversification of the local productive structure, improving regional competitiveness and innovativeness. Thus, not all incubators are similar in nature as they are created to attend diverse needs (Dutt et al. 2016). Aernoudt (2004) identified particular types of incubators that include an emphasis on employment and business creation, stimulation of innovation, technology, and research. Often, incubators provide the incubated start-ups with a mix of tangible (e.g. accommodation, shared facilities) and intangible resources (e.g. business and legal consulting services, coaching, networking) (EU 2002, Soetanto and Jack 2018). Additionally, the support frequently includes business monitoring (through the analysis and interpretation of MCS data), holding recurring follow-up meetings, and supporting better decision-making, whether in investment, financing, or operational issues (Bøllingtoft 2012).[5] As a consequence of the support received, managers of incubated start-ups can better devote their time to decision-making and to focusing on the development of their business and strategy while managers of other small early-stage start-ups struggle with the managerial and operational tasks that involve starting a business.[6]

Whereas several studies emphasise the impact of incubators on incubated start-up performance (Dutt et al. 2016), recent literature shows that a combination of sponsorship and other firm characteristics is necessary to ensure incubated start-up survival (Mas-

[5] McAdam and McAdam (2008, p. 287-288) show the example of an incubated start-up that is in a critical stage of securing funding from external investors. Managers of the incubated start-up talk about the support they received by saying "We turned to the MGT [incubator] team who have been great in helping us during this awful time" […] "The management team [of the incubator] set up a meeting with X [investors] which was great as this is all new to us and we have heard some scary stories, they helped us prepare for the meeting and kept us right on all the legal jargon."

[6] As an example, suppose that an incubated start-up is negotiating a sales contract with a retailer or wholesaler that has the bargaining power. The retailer or wholesaler will adjust and reduce the margins and will demand product availability. Thus, this small supplier, the incubated start-up, is constrained by limited resources, yet often faces stringent and unpredictable demands from larger buyers who have been known to exploit their market power. As described in Malagueño et al. (2019, p. 418), the suppliers "can find themselves over-stretched and exposed, as they seek to satisfy their key customers for little or no marginal return on their investments and efforts." The decision-making by the firm will be very different in an incubated/non-incubated setting (*ceteris paribus*, assuming two firms of the same size or age): managers of the incubated start-ups will make, a priori, better decisions, due to the advice of the incubator (support in reading financial data and forecasts, ameliorating the uncertainty of the decision).

Verdú et al. 2015, Soetanto and Jack 2018). On one hand, most studies focusing on incubators have shown that such spaces provide a safe environment that allows start-ups to innovate and increase their success rate (Mian et al. 2016). On the other hand, studies focusing on the incubated start-ups have revealed that positive outcomes do not result from their mere presence in an incubator but indicate the factors that, at firm level, explain the success rate of those small enterprises (Peña 2004, Hughes et al. 2007b, Sedita et al. 2019). This previous research found empirical evidence suggesting that human capital attributes can increase the expected survival of start-ups (Peña 2004, Ganotakis 2010). Albort-Morant and Oghazi (2016) found that incubated start-ups that benefit the most from incubators are those run by educated young professionals with family-business experience. Other studies have linked incubated start-ups' growth or survival to characteristics such as family commitment in financial decision-making (Koropp et al. 2013), entry into foreign markets (Peña 2004), size (Mas-Verdú et al. 2015) and strategy (Soetanto and Jack 2016).

Innovation strategy is a key factor in determining the performance of incubated start-ups (Hughes et al. 2007a, Soetanto and Jack 2016). The creation of a new firm entails novelty, and consequently, innovation strategy is the core of all the incubated start-ups' activities. Exploratory and exploitative innovation strategies have emerged as the twin concepts underpinning organisational adaptation research (Gupta et al. 2006), both represent two fundamentally different approaches to innovation. While the objective of the exploratory innovation strategy is to respond to latent environmental trends, an exploitative innovation strategy aims to meet the observable needs of current customers and markets (Mueller et al. 2013). Although both innovation strategies relate to knowledge management, the purpose and novelty of that knowledge vary; exploratory

strategies pursue new knowledge, whereas exploitative strategies build on existing knowledge.

The constrained resources of small early-stage start-ups hamper them in sustaining a genuinely ambidextrous orientation, i.e. simultaneously excelling at exploratory and exploitative innovation. However, evidence exists of small firms engaging in both exploration and exploitation, even if to different degrees (Bierly III and Daly 2007). In this vein, Soetanto and Jack (2016) examine how the emphasis on exploratory or on exploitative innovation strategies can determine the performance of incubated start-ups. Their results indicate that start-ups emphasising an exploitation strategy are more successful in the short term. However, this may impede the adaptation of these start-ups to compete in the event of meaningful market changes. The authors suggest that managers emphasising an exploitative strategy need to be trained to give responses to competitors' moves and environmental changes. Contrarily, incubated start-ups emphasising exploratory strategy face managerial problems in running their business in the short term.

Incubators provide professional support, including coaching and training, increasing the manager's ability to manage their start-ups properly. Consequently, incubators contribute to the incubated start-up's development by professionalising decision-making and managerial processes and providing the necessary resources for the implementation of formal controls (Bruneel et al. 2012). That is to say, the assistance of an incubator reduces the costs associated with the implementation of controls and helps to make information more accessible for managers.

2.2. MCS and Innovation Strategy in Start-Ups

Organisational life cycles are used to conceptualise how firms evolve and change over time (Mooers and Yuen 2001). These cycles are hierarchical and not easily reversed. Prior work on organisational life cycles identifies four broad developmental stages (Fisher et al. 2016):[7] (i) conception, (ii) commercialisation, (iii) growth, and (iv) stability. While extant literature has long recognised the effect of life cycle in shaping MCS and innovation strategies at growth (Sandino 2007, Davila et al. 2015) and stability stages (Chenhall and Langfield-Smith 1998, Kallunki and Silvola 2008, Ylinen and Gullkvist 2014), to the best of our knowledge little is known in the early stages (i.e. conception and commercialisation). The shift from commercialisation to growth stage is a highly transformational event that inevitably entails changes in all the systems of the organisation, therefore also in the interactions between MCS and innovation strategies.

The relationship between specific MCS choices and firms' desired outcomes is associated with the earlier contingency notion of the fit between attributes of MCS and context (Gerdin and Greve 2008, Burkert et al. 2014). This implies that firms will tend to align MCS with their strategic goals to obtain superior performance (Chenhall 2003). In this study, we analyse the associations between MCS attributes and performance outcomes under two different innovation strategies in incubated start-ups. We examine these types of start-ups and therefore we do not make claims or test the differences between incubated and other non-incubated start-ups. However, we recognise the extant literature in MCS and start-ups and frame our theoretical arguments around the use and effect of MCS in incubated start-ups compared to other types of start-ups.

2.2.1 Small early-stage non-incubated start-ups

[7] These stages have been labelled differently in prior work, but they converge in nature, being the choice more semantic than substantive. In our study, we choose this classification for its recent application in start-ups (Fisher et al. 2016).

The evidence presented by contingency studies supports the idea that strategy is not a relevant factor explaining MCS effectiveness in start-ups at very early stages of development (Sandino 2007, Davila et al. 2015). In fact, accounting literature indicates that small early-stage non-incubated start-ups struggle to adopt and use MCS (Granlund and Taipaleenmäki 2005). Due to their resource constraints, those start-ups are often unable to afford trained managers and accountants. The absence of professional expertise often reflects in a partial or complete lack of management and accounting skills. Consequently, the management teams of those firms do not access valuable information for planning, strategy implementation and financial control; frequently relying on intuition as the key input for their decision-making (Lavia López and Hiebl 2015).[8] Even when small early-stage start-ups succeed in adopting MCS, very often, they lack the resources that enable them to make proper use of those systems. As a result, in those start-ups, MCS use is very limited and mostly informal (Mooers and Yuen 2001).

Contrarily, incubated start-ups obtain professional managerial and accounting support and specialised coaching and training. Incubators contribute to overcoming the resource constraints and support the development of MCS that assist incubated start-ups in managing their immediate tensions in a timely and efficient manner. Additionally, the networks and physical proximity between incubated start-ups facilitate the transfer of valuable information and the diffusion of best practices (Schwartz and Hornych 2010). The support of professionals combined with the knowledge acquired from the exchange of experiences with other incubated peers reflects in higher levels of managerial skills and the adoption of more sophisticated and formalised control systems (Chatterji et al. 2019).

[8] Lavia López and Hiebl (2015) argue that, commonly, small start-ups make a very limited and mostly ceremonial use of MCS that are put in place mainly to conform to larger partners or to provide information for external stakeholders (e.g. banks, investors, retailers or wholesalers).

2.2.2 Non-incubated start-ups at growth and stability stages

Findings of previous studies focusing on non-incubated start-ups at growth and stability stages, commonly presenting more complex organisational structures, observed stable patterns on the fit between innovation strategy and MCS. This prior work shows that more financial (non-financial) MCS are a better fit to strategies involving low (high) levels of uncertainty (e.g. cost/low price or exploitative *versus* differentiation or exploratory strategies). In this vein, studies have argued that financial MCS allow start-ups emphasising exploitative strategies to be more efficient by reducing organisational slack and waste, standardising procedures and encouraging the conformance of employees with pre-stablished goals (e.g. Sandino 2007). More specifically, the literature on the use of MCS by start-ups on their growth stage has shown that the alignment of MCS complements other firm capabilities. This brings the necessary marginal benefits that help managers to build new mental models of business operations, clarifies courses of action, concentrates efforts on firms' key success factors and improves learning and managerial decision-making processes (Hill and Birkinshaw 2008). Sandino (2007) examined the adoption of MCS in a sample of retail start-ups and its relationship with firms' competitive strategy (i.e. cost leadership versus differentiation). Her findings reveal that firms pursuing a cost leadership strategy place more emphasis on financial MCS to improve the efficiency of operations, like cost control, whereas firms pursuing a differentiation strategy place more emphasis on non-financial MCS to support long-term growth and revenue-maximisation. Hill and Birkinshaw (2008) found empirical evidence that the structures and MCS used by corporate ventures are a function of their strategic role (i.e. exploratory, exploitative), and that their performance will depend on the fit between these elements. Davila et al. (2015) show, in a sample of medium-sized start-

ups, that those firms have a higher valuation when they are able to align their MCS choices with their strategic positioning. Finally, some studies conclude that misfit choices of MCS can also lead to ineffective price setting, poor investment decisions or inaccurate cost calculations that negatively affect firm performance (Laitinen 2011, Lavia López and Hiebl 2015).

As noted in Section 2.1, incubated start-ups, in addition to operating under different conditions from non-incubated start-ups, are in an early life cycle stage (i.e. conception and commercialisation) in which the patterns set out in prior work at growth and stability stages would not necessarily be applicable. Furthermore, their small size and simpler organisational structures also influence the challenges and constraints faced by incubated start-ups, thus determining the marginal return on resources invested in the adoption of MCS and the implementation of strategic agendas (Howorth and Westhead 2003). Additionally, the collective structures introduced through business sponsorship do not necessarily serve as a one-size-fits-all approach to increasing performance (Amezcua et al. 2013). They demonstrate that a contingent approach to the heterogeneity of practices is more useful in predicting the effectiveness of the incubators' environment. Accordingly, it is plausible to expect that incubated start-ups with particular innovation strategies will benefit differently from their MCS choices and that the alignment will be different from findings reported in non-incubated start-ups.

Next, we turn to the plausible fit between MCS and innovation strategies in incubated start-ups.

3. Hypotheses Formulation

Financial MCS support managerial and investment controls. The mentoring provided by the incubator in elaborating and reading financial data and forecasts, mitigate the potential lack of resources, including financial literacy, which is required for the proper implementation and use of those controls in small early-stage start-ups (McAdam and McAdam 2008). As a consequence of the support received, managers of incubated start-ups can better monitor their firms' daily routines, closely supervise short-term variations in effectiveness, scrutinise their investments, assess viable alternatives and minimise risks.[9] Financial MCS provide managers with information that is essential for incubated start-ups with strategies involving higher levels of uncertainty (Aernoudt 2004).

Start-ups emphasising exploratory strategies are characterised by investigation, invention, experimentation, complexity and uncertainty (Hill and Birkinshaw 2008). They engage in highly uncertain markets with ambiguous performance outcomes. Therefore, those start-ups commonly experience longer time lags to profitability as the commercialisation of products and services have extended cycles that are fully dependent on the success of exploratory activities (Slater et al. 2014). That implies great concerns with cash flow in the short term (Weng and Soderbom 2018), especially due to the usual lack of a monetary safety net and difficulties in financing working capital needs (Ughetto et al. 2017).

Given the above discussion, we expect that a financial MCS will benefit incubated start-ups emphasising an exploratory strategy as they allow adequate financial control. Although financial MCS presumably might contribute to all incubated start-ups, it may be argued that the return obtained from the higher emphasis on financial MCS will outweigh the costs of implementation and use among incubated start-ups emphasising

[9] As we noted in Section 2.2.1, small early-stage non-incubated start-ups have scarce resources and they are usually highly dependent on the owners' skills and time, and cash and financial management is just one of their responsibilities (Howorth and Westhead 2003). Consequently, those start-ups commonly struggle with the tasks that involve starting a business and do not formalise financial MCS.

exploratory strategies. Compared with the short cash conversion cycles of start-ups emphasising an exploitative strategy, the emphasis on exploratory strategy presents long commercialisation cycles of products and services that frequently reflect on lower revenues and higher levels of liquidity risk and shortfall in the short term. Financial MCS assist managers of those incubated start-ups to better monitor their scarce financial resources that keep their business afloat and that could restrict exploration much more than other forms of innovation and investment. In this regard, Soetanto and Jack (2016) suggest that incubated start-ups emphasising an exploratory strategy would benefit more from the business coaching offered by incubators to deal with operational and managerial problems. Financial MCS reduce financial distress from debt pressures, prevent adverse selection problems and reduce collateral requirements in settings with limited daily cash inflows.[10]

The positive effects of financial MCS on incubated start-ups emphasising an exploratory strategy constitutes our main expectation regarding financial MCS in incubated start-ups. Nevertheless, for completeness and comparability with prior work, we predict the performance consequences of financial MCS in incubated start-ups emphasising exploitative innovation strategies. Incubated start-ups emphasising an exploitative innovation strategy usually focus on incremental refinements, continuous improvement, implementation, and routinisation (Hill and Birkinshaw 2008, Yannopoulos et al. 2012). Those start-ups require comparatively less intensive control of their financial operations, as sales and cash inflows are more immediate than start-ups emphasising an exploratory strategy (Slater et al. 2014). Arguably, the simple observation of invoices, cash inflow, cheques, and transferences to the firms' bank accounts is enough

[10] Start-ups following exploratory innovation strategies often have limited collateral value (De Maeseneire and Claeys 2012). This strategy repeatedly involves sunk costs with little or no salvage value at the initial stage, like market and industry analysis, market surveys, or legal consulting services for new products.

to allow managers to be confident of their short-term liquidity (Perren and Grant 2000). Hence, higher levels of financial MCS use would not translate necessarily into higher benefits to those start-ups. These arguments lead to the following hypotheses:

H1: *Financial MCS are (a) positively associated with firm performance in incubated start-ups emphasising an exploratory innovation strategy, and (b) not associated with firm performance in incubated start-ups emphasising an exploitative innovation strategy.*

Non-financial MCS assist managers in visualising paths for the achievement of long-term goals (Hall 2008). Those MCS support adaptive responses to competitors' moves and environmental changes. Non-financial MCS capture strategic envisioning that are not accurately reflected in short-term financial measures (Ittner et al. 2003). Thus, access to non-financial information allows managers to understand the big picture and how to perform long-term strategic managerial functions (Hall 2008).

Incubated start-ups emphasising exploitative strategies, while being in an initially more stable position than incubated start-ups emphasising exploratory strategies, may be vulnerable to competition (Laitinen 2011). This suggests that, rather than directing the focus and attention to short-term financial solvency, the managerial challenge for these start-ups is in ensuring the accomplishment of the firm's mission and goals in the long term according to the organisational values. Specifically, managers must focus on the future strategic adjustment outside the protected environment provided by the incubator, ensuring their firm's continuity in the medium and long term. In response to this challenge, managers of incubated start-ups emphasising an exploitative strategy must transit from a technical to a prospective mindset.

Non-financial MCS in incubated start-ups emphasising an exploitative innovation strategy play a role in supporting firms as they re-define their strategy. Small start-ups often have only reduced knowledge of the markets in which they operate, which is

reflected in a lack of control over their own competitive position (Huang and Brown 1999, Hudson Smith and Smith 2007). The incubators, through firms' MCS information, their own analysis, and data of the environment, facilitate the strategic planning of these start-ups, in order to increase the chances of survival in the medium term (Grimaldi and Grandi 2005). As the market for exploitative products becomes more hostile, the need for strategic adaption, fine-tuning and adjustment, and the importance of making the right decisions will increase (Bisbe and Otley 2004). MCS such as value systems or performance measurement systems drive the focus of attention to these medium- and long-term uncertainties. With the support and advice of the incubator, non-financial MCS guide and communicate to the managers of incubated start-ups where to look when existing markets change and, more so, when in the medium-term the start-up must leave the incubator. Even among incubated start-ups with little uncertainty in the short- and medium-term, focus is critical for maintaining the orientation of innovations (Soetanto and Jack 2018).

The positive effects of non-financial MCS on incubated start-ups emphasising an exploitative strategy constitutes our main expectation regarding non-financial MCS in incubated start-ups. Nevertheless, for completeness and comparability with prior work, we also predict the performance consequences of non-financial MCS in incubated start-ups emphasising exploratory innovation strategies. Incubated start-ups emphasising an exploratory innovation strategy are usually focused on the experimentation of innovative products and services. We expect that the benefits of focusing attention on non-financial MCS jointly with exploratory strategies are less evident than the benefits of those systems for incubated start-ups emphasising exploitative strategies. Even though information provided by a non-financial MCS could support the long-term goals of incubated start-ups in general, the immediate and major control concerns of incubated start-ups

emphasising exploratory strategies should be on the financial problems in the short term, which are derived from emphasising a long-term-oriented strategy. This previous argumentation leads us to the following hypotheses:

H2: *Non-financial MCS are (a) positively associated with firm performance in incubated start-ups emphasising an exploitative innovation strategy, and (b) not associated with firm performance in incubated start-ups emphasising an exploratory innovation strategy.*

4. Research Methods

4.1. Research Setting

We conducted our study in the Network of Business Incubators of the Spanish Chambers of Commerce. Currently, it is the largest business incubator network in Europe, comprising 651 incubated start-ups (our target population). It was created with funding from the European Regional Development Fund (ERDF) program and is managed by the INCYDE Foundation (foundation created by the Spanish Chamber of Commerce). Since 2002, INCYDE has supported the incubation of more than 2,850 start-ups, and has been recognised on several occasions as an example of good practices by the ERDF funds and the European Commission (Spanish Chamber of Commerce 2016). This publicly funded incubators network was created to encourage entrepreneurship, innovation and regional economic development in Spain, playing a key social role, mainly since the global financial crisis, by assisting new entrepreneurs (Barbero et al. 2012).[11] An innovative orientation is a common prerequisite for acceptance in the incubator. However, the

[11] At the time of our study, about 53% of the entrepreneurs in our setting were previously unemployed, 17% had quit their previous employment to start their own business project, while 7% were self-employed entrepreneurs. The remaining 23% correspond to other profiles (Spanish Chamber of Commerce 2016).

spectrum of business projects accepted varies considerably given the diverse and social objectives of the INCYDE Foundation.[12]

Incubated start-ups within this network are under a similar selection-exit policy, structure and services portfolio. According to Bruneel et al.'s (2012) taxonomy, those start-ups are hosted by third generation incubators as they benefit from several services including office space, shared resources, coaching support and networking.[13] For example, incubated start-ups have at their disposal several common tangible services, such as printing services, internet access, furniture, meeting rooms and administration, in exchange for a rental rate that is generally below the market price. The intangible services include training and guidance for internationalisation, accounting and finance, marketing, branding, contracting or access to financing instruments, arbitration, and mediation, brand recognition certification, ATA carnets[14] or certifications of origin. Incubated start-ups can stay in the incubator structures for five years and, in some specific cases, this period can be extended.

The Business Incubator Network is an inherently interesting setting for research given its economic and social relevance and a reasonably expected variation in MCS choices and innovation strategies. Working with start-ups in this single network provides greater internal validity (Ittner et al. 2003) that helps to discriminate the results and focus on the effect of firms' characteristics.

4.2. Sample and Data

[12] Examples of start-ups in our sample include a start-up offering an optimised technical maintenance service for wind turbines and an APP development start-up experimenting with quality monitoring and process management.
[13] The services offered by incubators have evolved during the last six decades. According to Bruneel et al. (2012), first generation incubators provided infrastructure (office space and shared resources). The second generation added coaching and training support. The third generation provides access to technological, professional and financial networks.
[14] ATA carnet is a certificate that authorises transitory tax-free international operations of goods.

To test our hypotheses, we used a cross-sectional questionnaire administered to top managers in incubated start-ups. Where possible, we followed the steps recommended by Dillman (2011) for survey design, taking into account the simplicity, brevity and relevance of the issues. To encourage questionnaire response, we promised participants a brief summary of the findings upon request when available. For the same reason, the incubator managers administered the survey.[15] Questionnaires were provided in February 2016 through an electronic link and were pre-tested by six experts, including management and accounting scholars, top managers, and founders of incubated start-ups. Two reminder emails were sent before the deadline. Altogether, 102 surveys were received, which implies a response rate of 15.67%, in line with recent previous studies in accounting and management control (Bisbe and Malagueño 2015, Garcia Osma et al. 2018, Hiebl and Richter 2018) and small business management (Son et al. 2019). After discarding the responses with excessive missing data,[16] 94 responses were included in the analysis. Among the sampled start-ups, the maximum duration of tenancy was 77 months, 76% were services start-ups, and the maximum number of employees was 15 at the time of survey response. Additionally, on average, sample start-ups export to 1.2 countries, have 4.9% of their overall sales to other start-ups within the incubator and obtain 14.5% of financing from family. See Table 1 for further sample descriptives.

<Insert Table 1 about here>

In order to avoid potential response bias, we ensured the anonymity and confidentiality of the respondents and start-ups. Additionally, we compared the means of

[15] We offered instructions to the incubator managers in order to allow them to resolve specific questions regarding the content of the survey. Additionally, incubator managers were in contact with a member of the research team who oversaw the distribution of questionnaires and data collection.
[16] We excluded eight questionnaires with multiple missing values (mainly on MCS and firm performance) in order to avoid any artificial increase in the analysed effects (Hair et al. 2010).

the main constructs between the first and the last 20% of responses received. Untabulated results show no meaningful differences.

Since we gathered our data from a single key informant per start-up, common method variance might be a concern. To minimise it, we reverse-coded some selected items, paid close attention to the wording (mainly regarding the translation of original items from English to Spanish), and separated items of constructs throughout the online survey (Podsakoff et al. 2012). Moreover, we ran Harman's single factor test. The unrotated principal components analysis yielded nine factors with eigenvalues greater than one and the variance explained by the first factor (24.4%) well below half of the total explained variance (71.7%), which shows that the likelihood of common measure bias is very low.

4.3. Measurement of Variables

Management control systems. Multiple items were used to measure constructs related to MCS. Four individual MCS are captured based on the previous literature (Davila 2000, Davila and Foster 2005, 2007, Davila et al. 2009a), and the survey pre-test: (i) cost control; (ii) operating budgets and variances; (iii) performance measurement systems; and (iv) value system. For each individual MCS, respondents answered two questions about their start-up practices on a seven-point Likert scale (Scale: (1), low and (7), high): (i) having documented a process; and (ii) frequency of information updating. These items are proxies for MCS formalisation.[17] Both items scored zero when a specific MCS was not adopted. Factor analysis supported unidimensionality for each of the four selected

[17] We follow the definition of Davila et al. (2009a, p. 344), where "formalized is defined as having documented a process and / or periodically and purposefully executing the process."

MCS.[18] The four Cronbach's α were in the 0.793–0.930 range, suggesting that the reliability of the constructs was acceptable. We computed the *financial MCS* as the sum of the variables' *cost control* and *operating budgets and variances*, while *non-financial MCS* were computed as the sum of the variables' *performance measurement systems* and *value system*. According to Malmi and Brown (2008) short-term and financial orientation is associated with a more tactical focus while long-term and non-financial has a more strategic focus. Among several start-ups we interviewed while developing the questionnaire, cash flow was not understood as an independent tool but as part of the operating budget. Previous researchers studying small businesses have observed this practice. For instance, in a report on their CIMA-backed study of the development of control mechanisms in small businesses and micro-organisations, Pilkington and Crowther (2007, p. 29) show that in "… such environments cash control is a major – and often sole – component of budgetary control."[19] Table 2 reports descriptive statistics for each individual item, while Table 3 displays additional measure validation.

Innovation strategies. We used the measures from Bedford (2015) and Jansen et al. (2006) for both constructs: exploratory and exploitative innovation strategies. *Exploratory innovation strategy* comprises five items on a seven-point Likert scale (Scale: (1), low and (7), high): (i) being first to market with new products/services; (ii) developing new generation product/service capabilities; (iii) frequent new product/service introductions; (iv) experimenting with new products/services; and (v) opening up new product/service markets. *Exploitative innovation strategy* also comprises

[18] We compute each individual control systems as a sum of both respective items.

[19] To assure our proxy for operating budgets and variances is capturing cash control, we searched for additional evidence in our sample. We follow Howorth and Westhead (2003) and looked at proxies for better cash control. Our sample was divided into high and low scores for operating budgets and variances (above and below the median). We observe that the subsample of start-ups with high score presents a better liquidity ratio (2.50 on average) and has a lower payment period to creditors (51.43 days on average) when compared with the subsample of start-ups with low operating budget and variance scores (1.56 and 71.14 days, respectively). Overall, this descriptive evidence confirms the role of the operating budgets as a mechanism for cash control in incubated start-ups.

five items: (i) low-cost products/services;[20] (ii) improving the quality of existing products/services; (iii) frequent, but incremental, modifications to existing products/services; (iv) improving efficiency in the provision of existing products/services; and (v) increasing economies of scale in existing product/service markets. The Cronbach's alphas of both constructs are 0.895 and 0.873, respectively, which is well above the acceptable minimum thresholds for construct reliability (Hair et al. 2010). Two weighted summated scales (labelled exploratory innovation strategy and exploitative innovation strategy) were created by adding the scores of the items related to each innovation strategy.

Firm performance. This construct is based on a self-reported subjective measure following proposals from previous studies (Gong and Ferreira 2014, Bedford 2015).[21] The Likert scale comprises five items with the stem, "Relative to your competitors, how does your firm perform concerning the following statements": (i) profitability; (ii) sales growth of new product/service markets; (iii) sales growth of existing product/service markets; (iv) market share for primary products/services; and (v) overall performance. The anchor points for item rating were 1, "significantly below average," to 7, "significantly above average." Table 2 displays descriptive statistics, while Table 3 shows that the five items load on a single factor (loadings in the range of 0.633–0.918) with satisfactory reliability ($\alpha = 0.832$). A weighted summated scale was created by adding the scores of the five items that loaded on the factor.

[20] Consistent with Bedford (2015) and Jansen et al. (2006), this item is removed from the analysis due to the low communality. Bedford (2015) and Jansen et al. (2006) explain that low-cost strategy represents a different concern to exploitative innovation strategy. Exploratory factor analysis results displayed in Appendix A show that the 10-item load was as expected in two factors representing the exploitative and exploratory innovation strategies, except for the low-cost item.

[21] According to Spanish commercial regulation (*Art. 365 del Reglamento del Registro Mercantil*) firms following the simplest legal form, like most firms in our sample, are not required to register accounts. This restricts our possibility of collecting objective secondary data on firm performance.

Control variables. We also included several control variables in our statistical analyses, mainly related to contextual factors from the environment, technology, structure and size, to minimise spurious interpretation of our findings: (i) environmental hostility, measured as a summated index of three items related to competitors, inputs and public administrations (see tables 2 and 3). A weighted summated scale was created by adding the scores of the three items that loaded on the factor. Hostile conditions were previously associated with more investments in exploitation and with an increasing use of MCS (Bedford 2015); (ii) employees at the foundation, measured in full-time equivalent employees. The number of employees at the foundation may affect the decision to adopt MCS at the start-up foundation; (iii) start-up size, measured in full-time equivalent employees. Start-up size may signal stability and may potentially affect firm performance and survival (Nijssen and van der Borgh 2017) and also influence the decision to adopt MCS; (iv) CEO entrepreneurial tenure, measured in years. High levels of skills and knowledge can increase expected incomes (Xiao and Ramsden 2016); (v) CEO/Founder's education, measured from 1 = primary studies to 6 = PhD studies. The key role of founders' human capital on firm performance and MCS adoption was acknowledged by a growing body of literature (Xiao and Ramsden 2016); (vi) tenancy duration, measured in months. Older firms are more likely to adopt MCS (Mooers and Yuen 2001); (vii) CEO risk-taking, measured in a seven-point Likert scale. CEO risk-taking is usually analysed in the context of decision-making and firm performance, and refers to the proclivity to engage in risky projects (Hughes et al. 2007a); (viii) business networks, measured on a seven-point Likert scale if the start-up is involved in incubator business networks. Networks were linked to innovation and performance in the previous literature (Molina-Morales and Martinez-Fernandez 2010); (ix) previously created firms, measured by the number of firms created by the CEO/Founder, as a proxy of entrepreneurial experience,

usually related to firm performance (Toft-Kehler et al. 2014); (x) start-up social orientation measures whether the firm undertakes social activities, plus its impact on the community on a seven-point Likert scale. Social orientation would lead to superior firm performance (Li et al. 2020); and (xi) incubator social programmes, measured on a seven-point Likert scale if the start-up participates in the social network activities organised by the incubator. Previous literature suggests that these social networks are informal structures that enable managers to be more effective in strategy implementation (Molina-Morales and Martinez-Fernandez 2010, Oyewo et al. 2021).

<Insert Table 2 about here>

<Insert Table 3 about here>

4.4. Statistical Analysis

We use the moderated regression analysis to test our hypotheses and to model the relationships between MCS, innovation strategies, and firm performance. The predictor variables were entered in the following stages: (stage I) control variables; (stage II) the main effects; (stage III) the two-way interactions testing the complementary effects (H1b and H2b); and (stage IV) the two-way interactions testing the main predictions (H1a and H2a).

H1a and H2a, tested in stage IV, posit that the interactions between (i) financial MCS and exploratory innovation strategy, and (ii) non-financial MCS and exploitative innovation strategy, have a positive effect on firm performance. Meanwhile, H1b and H2b suggest that the interactions between (i) financial MCS and exploitative innovation strategy and (ii) non-financial MCS and exploratory innovation strategy have a non-significant effect on firm performance. In these regressions, our variables of interest are

the interactions. In addition to the set of control variables and following previous literature on forms to test the contingency fit (Hartmann and Moers 1999, Gerdin and Greve 2008, Burkert et al. 2014), we also include financial MCS, non-financial MCS, exploratory innovation strategy, and exploitative innovation strategy, to isolate the primary effect of the interactions.[22] Thus, at stage IV, we run the following model (1):

$$\begin{aligned} \textit{Firm performance} = {} & \beta_0 + \beta_1 \textit{ financial MCS x exploratory innovation strategy} + \\ & + \beta_2 \textit{ non-financial MCS x exploitative innovation strategy} + \\ & + \beta_3 \textit{ financial MCS x exploitative innovation strategy} + \\ & + \beta_4 \textit{ non-financial MCS x exploratory innovation strategy} + \beta_5 \textit{ financial MCS} + \\ & + \beta_6 \textit{ non-financial MCS} + \beta_7 \textit{ exploratory innovation strategy} + \\ & + \beta_8 \textit{ exploitative innovation strategy} + \gamma \sum \textit{controls} + \varepsilon \end{aligned} \quad (1)$$

5. Results

5.1. Hypotheses Testing

Table 4 presents the correlation matrix. All correlations are below $r = 0.7$.[23] Table 5 shows the estimates of MCS and innovation strategies on firm performance. Our coefficients of interest are the interaction terms (β_1 to β_4) at stage IV. Results show that financial MCS *x* exploratory innovation strategy is positive and significantly associated with firm performance ($\beta = 0.453$, $p < 0.05$). They also show that financial MCS *x* exploitative innovation strategy is non-significant ($\beta = -0.168$, $p > 0.10$), providing support for H1a

[22] As an additional test, we also include in our model the interaction term financial MCS *x* non-financial MCS. Results show qualitative similar effects in testing our hypotheses. Financial MCS *x* non-financial MCS term shows a non-significant effect on firm performance ($\beta = 0.087$, $p > 0.10$).

[23] The two highest correlations are between (i) financial and non-financial MCS and (ii) exploratory and exploitative innovation strategies. While this would be natural as, for example, innovation leads to more innovation (Bierly III and Daly 2007, Geerts et al 2018), it does open up concerns about multicollinearity. Thus, orthogonalised estimates of the interaction terms were included to reduce potential multicollinearity. We calculate and report variance inflation factors (VIF) for all independent variables, being in the 2.187 to 6.330 range, well below the threshold of 10 (Hair et al. 2010). We also account for, as untabulated tests, results using non-orthogonalised terms. These results reveal qualitative similar effects, however, with VIF values slightly above 10.

and H1b, respectively. Stage IV also displays a positive and significant effect of non-financial MCS *x* exploitative innovation strategy (β = 0.664, $p < 0.05$), providing support for H2a. In addition, non-financial MCS *x* exploratory innovation strategy is significant, but is negatively associated with firm performance (β = -0.513, $p < 0.01$). As such, H2b was not supported.[24, 25]

<Insert Table 4 about here>

<Insert Table 5 about here>

Figure 1 shows the joint effects of MCS and innovation strategies in a simple slope analysis. On the left side, we plot the interactions predicted in H1a and H1b and related to financial MCS. As in our results, a significant difference in the slope, representing a strong positive effect on firm performance, is observed only when financial MCS are high and the start-up emphasises an exploratory innovation strategy. On the right side, we plot the interactions predicted in H2a and H2b, related to non-financial MCS. In line with our main results, slopes show that the strongest positive effect on firm performance is observed when non-financial MCS are high and the start-up emphasises an exploitative innovation strategy.

<Insert Figure 1 about here>

[24] As a robustness check, we replicated our analysis using an adjusted measure of performance. Due to potential endogeneity concerns, and following Bisbe and Otley (2004), the two innovation-related items were excluded from the performance construct ("sales growth of new markets" and "sales growth of existing markets"). The three remaining items showed appropriate loadings and composite reliability (loadings range = 0.753-0.889; eigenvalue = 2.110; variance explained = 70.236%; Cronbach Alpha = 0.694; KMO = 0.658). Untabulated regression results report a positive and significant effect of the interactions to test H1a and H2a (β = 0.326, $p < 0.10$ for financial MCS *x* exploratory innovation strategy; and β = 0.507, $p < 0.01$ for non-financial MCS *x* exploitative innovation strategy), and non-significant (negative) effects when analyse H1b and H2b (β = -0.152, $p > 0.10$ for financial MCS *x* exploitative innovation strategy; and β = -0.448, $p < 0.01$ for non-financial MCS *x* exploratory innovation strategy). For comparability, we opt to use the original scale of Bedford (2015) in our main results.

[25] Due to the potential concerns about the relevance of the item "profitability" for early-stage start-ups, we re-run our regressions by eliminating this item from the construct firm performance. Results remain qualitatively similar (β = 0.521, $p < 0.01$ for financial MCS *x* exploratory innovation strategy; β = 0.698, $p < 0.01$ for non-financial MCS *x* exploitative innovation strategy; β = -0.170, $p > 0.10$ for financial MCS *x* exploitative innovation strategy; and β = -0.530, $p < 0.01$ for non-financial MCS *x* exploratory innovation strategy). We thank an anonymous reviewer for making this point.

5.2. Additional Results and Robustness Tests

Our findings offer evidence that financial (non-financial) MCS are associated with greater performance among start-ups emphasising exploratory (exploitative) innovation strategies, while financial (non-financial) MCS do not have significant (negative) performance consequences among start-ups emphasising exploitative (exploratory) innovation strategies. In this section, we provide further insights into these results by re-running the model, taking into consideration: (i) survived incubated start-ups in year *t*+1 and *t*+2 as sample; (ii) high innovative start-ups; and (iii) start-ups in which a clear differentiation between the emphases on a particular innovation strategy could be observed.

First, in Table 6 we run our models using a sample of the survived start-ups. Given the high mortality rates of start-ups (Calvino et al. 2015), survival is a key factor in analysing the business-incubated setting. Firm survival includes the overall effects of all positive and negative effects affecting firm viability (Chadwick et al. 2016). We obtained data on the survival of the incubated start-ups in our sample from the database of the Spanish Chambers of Commerce (Camerdata). Of the 94 start-ups in our sample, we obtained information on *t*+1 and *t*+2 from 67 start-ups. Of those, in *t*+1 there were 57 start-ups with activity (mortality ratio of 14.92% on *t*), while in *t*+2, 54 start-ups showed activity (mortality ratio of 19.40% on *t*). We expect that the results observed in the full sample remain robust in the surviving start-ups, both in *t*+1 and in *t*+2. Results in Table 6 show that financial MCS *x* exploratory innovation strategy is positive and significant in both *t*+1 ($\beta = 0.545$, $p < 0.05$) and *t*+2 ($\beta = 0.457$, $p < 0.10$). Meanwhile, non-financial MCS *x* exploitative innovation strategy is also significant in *t*+1 ($\beta = 0.595$, $p < 0.05$) and in *t*+2 ($\beta = 0.641$, $p < 0.05$). In addition, financial MCS *x* exploitative innovation strategy

is non-significant, both in t+1 (β = -0.254, p > 0.10) and in t+2 (β = -0.208, p > 0.10), while non-financial MCS *x* exploratory innovation strategy is negative and significant in t+1 (β = -0.610, p < 0.05) and in t+2 (β = -0.545, p < 0.05), as in our main results. Overall, these results are consistent with the findings presented in Table 5.

<Insert Table 6 about here>

Second, in an untabulated analysis, we run our model using a subsample that excludes less innovative start-ups. To run this analysis, we exclude those start-ups which, in either of the two innovation constructs, show an average value below 4 (half of the Likert scale). Analysis of this subsample (n = 66) yields qualitatively similar results to those reported using the full sample.

Third, also in an untabulated analysis, we run our model using a sample excluding start-ups where scores of innovation strategies are very similar. Thus, we eliminated those observations with very similar average scores (equal to or less than ± 0.5), trying to avoid the potential confounding effects of start-ups equally emphasising different innovation strategies (i.e. exploitative and exploratory). Results using this subsample (n = 62) are also qualitatively similar to those reported with the full sample.

6. Discussion and Conclusions

We began this research paper by noting the particularities of the incubation setting and the dearth of research on the consequences of the use of MCS in incubated start-ups. We aim to respond to recent calls for a better understanding of the factors that support the performance of small start-ups. We provide empirical evidence of the use of MCS and its impact on incubated start-ups' performance by focusing on the alignment between MCS and innovation strategies. We use a sample of 94 Spanish incubated start-ups, all of which

are developing their activities in the Network of Business Incubators of the Spanish Chamber of Commerce.

Consistent with contingency theory, we find that the fit between MCS and innovation strategy enhances performance. Higher performance is perceived both in incubated start-ups using financial MCS and emphasising an exploratory strategy, and using non-financial MCS and emphasising an exploitative strategy. We also provide evidence of complementary effects, to extend our understanding about the alignment between MCS and innovation strategy on incubated start-ups. Results indicate that non-financial MCS in incubated start-ups emphasising an exploratory innovation strategy show a negative effect on performance. We find no evidence in the case of financial MCS in incubated start-ups emphasising an exploitative innovation strategy.

These results complement the current MCS-strategy literature (e.g. Chenhall and Langfield-Smith 1998, Chenhall 2003, Ittner et al. 2003, Auzair and Langfield-Smith 2005, Sandino 2007, Bedford 2015) bringing a new setting—incubated start-ups. Our findings suggest that the use of control systems in incubated early-stage start-ups has different implications from both non-incubated early-stage start-ups and non-incubated larger start-ups. The results depart from established knowledge hinting at different interactions between MCS and contextual factors. This departure is mainly attributed to the specific features of those firms and the supportive setting in which they are born and grow. However, more research on this topic needs to be undertaken to determine whether there are conditions under which exploratory (exploitative) incubated start-ups may benefit from non-financial (financial) controls.

Overall, our results suggest positive implications of the use of MCS in incubated start-ups. Additionally, our findings signal major challenges for incubators and incubated start-ups aiming to use MCS. First, they reveal that superior performance is only to be

expected in incubated start-ups emphasising an exploratory strategy if managers are able to transit from a "creative to a managerial mindset" (Davila et al. 2009b, p. 291). Second, although the challenge for incubated start-ups emphasising an exploitative strategy is less pressing and immediate than for exploratory incubated start-ups, we observe that superior performance in those firms occur if managers are able to put the emphasis on non-financial MCS. Finally, incubator' managers must adapt and customise their management support services, taking into account the different MCS requirements fitting the innovation strategy. Whereas the high failure rate among start-ups can be explained by external and usually uncontrollable factors (i.e. macro-economic conditions, location, public policies), research in entrepreneurship has highlighted the importance of internal factors (i.e. human capital attributes of entrepreneurs, managerial practices, strategies) for explaining successful cases (Peña 2004, Chatterji et al. 2019). Our results show incubators how they can improve their coaching and training support considering the performance implications of the alignment between MCS and innovation strategy.

This study brings original empirical evidence of the role of formal controls in incubated start-ups and is among the first to building subsequent knowledge in this context. In addition, our work also has practical implications, since it offers managers evidence of how control systems help start-ups perform better in a setting as critical as that of business incubation. Several authors have highlighted the need for these bridges between theory and practice, especially to emphasise the relevance of management accounting (Tucker and Parker 2014). Previous studies on early-stage non-incubated small and innovative start-ups have suggested an intensive use of informal control systems by those firms (Moores and Yuen 2001). In this regard, there is an opportunity for future research to extend the knowledge on how informal and formal controls interact in these types of firms. For example, there is a lack of evidence in incubated start-ups of

how different MCS choices affect the use of informal controls and *vice versa*. Additionally, future work could investigate the potential synergies between financial and non-financial controls in start-ups.

The study is not without limitations. First, this research relied on the recollections of survey respondents. We acknowledge the limitations of such a research approach and suggest that future research should attempt to obtain objective data and triangulations to support the findings, therefore reducing potential concerns about common method, memory, and interpretation biases. This is why we run additional tests, using survival start-ups in t+1 and t+2, to offer validity and robustness to our results. Second, we examine four different MCS. This choice was made after the literature review was completed and after receiving feedback from managers of incubated start-ups. These four MCS seemed to be the most adopted ones; however, it is possible we have not accounted for other specific systems. Future research could aim to understand the consequences of the adoption of other MCS in incubated start-ups. Finally, the sample consists of firms incubated in the Network of Business Incubators of the Spanish Chamber of Commerce. The specific incubators in this network are at a third-generation level (Bruneel et al. 2012). Previous literature on incubators recognises that there is a large degree of heterogeneity in the objectives, stakeholders, types of services, and resources offered by incubators (Soetanto and Jack 2016). Given the specificities of our sample, a generalisation of the results of this study to another type of incubator should be made with caution.

APPENDIX A. Factor analysis of innovation strategies

	Factor 1	Factor 2	Factor 3
Being first to market	**0.780**	0.254	-0.090
New generation capabilities	**0.819**	0.281	0.090
Frequent new product/services	**0.844**	0.171	0.050
Experimenting with products/services	**0.811**	0.315	0.050
Open new markets	**0.672**	0.422	0.075
Low-cost products/services	0.050	0.037	**0.991**
Improving existing services/products	0.324	**0.807**	-0.017
Modifications to existing services/products	0.298	**0.837**	-0.009
Efficiency of existing services/products	0.192	**0.898**	0.145
Economies of scale	0.468	**0.589**	-0.073
Eigenvalue	5.360	1.161	1.022
Variance explained	53.601%	11.613%	10.222%

After removal of "Low-cost products/services" item

	Exploratory innovation strategy	Exploitative innovation strategy
Being first to market	**0.776**	0.256
New generation capabilities	**0.818**	0.290
Frequent new product/services	**0.843**	0.178
Experimenting with products/services	**0.810**	0.322
Open new markets	**0.671**	0.430
Improving existing services/products	0.317	**0.808**
Modifications to existing services/products	0.292	**0.838**
Efficiency of existing services/products	0.188	**0.904**
Economies of scale	0.462	**0.589**
Eigenvalue	5.349	1.161
Variance explained	59.436%	12.900%

Varimax rotation. Bold indicates the loadings of the items that represent the factor.

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Table 1. Sample descriptives

	Mean	S.D.	Range
Start-up size (employees)	2.644	2.921	0-15
Tenancy duration (months)	37.234	22.720	1-77
Sales into business incubator (%)	4.860	9.953	0-60
Purchases into business incubator (%)	4.000	8.646	0-60
Family loans (%)	14.483	27.693	0-100
Exports (number of countries)	1.244	2.400	0-10

Table 2. Descriptive statistics (n = 94)

	Mean	Median	S.D.	Theoretical range	Actual range
Cost control	*3.638*	*4.000*	*2.185*	*0-7*	*0-7*
Formalisation	3.564	4.000	2.456	0-7	0-7
Revision	3.713	4.000	2.345	0-7	0-7
Operating budgets and variances	*2.500*	*2.750*	*2.241*	*0-7*	*0-7*
Formalisation	2.596	2.000	2.402	0-7	0-7
Revision	2.404	2.000	2.269	0-7	0-7
Performance measurement system	*2.500*	*2.250*	*2.302*	*0-7*	*0-7*
Formalisation	2.543	2.500	2.381	0-7	0-7
Revision	2.457	2.000	2.381	0-7	0-7
Value system	*1.979*	*1.000*	*2.158*	*0-7*	*0-7*
Formalisation	2.043	1.000	2.267	0-7	0-7
Revision	1.915	1.000	2.227	0-7	0-7
Exploratory innovation strategy	*4.496*	*4.548*	*1.291*	*1-7*	*1.4-7*
Being first to market	4.516	4.000	1.570	1-7	1-7
New generation capabilities	4.559	5.000	1.499	1-7	1-7
Frequent new product/services	4.097	4.000	1.545	1-7	1-7
Experimenting with products/services	4.674	5.000	1.518	1-7	1-7
Open new markets	4.634	5.000	1.564	1-7	1-7
Exploitative innovation strategy	*4.651*	*4.750*	*1.187*	*1-7*	*1-7*
Improving existing services/products	5.120	5.000	1.294	1-7	1-7
Modifications to existing services/products	4.593	5.000	1.391	1-7	1-7
Efficiency of existing services/products	4.826	5.000	1.419	1-7	1-7
Economies of scale	4.067	4.000	1.494	1-7	1-7
Firm performance	*3.561*	*3.800*	*1.351*	*1-7*	*1-6.6*
Profitability	3.311	3.000	1.267	1-7	1-7
Sales growth of new markets	3.782	4.000	1.555	1-7	1-7
Sales growth of existing markets	3.655	4.000	1.509	1-7	1-7
Market share	3.360	3.360	1.436	1-7	1-7
Overall performance	4.000	4.000	2.740	1-7	1-7
Environmental hostility	*4.315*	*4.333*	*1.199*	*1-7*	*1.7-7*
Intensity of competition	4.815	5.000	1.703	1-7	1-7
Difficulty to obtain inputs	4.220	4.000	1.592	1-7	1-7
Obstacles with public administrations	3.910	4.000	1.847	1-7	1-7
Employees at foundation	1.710	1.000	1.547	-	0-11
Start-up size (employees)	2.644	2.000	2.921	-	0-15
CEO entrepreneurial tenure (years)	4.862	3.000	5.325	-	0-30
CEO/Founder's education	2.894	3.000	0.769	1-5	1-5
Tenancy duration (months)	37.234	32.500	22.720	-	1-77
CEO risk-taking	5.236	5.00	1.448	1-7	2-7
Business networks	2.011	2.000	1.858	0-7	0-7
Previously created firms	0.613	0.000	1.104	-	0-6
Firm social orientation	4.033	4.000	1.493	0-7	0-7
Incubator social programmes	2.415	2.000	1.914	0-7	0-7

Table 3. Factor analysis

	Range of factor loadings	Eigenvalue	Variance extraction	Cronbach's alpha	KMO
Exploratory innovation strategy	0.791-0.879	3.528	0.706	0.895	0.881
Exploitative innovation strategy	0.746-0.893	2.899	0.725	0.873	0.821
Cost control	0.910-0.910	1.658	0.829	0.793	0.500
Operating budgets and variances	0.959-0.959	1.841	0.921	0.913	0.500
Performance measurement systems	0.967-0.967	1.870	0.935	0.930	0.500
Value system	0.960-0.960	1.844	0.922	0.915	0.500
Firm performance	0.633-0.918	3.436	0.687	0.832	0.809
Environmental hostility	0.516-0.842	1.509	0.503	0.575	0.504

Table 4. Correlation matrix

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1. Exploratory innovation strategy	1.000							
2. Exploitative innovation strategy	0.665***	1.000						
3. Financial MCS	0.291***	0.326***	1.000					
4. Non-financial MCS	0.177	0.174	0.681***	1.000				
5. Environmental hostility	0.192	0.232**	0.271***	0.205**	1.000			
6. Employees at foundation	0.087	-0.001	0.005	0.019	0.061	1.000		
7. Start-up size	0.086	-0.002	0.004	0.002	-0.125	0.625***	1.000	
8. CEO entrepreneurial tenure	-0.067	0.038	-0.115	0.023	0.000	0.006	0.086	1.000
9. CEO/Founder's education	-0.121	-0.119	0.150	0.166	0.077	0.052	0.087	0.095
10. Tenancy duration	-0.020	0.133	-0.061	0.044	0.017	0.028	0.090	0.687***
11. CEO risk-taking	0.220**	0.105	0.231*	0.236**	0.073	0.011	0.145	0.145
12. Business networks	0.085	-0.116	0.052	0.090	0.002	-0.088	-0.067	0.036
13. Previously created firms	0.136	0.139	0.133	0.094	0.001	0.169	0.229**	0.264**
14. Firm social orientation	0.305***	0.157	0.132	0.024	0.058	-0.075	-0.007	-0.038
15. Incubator social programs	0.113	0.043	-0.098	-0.044	0.032	-0.058	0.001	0.134
16. Firm performance	0.343***	0.206**	0.063	0.049	-0.043	0.059	0.249**	0.082
	9	**10**	**11**	**12**	**13**	**14**	**15**	**16**
9. CEO/Founder's education	1.000							
10. Tenancy duration	0.069	1.000						
11. CEO risk-taking	0.078	0.053	1.000					
12. Business networks	0.036	-0.121	0.026	1.000				
13. Previously created firms	-0.068	0.232**	0.047	-0.103	1.000			
14. Firm social orientation	-0.046	-0.031	0.0.023	0.257**	0.038	1.000		
15. Incubator social programmes	0.054	0.061	-0.040	0.681***	0.039	0.332***	1.000	
16. Firm performance	-0.004	-0.011	0.039	-0.059	0.053	0.172	-0.082	1.000

Significance shown as *** $p < 0.01$, ** $p < 0.05$

Table 5. Results of linear regressions to test H1a-H1b and H2a-H2b (n = 94)

		Firm performance			
		Coef. (t-value)			
		Stage I	Stage II	Stage III	Stage IV
Main variables					
Financial MCS *x* Exploratory innovation strategy	*H1a*				0.453 (2.242)**
Non-financial MCS *x* Exploitative innovation strategy	*H2a*				0.664 (2.954)***
Financial MCS *x* Exploitative innovation strategy	*H1b*			-0.007 (-0.056)	-0.168 (-1.072)
Non-financial MCS *x* Exploratory innovation strategy	*H2b*			-0.326 (-2.845)**	-0.513 (3.513)***
Financial MCS			-0.067 (-0.416)	-0.154 (-0.960)	0.094 (0.522)
Non-financial MCS			-0.013 (-0.085)	0.112 (0.719)	-0.103 (-0.602)
Exploratory innovation strategy			0.473 (3.193)***	0.517 (3.525)***	0.736 (4.505)***
Exploitative innovation strategy			-0.028 (-0.191)	-0.088 (-0.614)	-0.347 (-2.060)**
Control variables					
Environmental hostility		0.007 (0.069)	-0.037 (-0.355)	-0.058 (-0.580)	-0.143 (-1.432)
Employees at foundation		-0.217 (-1.842)*	-0.269 (-2.428)**	-0.129 (-1.098)	-0.221 (-1.894)*
Start-up size		0.318 (2.806)***	0.348 (3.268)***	0.373 (3.592)***	0.375 (3.757)***
CEO entrepreneurial tenure		0.055 (0.474)	0.140 (1.232)	0.103 (0.940)	0.146 (1.396)
CEO/Founder's education		0.032 (0.305)	0.085 (0.837)	0.099 (1.011)	0.148 (1.560)
Tenancy duration		0.059 (0.491)	0.023 (0.202)	0.034 (0.310)	-0.007 (-0.065)
CEO risk-taking		-0.021 (-0.191)	-0.140 (-1.298)	-0.1090 (-1.805)*	-0.294 (-2.739)
Business networks		-0.012 (-0.079)	-0.050 (-0.338)	-0.053 (-0.368)	-0.078 (-0.553)
Previously created firms		0.153 (1.388)	0.058 (0.551)	0.031 (0.302)	0.059 (0.563)
Firm social orientation		0.166 (1.487)	0.087 (0.809)	0.110 (1.053)	0.118 (1.163)
Incubator social programmes		-0.110 (-0.717)	-0.101(-0.681)	-0.141 (-0.963)	-0.183 (-1.299)
F-test statistic		1.288	2.137**	2.508***	2.913***
R^2		0.154	0.302	0.372	0.442
R^2 adj.		0.034	0.161	0.224	0.290

*** p < 0.01, ** p < 0.05, and * p < 0.10 (one-tailed for hypothesised links, two-tailed otherwise)

Table 6. Surviving firms in *t*+1 and *t*+2. Additional results of linear regressions to test H1a-H1b and H2a-H2b

	Firm performance	
	Coef. (t-value)	
	t+1	*t+2*
Main variables		
Financial MCS *x* Exploratory innovation strategy	0.545 (1.694)**	0.457 (1.447)*
Non-financial MCS *x* Exploitative innovation strategy	0.595 (1.772)**	0.641 (1.996)**
Financial MCS *x* Exploitative innovation strategy	-0.254 (-0.850)	-0.208 (-0.726)
Non-financial MCS *x* Exploratory innovation strategy	-0.610 (-2.295)**	-0.545 (-2.250)**
Financial MCS	0.040 (0.158)	0.074 (0.289)
Non-financial MCS	-0.037 (-0.154)	-0.039 (-0.164)
Exploratory innovation strategy	0.788 (2.830)***	0.768 (2.762)***
Exploitative innovation strategy	-0.360 (-1.115)	-0.437 (-1.520)
Control variables	INCLUDED	INCLUDED
F-test statistic	2.411**	2.092*
R^2	0.427	0.411
R^2 adj.	0.250	0.215

*** p < 0.01, ** p < 0.05, and * p < 0.10 (one-tailed for hypothesised links, two-tailed otherwise)

Figure 1. Slope analysis