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**Firm capabilities, business model design and performance of SMEs.
The moderating role of family involvement**

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Firm capabilities, business model design and performance of SMEs.

Abstract

Purpose – This article investigates the relationships between firm capabilities, business model (BM) design, and firm performance.

Design/methodology/approach – The study provides a quantitative assessment of the proposed model using a sample of 411 small- and medium-sized enterprises. Heckman's sample selection model is employed as an econometric framework.

Findings – The outcomes demonstrate that the adoption of a given BM is endogenous with respect to firm capabilities, different capabilities spur the adoption of different BM, and that different business model designs have variable impacts on firm performance.

Research limitations/implications – Some investigated variables were operationalized using proxies, and firm performance was measured based on a self-assessed scale.

Practical implications – Since different types of capabilities are at the bases of different BM designs that eventually reverberate on firm performance, SMEs should carefully balance their financial resources invested in the development of capabilities.

Originality/value – This study represents one of the first attempts to investigate the relationships between firm capabilities, BM design, and firm performance.

Keywords Firm Capabilities, Business Model Design, Firm Performance, SMEs

Paper type Research paper

1. Introduction

The ultimate dependent variable in strategic management studies is firm performance. In the broad field of strategy literature, two major theoretical frameworks have characterized economic approaches to strategy research (Doh, 2007): The Industrial Organization – I/O perspective (Porter, 1980; Rumelt, 1991) and the Resource-based

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9 view – RBV (Barney, 1991; Wernerfelt, 1984). While the first theory recognizes that
10 environmental conditions are the main determinants of firm performance, the latter
11 identifies the firm's internal characteristics to be the major performance antecedents.

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13 The impact of market structure on firm performance has been the focus of considerable
14 debate in the strategy research field (e.g., Galunic and Eisenhardt, 1994; McGahan and
15 Porter, 1997; Porter and Siggelkow, 2008). The so-called Industrial Organization
16 theory, usually associated with Porter (1980), claims that firms' attainment of superior
17 performance is mostly attributable to favorable industry structure. Given that
18 strategically relevant resources are homogeneously distributed among enterprises and
19 that resources are mobile in markets, disparities in firm performance can be
20 substantially explained by and based upon the forces that shape the competitive
21 environment in which they operate (Porter, 1981). According to this view, the way
22 firms fit into the sector structure is the real and major source of firms' competitive
23 advantage (Porter, 1985).

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25 Differently, the two pillars of the RBV are resource heterogeneity and immobility
26 (Barney, 1991). First, far from boasting the same resource endowment, firms are
27 assumed to possess different bundles of strategically relevant assets, knowledge,
28 attributes, and organizational processes. Thanks to such heterogeneity, some firms are
29 able to outperform others (Barney and Arkan, 2001; Wernerfelt, 1984). Second,
30 resources are imperfectly mobile. This condition allows for heterogeneity to persist over
31 time, enabling some firms to achieve a sustained competitive advantage (Barney, 1995).
32 Resource value, rarity, inimitability, and non-substitutability are claimed to be the key
33 requirements that resources have to possess in order to really determine a firm's
34 sustainable superior performance (Barney, 1991).

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36 According to some authors (e.g., Grant, 1991), capabilities constitute a "*special type*" of
37 resource. These special resources are embedded in the organization, firm specific, and
38 hardly transferrable. Their aim is to increase the productivity of the other resources
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9 controlled by the firm (Makadok, 2001); they therefore play a major role in the
10 achievement of a durable competitive advantage.

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12 In addition to capabilities, multiple further internal elements have been considered to
13 explain and predict firm performance, such as entrepreneurial orientation (Wiklund and
14 Shepherd, 2005; Wright and Stigliani, 2013), strategic planning (Shea-Van Fossen *et*
15 *al.*, 2006), innovation (Salavou, 2002), as well as business model (Zott and Amit, 2008).
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17 Though interesting, the link between this last element and firm performance is still an
18 underdeveloped field of research. Given that the business model is claimed to be a
19 manifestation of the firm's adopted strategy (Casadesus-Masanell and Ricart, 2010) and
20 that the business model shows how the firm creates and captures value (Brink and
21 Holmén, 2009), the link between the business model and firm performance seems yet to
22 be undeniable (Zott and Amit, 2007). However, despite the unquestionable theoretical
23 and managerial relevance of the topic, few empirical studies have investigated how the
24 adoption of a certain BM reflects firm performance; that is, if and to what extent
25 different BM configurations can be at the basis of firm performance disparities
26 (Lambert and Davidson, 2013; Sanio *et al.*, 2011). A further, underdeveloped BM-
27 related topic concerns the antecedents of the business model. Particularly scarce are
28 contributions, both theoretical and empirical, that explore the role that organization
29 internal factors play in explaining why a firm adopts a specific BM and, particularly, if
30 and to what extent the capabilities embedded in the organization influence the choice of
31 a given BM (Pucci, 2015).

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33 Based on these premises, the aim of this study to answer the following research
34 question: Is there a relationship between firm capabilities, the adoption of a specific
35 BM, and firm performance?

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37 The herein research is based on a survey conducted between 2013 and 2015 on a sample
38 of 411 Italian SMEs located in Tuscany.

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9 The paper is organized as follows. Section 2 presents our theory, research hypotheses,
10 and the proposed conceptual model. Section 3 illustrates the research design used to
11 empirically test the hypotheses. Section 4 describes the results of the study. Finally,
12 conclusions and theoretical and managerial implications are discussed and limitations of
13 the study, as well as suggestions for further research are provided.
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18 **2. Theory and hypotheses development**

19 *2.1 Firm performance*

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21 Performance is one of the most important constructs in the strategic management field
22 (Rumelt *et al.*, 1994). Despite its relevance, however, there still is a lively scientific
23 debate about performance conceptualization, dimensionality, and measurement (Franco-
24 Santos *et al.*, 2007). Since the seminal work of Venkatraman and Ramanujam (1986),
25 firm performance has been recognized as being a multidimensional construct (Kaplan
26 and Norton, 1996; Morgan and Strong, 2003; Simpson *et al.*, 2012), including the firm
27 financial and business (operational) performance, as well as its organizational
28 effectiveness (absence of internal faults, implementation of legitimate activities,
29 resource attainment, and achievement of established objectives). Based on the
30 stakeholder theory, firm performance also includes other facets, such as profitability,
31 market value, growth, customer and employee satisfaction, as well as social and
32 environmental responsibility (Santos and Brito, 2012). While acknowledging its
33 multidimensionality, numerous researches measure firm performance using single
34 indicators and representing the construct as unidimensional. The measurement of firm
35 performance is indeed one of the most critical aspects in strategic management research
36 (e.g. Carton and Hofer, 2006; Combs *et al.*, 2005; Richard *et al.*, 2009), especially in
37 relation to SMEs (Jarvis *et al.*, 2000; Wood, 2006).
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50 Whereas there is widespread consensus among academics that objective measures of
51 performance are preferable to subjective measures based on manager self-assessed
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9 judgements (Beal, 2000), objective indicators on the performance of small- and
10 medium-sized enterprises are hard to collect. Most SMEs are in fact privately-owned
11 and are not legally required to publish their financial results (Khan, 2014). Even when
12 available, accounting data of SMEs may be biased due to the lack of an appropriate
13 auditing system. Furthermore, owners are usually unwilling to reveal their business
14 financial data voluntarily to outsiders (Gibcus and Kemp, 2003). Lastly, entrepreneurs
15 may have goals other than profitability, such as independence, growth or firm
16 continuation (Meijaard *et al.*, 2002; Peacock, 2004). This is why numerous studies
17 adopt subjective, perception-based indicators in order to measure the
18 multidimensionality of the performance construct. To provide just a few examples, we
19 elicit: Owners' assessment of firm performance compared to major competitors in terms
20 of profitability, return of investment and financial goals (Morgan *et al.*, 2009; Ren *et al.*,
21 2015; Sok *et al.*, 2013); senior managers' assessment of firm performance (in the last 3
22 years), when compared to the average competitors of the sector, in terms of growth,
23 profitability, market value, customer and employees' satisfaction, and social and
24 environmental responsibility (Santos and Brito, 2012); owners' appraisal of market
25 share, sales growth, customer satisfaction, return on investment, customer retention, and
26 competitive position (Morgan and Strong, 2003).

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Compliant with the stream of literature that deals with SMEs performance measurement
(Khan, 2014), also in this study, firm performance is assessed through perception-based
measures related to the firm's overall performance in terms of achievement of stated
objectives, and compared to main competitors and industry performance (De Luca *et al.*, 2010).

2.2 Firm capabilities and performance

According to the resource-based view (Barney 1991; Wernerfelt 1984), the competitive
advantage of firms resides in the exploitation of a bundle of resources that are valuable,

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9 rare, hardly imitable, and durable (Nath *et al.*, 2010; Ren *et al.*, 2015). The capabilities
10 perspective argues instead that it is the capabilities, more than the resources, which
11 allow the deployment and enhancement of resources enabling some firms to outperform
12 others (Grant, 1996; Teece *et al.*, 1997). Capabilities represent a distinct type of
13 resources, embedded in the organization, whose function is to increase the productivity
14 of other resources that are at a firm's disposal (Makadok, 2001). Differently from
15 "ordinary" resources, capabilities represent the capacity of a firm to deploy its
16 possessed assets and to enhance their potential, eventually increasing firm profitability
17 (Mahoney, 1995). A firm's achievement of superior performance then, does not reside
18 only in the possession of strategically relevant resources but also, and mostly, in a
19 firm's ability to organize, combine, and configure these resources such that their
20 exploitation leads to a firm's desired end (Serhan *et al.*, 2015). Capabilities are deeply
21 rooted in organizational processes and routines that are hard to replicate in different
22 organizational contexts (Nelson and Winter, 1982), resulting in "isolating mechanisms"
23 that prevent competitors from imitation (King, 2007; Rice *et al.*, 2015). Hence,
24 capability embeddedness gives rise to barriers to imitation, enabling firms to achieve
25 and maintain a sustainable competitive advantage over rivals (Grewal and Slotegraaf,
26 2007).

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38 In SMEs, certain capabilities have been found to positively impact firm performance.
39 R&D, innovation, and marketing capabilities greatly contribute to firms'
40 competitiveness (Golovko and Valentini, 2011; Tsai & Eisingerich, 2010), improving
41 their financial performance and their ability to internationalize (Jones and Coviello,
42 2005; Nath *et al.*, 2010). The combined effect of innovation, marketing and learning
43 capabilities, as well as their complementary effect are claimed to be key for firms in
44 their efforts to achieve superior performance (Sok *et al.*, 2013). Learning capability can
45 enhance the ability of small and medium enterprises to recognize and respond to market
46 challenges better and faster than competitors, and strengthen their capacity to develop
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9 new products (Prieto and Revilla, 2006), eventually enabling the achievement of
10 superior performance. Learning capability also facilitates the identification of new
11 strategies and novel ways to cooperate with customers supporting firms in the execution
12 of differentiation strategies (Sok and O’Cass, 2011). Technology capabilities allow
13 SMEs to develop and exploit different technologies and effectively respond to the fast
14 changing technological ecosystem (Afuah, 2002). Finally, information technology
15 capabilities facilitate the diffusion of technical and market information in the
16 organization (Di Benedetto *et al.*, 2008), and increase the strategic flexibility of firms,
17 positively contributing to their competitiveness (Hao and Song, 2016).
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22 Based on these premises, our first research hypothesis is:
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27 *H1. Firm capabilities positively influence firm performance.*
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30 *2.3 Business model and firm performance*

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32 Despite the multiple definitions of BM provided in existent literature, it can be
33 generally outlined that “*Business model results from the systemic combination of the*
34 *strategic, organizational, and technological activities of a firm, how these shape the*
35 *relationships that the firm develops with its external environment, and the related*
36 *underlying financial structure, enabling the understanding of how a firm is capable to*
37 *create or capture value*” (Pucci *et al.*, 2013b, p. 29). In the last few years, business
38 models have been the focus of an extensive debate involving several scholars of
39 business management, as demonstrated by a few recent literature reviews (e.g., Zott *et*
40 *al.*, 2011; Wells *et al.*, 2015). However, despite the “*scientific popularity*” of the BM
41 concept, related theories and streams of research are still subject to severe criticism,
42 impeding the full development of the academic discourse on this theme (Klang *et al.*,
43 2014). The BM-related issues that still need to be addressed include the processes
44 enabling the development of a BM and its execution over time, how BMs can be
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9 mapped, which characteristics make some business models more effective than others,
10 how certain types of BM hinder, or conversely, enhance innovation, and if and to what
11 extent BM and strategy overlap (Amit and Zott, 2001; Mitchell and Coles, 2004;
12 Osterwalder *et al.*, 2005; Seddon *et al.*, 2004; Balboni and Bortoluzzi, 2016). A recent
13 article providing a review of empirical BM research completed between 1996 and 2010
14 (Lambert and Davidson, 2013) reveals the existence of three dominant research streams:
15 the first analyzes the BM as a discriminating factor for firm classification, the second
16 investigates the relationship between BM and firm performance, and the third examines
17 BM innovation.

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23 Up-to-date scientific contributions (e.g. Brettel *et al.*, 2012) point out the need to clarify
24 some business model-related issues and their linkages to firm performance in order to
25 build a strong and reliable theory on the relationship between such constructs. First, the
26 definition of BM needs to enable measurement of performance implications based on
27 the advantage provided by business model design, given that some researches aim to
28 shed light on the performance implications of the adoption and implementation of
29 different business models. Second, the business model construct needs to include a
30 sharp definition of quantifiable design features that allow investigators to analyze
31 differences of dissimilar BMs. Third, the business model concept should maintain
32 validity across industries. Fourth, a theoretical basis is required to derive and
33 empirically verify hypotheses according to high scholarly standards.

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42 Taking into account these calls for further investigation, while it is apparent that there is
43 a large body of literature claiming that BM can be a source of competitive advantage
44 (Markides and Charitou, 2004) and therefore affect firm performance (e.g., Afuah and
45 Tucci, 2001; Aspara *et al.*, 2010; Patzelt *et al.*, 2008; Zott and Amit, 2007; Zott and
46 Amit, 2008), we acknowledge that the contributions that combine the investigation of
47 the BM as the basis for firm classification *and* how this affects enterprise performance,
48 or, in other words, the influence that different types of business models exert on firm
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9 performance, are few (e.g., DeYoung, 2005; Ordanini *et al.*, 2004; Zott and Amit,
10 2008). There is evidence, instead, as argued by Brettel *et al.* (2012), that firm
11 performance relates to the share of value appropriated by a firm that has adopted a
12 specific business model. Such a theme is then worth investigating in the attempt to
13 contribute to the current theoretical debate on the business model and its linkage to firm
14 performance, as well as to provide entrepreneurs with valuable recommendations to
15 increase their firm competitiveness. Our second research hypothesis is:
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22 *H2.* Different BMs have different impacts on firm performance.
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25 *2.3 Firm capabilities and BM*

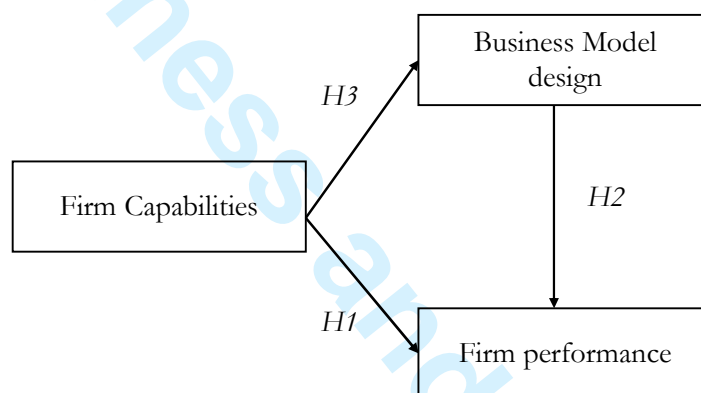
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27 Existing research on the determining factors of firms' business model adoption has
28 tended to focus on external factors, such as stakeholder activities, industry
29 characteristics, regulations, and environmental constraints (Amit and Zott, 2015; Demil
30 and Leqoc, 2010; Tankhiwale, 2009; Zott and Amit, 2013). However, while external
31 factors are important, they do not fully explain either the adoption of specific types of
32 business models, or their diversity. Enterprises, in fact, adopt similar business models
33 regardless of firm dimension or industry, while firms operating in the same sector may
34 adopt radically different business models (Rumble and Mangematin, 2015). Firm
35 internal factors, therefore, do play a major role in shaping the adopted business model.
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37 Among the most frequently investigated BM internal antecedents there are: the firm
38 organizational structure, leadership, cost and revenue structure, and managerial
39 characteristics (Frankenberger *et al.*, 2014). Within this research field, the relationship
40 between firm capabilities and BM design has been seldom investigated in literature. It
41 has however been claimed that the specific configuration of a business model is
42 grounded in distinctive competences and resources (Morris *et al.*, 2005) that enable the
43 effective and efficient attainment of value creation, provision, and capture (Amit and
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9 Zott, 2001; Venkatraman and Henderson, 1998). In particular, value creation, delivery
10 and capture are claimed to be realized through the exploitation of the firm human,
11 physical and capital resources (Zott and Amit, 2010), which represent the underlying
12 structure of an adopted business model. In the literature, firm resources and capabilities
13 have been more often investigated with relation to business model innovation (e.g.
14 Cucculelli and Bettinelli, 2015; Mezger, 2014), that is the adaptation of an existing
15 business model or the development of a new business model on the part of established
16 firms in the attempt to remain competitive and outperform rivals (Schneider and Spieth,
17 2013). BM reconfiguration is said to depend on the firm ability to select and integrate
18 new and valuable resources and competences, as well as to adapt the organizational
19 structure and activities necessary for execution of the renewed business model (George
20 and Bock, 2011). However, these studies tend to provide outcomes that are essentially
21 descriptive and of an anecdotal type, given that researches are mostly driven by
22 renowned examples from practice (concerning large companies, such as Ryanair and
23 Walmart) (Hock *et al.*, 2016), and make extensive use of qualitative, case-based
24 investigation methodologies (Casadesus-Masanell and Ricart, 2010). Finally, studies on
25 BM and capabilities usually focus on single sectors, characterized by a homogeneous
26 technological level, ignoring that industry-specific circumstances may have a significant
27 impact on their findings (Mezger, 2014). Based on this evidence, we acknowledge that
28 the relationship between business model and firm capabilities represents a valuable
29 topic to investigate, also in occurrences other than BM innovation. Furthermore, taking
30 into consideration the weaknesses of most BM research (industry-specific and
31 qualitative in nature), we quantitatively assess the relationship between firm capabilities
32 and type of adopted BM, also accounting for the possible influence exerted by the sector
33 the firm belongs to. Thus, our third research hypothesis is:
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9 *H3*. The possession of different capabilities is associated with the adoption of different
10 BMs.
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14 The hypothesized conceptual model is represented in Figure 1.
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20 *Figure 1: The conceptual model*
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It is noted that the proposed conceptual model does not address the issue of complementarity among the firm's internal factors (capabilities); however, these are taken into account in the model to handle the problem of endogeneity that characterizes the adoption of a specific BM. Intuitively, in fact, only firms with a certain capability endowment are expected to adopt one BM over another.

3. Research design

3.1 The sample and data collection

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9 Data for this study were collected from a database created by the authors through a
10 survey conducted in the years 2013-2015. The database provides the structural,
11 strategic, and performance data of 411 Italian SMEs (i.e., with less than 250
12 employees), located in Tuscany. Firms were grouped together based on their
13 technological intensity, which is the level of R&D investment by the industry to which
14 they belong (OECD, 2011). The decision to stratify the sample by means of
15 technological intensity aims to counteract possible industry-specific biases in the
16 adoption of a particular BM. Eighty firms belong to high-tech industries
17 (pharmaceuticals, biotech, etc.), 110 to medium-high-tech (chemicals, machinery and
18 equipment, etc.), 109 to medium-low-tech (basic metals and fabricated metal products,
19 plastic products, etc.), and 112 to low-tech (textiles, food, beverages, etc.). In line with
20 previous studies (Song *et al.*, 2005) and to allow accurate comparisons across firms,
21 industries, sector conditions, and environments, firm performance and BM choice were
22 measured using perceived scales. Consistent with previous studies (e.g. Santos and
23 Brito, 2012; Zattoni *et al.*, 2015), entrepreneurs were considered the best possible key
24 informants because they are knowledgeable about the structure, the capabilities, and the
25 performance of their own firm. The self-report method is commonly used in
26 management- and strategy-related studies (e.g., Morgan and Strong, 2003; Morgan *et*
27 *al.*, 2009; Protogerou *et al.*, 2011; Ren *et al.*, 2015; Sok *et al.*, 2013), especially when
28 the investigated variables are hard to measure and data are either not available or do not
29 enable reliable comparisons between sectors and/or firms (Tippins and Sohi, 2003),
30 such as in the case of small and medium enterprises (Sapienza *et al.*, 1988; Song *et al.*,
31 2005). Furthermore, subjective measures enable the appraisal of non-financial criteria
32 (Richard *et al.*, 2009) and have been recognized to be positively related to objective
33 parameters (e.g. Dawes, 1999; Wall *et al.*, 2004).
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9 *Dependent variable: Firm performance.*

10 The herein research employs perceived measures to assess performance using a multi-
11 item construct already validated by literature (De Luca *et al.*, 2010). The variable was
12 operationalized using a three-item, five-point Likert scale anchored 1 = not at all and 5
13 = to an extreme extent, evaluating the interviewees' self-assessment of the firm's
14 overall performance over the last three years, with respect to planned objectives, main
15 competitors, and sector performance. The reliability test conducted on the scale
16 provides satisfactory results (Cronbach's alpha = 0.88; Average Variance Extracted
17 (AVE) = 0,80).
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25 *Independent variables: Firm capabilities.*

26 The main effects of the model are represented by firm absorptive capability (*Ab. Cap.*),
27 marketing capability (*Market. Cap.*), relational capability (*Rel.*), and managerial
28 capability (*Manag. Cap.*). Absorptive capability is the ability, developed by the firm
29 over time, "to recognize the value of new, external knowledge, assimilate it, and apply it
30 to commercial ends" (Cohen and Levinthal, 1990, p. 128). Marketing capability
31 concerns the exploitation of the firm's resources to detect market needs, allow product
32 differentiation, develop customer cooperation (Prahalad and Ramaswamy, 2000), and
33 enable the achievement of superior financial performance (Nath *et al.*, 2010). Both
34 constructs were operationalized following what is generally accepted in literature (Ren
35 *et al.*, 2015). Specifically, absorptive capability was measured using the share of a
36 firm's sales invested in R&D (cf Cohen and Levinthal, 1989), whereas marketing
37 capability was measured by using a firm's marketing expenditure (cf Pucci *et al.*,
38 2013a). Relational capability was operationalized through two variables based on the
39 scope of the relationships that firms build with external organizations (Santoni and
40 Zanni, 2011): the number of external relationships aimed at developing innovation and
41 learning (*Inn. Rel.*), and the number of strategic relationships of an operational type
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9 (Op. Rel.). Managerial capability was measured using a multi-item construct validated
10 by literature (Hooley *et al.*, 2005). The construct was operationalized using a three-item,
11 five-point Likert scale anchored 1 = not at all and 5 = to an extreme extent, evaluating
12 the interviewees' self-assessment of the firm's ability to effectively manage its financial
13 aspects, human resources, and operations. Additionally, in this case, the reliability test
14 conducted on the scale provides satisfactory results (Cronbach's alpha = 0.87; Average
15 Variance Extracted (AVE) = 0,70).
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22 *Selection variable: Business Model.*

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24 The types of BM examined in this paper are based on the theoretical framework
25 proposed by Pucci *et al.* (2013b) and Casprini *et al.* (2014). The authors identify three
26 ideal-types of BM: business models focused on developing innovations and new
27 products (NPD-BM); business models focused on the search for operational efficiency,
28 the development of new production processes, and the pursuit of effective/efficient use
29 of resources and supply chains (OP-BM); and business models focused on the creation
30 of new markets, the development of new transaction systems in existing markets, and
31 the development and innovation of distribution networks (MM-BM). Accordingly, the
32 BM self-selection variable is a multinomial variable, coded "1" when the BM is of an
33 NPD type, coded "2" when it is of an OP type, and coded "3" when it is of an MM type
34 (Casprini *et al.*, 2014; Pucci *et al.*, 2013b). Each entrepreneur interviewed was asked to
35 self-assess the adopted BM by choosing among these models after being appropriately
36 informed about the characteristics of each type. Control questions were asked in order
37 to ascertain that the characteristics of the models and the differences between them had
38 been clearly understood.
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49 From a theoretical point of view, it is not excluded that some firms may adopt business
50 models that display characteristics of more than one of the considered BM ideal-types,
51 as already conjectured by the authors of the model used (Casprini *et al.*, 2014; Casprini
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et al., 2016). However, the present research aims to examine the *main* way adopted by interviewed firms to create value. This is why respondents were asked to make a decision specifying which was their foremost way of creating value, that is the foremost adopted business model type.

Table 1 shows the cross-tabulation between self-selected BM and firm technological intensity.

It is noted that the different BM types can be found in every firm category, regardless of technological intensity, confirming that the type of BM adopted is not industry-specific (Rumble and Mangematin, 2015). However, as one could expect, high- and medium-high-tech firms seem to choose the NPD type of BM more frequently, whereas low- and medium-low-tech firms seem to opt for the OP or MM type BM more often.

Table 1: BM/Firm technological intensity tabulation

BM	Tech. Int.				<i>Total</i>
	H	MH	ML	L	
NPD	30	63	32	15	<i>140</i>
OP	33	33	44	50	<i>160</i>
MM	17	14	33	47	<i>111</i>
<i>Total</i>	<i>80</i>	<i>110</i>	<i>109</i>	<i>112</i>	<i>411</i>

Control variables: Size and age.

We checked for two variables that may affect the firm's decision to adopt a specific business model, namely firm size (*Size*) and age (*Age*). Previous research, in fact, has already noted that both of these factors may influence the firm's BM design (Pucci *et al.*, 2013a). To account for these effects, we controlled firm size, measured as the natural logarithm of a firm's number of employees (*Size (Log)*), and age, measured as the natural logarithm of years from foundation (*Age (Log)*).

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9 Table 2 shows measures description and properties. Table 3 shows the descriptive
10 statistics and correlations between investigated variables. The variance inflection factor
11 (VIF) was run to test for multicollinearity between the variables. The VIF equal to 1.29
12 is acceptable and well below the cut-off value of 10.0 recommended by the literature
13 (Kutner *et al.*, 2004).
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Table 2: Measures Description and Properties

Measure	Item Description*	Sources
Business Model selection* (three dichotomous variables)	NPD-BM: business models focused on developing innovations and new products; OP-BM: business models focused on the search for operational efficiency, development of new production processes, and pursuit of effective/efficient use of resources and supply chains; MM_BM: business models focused on the creation of new markets, development of new transaction systems in existing markets, and development and innovation of distribution networks.	Adapted from: Pucci <i>et al.</i> , 2013b; Casprini <i>et al.</i> , 2014
Performance (five-point likert scale) $\alpha = 0.88$ AVE = 0.80	<i>Please rate your firm's overall performance in the last three years with respect to</i> 1. Stated objectives 2. Main competitors' performance 3. Industry performance	De Luca <i>et al.</i> , 2010
Managerial Cap. (five-point likert scale) $\alpha = 0.87$ AVE = 0.70	<i>To what extent do the following statements apply to your organization?</i> 1. Strong financial management capabilities 2. Effective human resources management 3. Good operation management expertise	Hooley <i>et al.</i> , 2005
Absorptive Cap.	(R&D expenditures/Total sales) X 100	cf Cohen and Levinthal, 1989
Marketing Cap.	(Marketing expenditures / Total sales) X 100	cf Pucci <i>et al.</i> , 2013a
Relational Cap. Innovation Rel.	Number of external relationships aimed at developing innovation and learning	Santoni and Zanni, 2011
Relational Cap. Operational Rel.	Number of strategic relationships of an operational type	Santoni and Zanni, 2011
Size	Natural logarithm of the firm's number of employees	cf Pucci <i>et al.</i> , 2013a
Age	Natural logarithm of years from foundation	cf Pucci <i>et al.</i> , 2013a

Note: * In the selection equation it is treated as a single multinomial variable, coded "1" when the BM is of an NPD type, coded "2" when it is of an OP type, and coded "3" when it is of an MM type.

Table 3: Descriptive statistics and correlations

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
[1] Firm Perfor.	1,00										
[2] BM (1 – NPD)	-0,11	1,00									
[3] BM (2 – OP)	0,02	-0,57	1,00								
[4] BM (3 – MM)	0,09	-0,44	-0,49	1,00							
[5] Size (Log)	0,21	-0,12	-0,07	0,21	1,00						
[6] Age (Log)	0,11	-0,26	0,07	0,20	0,47	1,00					
[7] Ab. Cap.	-0,03	0,35	-0,15	-0,20	-0,20	-0,30	1,00				
[8] Market. Cap.	0,05	-0,10	-0,12	0,24	0,03	-0,02	0,02	1,00			
[9] Inn. Rel.	0,04	0,29	-0,15	-0,14	0,00	-0,10	0,28	-0,01	1,00		
[10] Op. Rel.	0,11	0,14	0,00	-0,14	-0,07	-0,13	0,18	-0,05	0,62	1,00	
[11] Manag. Cap.	0,45	-0,12	-0,04	0,17	0,08	0,08	-0,13	0,02	-0,01	0,01	1,00
Mean	3,27	0,34	0,39	0,27	2,28	2,93	10,03	6,18	8,76	9,88	3,60
St. Dev.	0,86	0,47	0,49	0,45	1,36	0,96	20,08	9,72	23,19	17,97	0,85
Min	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,00
Max	5,00	1,00	1,00	1,00	5,60	4,94	95,00	83,00	310,00	206,00	5,00

N = 411. Correlation coefficients greater than 0.10 in absolute value are statistically significant at 95%.

3.3 Statistical methodology

The conceptual problem addressed in the herein study is to identify the influence that firm capabilities have on the adoption of a specific BM and, at a second stage, the effect that BM has on firm performance. To cope with such a problem, the econometric model of Heckman's sample selection is employed (Heckman, 1979). The model, extensively used in the field of social science research (Winship and Mare, 1992; McCann and Vroom, 2015; Whittaker *et al.*, 2016), assumes that a set of covariates—firm capabilities, in our case—influences the presence of an intermediate variable, labeled selection variable (*treatment*)—the business model—and that together, covariates and the selection variable influence the dependent variable (i.e., firm performance). Two equations are estimated. The first equation regresses the BM type of a firm against the set of possessed capabilities:

$$BM = \alpha + \beta_1 Ab. Cap. + \beta_2 Market Cap. + \beta_3 Inn. Rel. + \beta_4 Op. Rel. + \beta_5 Manag. Cap. + \beta_6 Size (log) + \beta_7 Age (log) + u$$

This first stage of the procedure is a *multinomial logit* analysis that predicts the choice of one of the three investigated BM typologies. Estimated probabilities of choosing a given business model are used to generate the *inverse Mills ratio (or inverse probability)*, which is then included as an additional explanatory variable in the second equation to adjust the estimates for possible self-selection bias.

The second equation estimates the influence of BM on the firm's performance.

$$Performance = \alpha + \beta_1 Ab. Cap. + \beta_2 Market Cap. + \beta_3 Inn. Rel. + \beta_4 Op. Rel. + \beta_5 Manag. Cap. + \beta_6 Size (log) + \beta_7 Age (log) + \beta_8 \text{ mills ratio} + u$$

4. Results

The results of the first equation are provided in Table 4. *Pseudo-R²* equal to 0.20 is considered highly satisfactory (McFadden, 1979), indicating a good model fit. The outcomes demonstrate that the adoption of a given BM is endogenous with respect to firm capabilities, thus confirming hypothesis 3. Furthermore, the results confirm the necessity to take account of the self-selection bias with respect to the adopted BM in the estimation procedure. Firms with higher absorptive capabilities ($b = 0.023$) and wider innovation networks ($b = 0.123$) tend to adopt BM of an NPD type, while businesses with superior marketing capabilities ($b = 0.055$) and management capability ($b = 0.402$) opt for BM of an MM type. The latter typology of BM is also positively associated with firms of a larger size ($b = 0.298$), whereas BMs of an NPD type are more likely adopted by younger firms ($b = -0.403$).

Table 4: Switching regression model - first stage

Dependent variable: Business Model choice		
Multinomial logit estimation		
Baseline: "OP BM"		
	NPD BM	MM BM
Size (Log)	0,044 (0,116)	0,298*** (0,115)
Age (Log)	-0,403*** (0,155)	0,042 (0,167)
Ab. Cap.	0,023*** (0,008)	-0,018 (0,015)
Market. Cap.	-0,040* (0,022)	0,055*** (0,016)
Inn. Rel.	0,123*** (0,021)	-0,033 (0,029)
Op. Rel.	-0,025** (0,010)	-0,028 (0,018)
Manag. Cap.	-0,096 (0,160)	0,402** (0,165)
Constant	0,500 (0,745)	-2,676*** (0,838)
N	411	
Wald χ^2	186,73	
Prob. χ^2	0,00	
Pseudo R^2	0,201	

Standard errors in parentheses

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.001$

The goodness-of-fit statistics R^2 (ranging from 0.28 to 0.50) and $Adj. R^2$ (ranging from 0.23 to 0.46) indicate a good model fit for all investigated BM typologies. Typically, values greater than 0.20 (with a statistical *power* of 0.80) with sample size higher than 100 and 10 independent variables are considered acceptable by literature (Hair *et al.*, 2009).

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9 The most robust results involve the relationship between a firm's managerial
10 capabilities and its performance (Table 5). Regardless of the type of BM adopted,
11 managerial capabilities have a positive and significant effect on performance (NPD – b
12 = 0.344; OP – b = 0.673; MM – b = 0.238). Relational capabilities of an operational
13 type have a positive impact on the performance of firms characterized by an MM type
14 of business model, while relational capabilities aimed at innovation and absorptive
15 capability are positively associated in firms adopting an OP business model. These
16 results confirm hypothesis 1. Finally, firm size positively affects the performance of
17 firms that execute a business model of either an NPD (b = 0.218) or an OP type (b =
18 0.144).
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25 The statistical significance of the slope of the inverse Mills ratio of the OP-type of
26 business model reveals the problem of performance endogeneity with respect to BM
27 typologies, thus confirming hypothesis 2. Specifically, the slope of the *inverse Mills*
28 *ratio* (2) (b = -2.009) indicates that the adoption of a specific BM exerts a direct,
29 negative, and statistically significant effect over performance only in the case that the
30 adopted BM is of an OP type. This means that the unobserved factors that prompt firms
31 to adopt an OP type of business model tend to be associated with poorer performance.
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Table 5: Switching regression model - second stage

Dependent variable: Firm Performance

	NPD BM	OP BM	MM BM
Size (Log)	0,215*** (0,057)	0,157*** (0,059)	0,080 (0,086)
Age (Log)	-0,079 (0,092)	-0,029 (0,075)	0,036 (0,090)
Ab. Cap.	0,004 (0,003)	0,009* (0,005)	-0,011 (0,010)
Market. Cap.	0,010 (0,012)	0,011 (0,009)	0,006 (0,011)
Inn. Rel.	-0,000 (0,007)	0,058*** (0,020)	0,005 (0,027)
Op. Rel.	0,002 (0,006)	-0,006 (0,006)	0,034** (0,011)
Manag. Cap.	0,344*** (0,081)	0,747*** (0,078)	0,268** (0,134)
Mills ratio (1)	-0,339 (0,287)		
Mills ratio (2)		-1,804*** (0,559)	
Mills ratio (3)			-0,096 (0,586)
Constant	1,818*** (0,389)	1,703*** (0,417)	1,893 (1,303)
N	140	160	111
R ²	0,252	0,438	0,287
Adj. R ²	0,205	0,408	0,231

Standard errors in parentheses

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.001$

5. Discussion, implications and conclusions

This study represents one of the first attempts to investigate the relationships between firm capabilities, BM design, and firm performance. Quantitatively assessing such relationships and accounting for the possible influence of industry-specific circumstances, the study also overcomes two flaws recognized as pertaining to BM research by the literature (Casadesus-Masanell and Ricart, 2010; Hock *et al.*, 2016; Mezger, 2014).

The results show that BM represents an intermediate variable between firm capabilities and firm performance. These outcomes corroborate what was recently argued by Morris *et al.* (2013), that performance disparities between firms are largely due to business model design (DeYoung, 2005; Ordanini *et al.*, 2004; Zott and Amit, 2008) and eventually to the development of internal capabilities that enable that specific business model execution (Zott and Amit, 2010).

The econometric evidence shows that the adoption of a particular BM is positively associated with the firm's possession of some distinctive capabilities. With reference to firm performance, the results show that the possession of greater managerial capabilities is a key element, regardless of the type of BM adopted. Such a result confirms what recently restated by Helfat and Martin (2015) who provide evidence of systematic managerial impact on firm performance in both new ventures and established firms.

Learning-oriented capabilities have been found determinant for the performance of firms adopting business models focused on new product development. Such an outcome is compliant with previous research (Prieto and Revilla, 2006; Sok and O'Cass, 2011) proving that learning capability can enhance SMEs' capacity to detect and cope with market challenges better, faster, and at lower costs than competitors, as well as strengthens firms' ability to develop new products. The relevance of learning capabilities for SMEs adopting NPD-type of business model can be explained by the

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9 high rivalry of environments in which they compete, where products can be easily and
10 quickly imitated. In these cases, as witnessed by previous researches (e.g. Chaston *et*
11 *al.*, 2001), the only effective source of competitiveness is to foster the firm's capability
12 to systematically attain new knowledge and favor the development and launch of new
13 products and services.
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16 Marketing capabilities, instead, are key factors for firms adopting BM focused on the
17 development of new markets, new transaction methods, and distribution networks.
18 Marketing capabilities refer in fact to the processes in which firms exploit tangible and
19 intangible resources to recognize market requirements, allow product differentiation,
20 and increase customer cooperation (Prahalad and Ramaswamy, 2000). The
21 identification of novel market opportunities, both domestically and internationally, may
22 help firms compete in the worldwide market space (Jones and Coviello, 2005). Based
23 on these results, marketing capabilities are confirmed to be related to the capacity of
24 firms to create and strengthen in time the relationships with operators along the
25 downward activities of the value chain.
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29 Interestingly, in models of type OP (and not in NPD types, as one could assume), it is
30 the capabilities more closely connected to learning and R&D activities that positively
31 affect firm performance. Such a result can perhaps be explained by the fact that in BMs
32 of an OP type, it is the capability to develop new production processes or new materials
33 (process innovation) that actually increases the efficiency of firm operations, eventually
34 improving firm performance. Finally, as one may expect, the firm's relational
35 capabilities of the operative type positively affect the performance of enterprises
36 adopting the MM business model. In such cases, the management of multiple
37 geographic markets, wider sales networks, and distribution channels requires the firm to
38 establish bonds and alliances with a plurality of strategic actors. Confirming what has
39 been recently found in the literature (George and Bock, 2011), capabilities aimed at
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9 building and maintaining both commercial and collaborative relationships with partners
10 and stakeholders represent key factors for the firm's value creation process.

11 In addition to being relevant from a theoretical point of view and contributing to
12 shedding light on an under-investigated research field, the above results are valuable
13 also from a managerial point of view. Given that different types of capabilities are at the
14 bases of different BM designs that eventually reverberate on firm performance, SMEs
15 should carefully balance their financial resources invested in the development of those
16 capabilities that are determinant for the achievement of their overall strategic conduct.

17 With regard to the relationship between BM adoption and performance, the results point
18 out that the choice of a BM of an OP type has an overall negative effect on firm
19 performance. Enterprises focused on the search for operational efficiency, as well as on
20 improving the effectiveness and efficiency in the use of resources and supply chains
21 generally adopt strategies of price leadership. In this case, they would be more likely to
22 compete with players of a larger size, which can presumably rely on greater economies
23 of scale and benefit from further dimension-related advantages, such as higher
24 bargaining power, lower capital cost, etc., eventually making ineffective attempts to
25 increase profitability by firms characterized by OP business models. Such a
26 consideration seems to be supported by a further result of the present study, that is, the
27 positive effect that firm size has over the performance of enterprises executing this type
28 of BM. This finding suggests that the adoption of BMs aimed at pursuing operational
29 efficiency should be carefully evaluated by SMEs. Their limited size, in fact, could
30 constitute a constraint limiting their likelihood to succeed in competitive environments
31 where larger organizations execute similar strategic conducts. Differently, the
32 achievement of higher performance on the part of small and medium enterprises seems
33 to be more strongly linked to the adoption of business models that exploit the learning,
34 marketing, and relational capabilities of the firm, suggesting that investments could be
35 more profitable if aimed at developing such capacities.
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9 An additional observation is worth making in relation to the type of investigated firms.
10 Even if not explicitly taken into account in the present research, in the entrepreneurial
11 literature, some authors have suggested that family involvement in the firm's
12 governance could play a key role in the exploitation of available resources and
13 capabilities (Chirico and Nordqvist, 2010; Chrisman *et al.*, 2013; Habbershon *et al.*,
14 2003; Kim and Gao, 2013; Sirmon and Hitt, 2003; Zahara, 2010). Such a consideration
15 has been made with particular reference to small- and medium-sized enterprises
16 (Gonzalez-Cruz and Cruz-Ros, 2015). While very recent studies (e.g., Zattoni *et al.*,
17 2015) claim that the vast majority of previous literature has investigated the direct effect
18 of family involvement on firm performance and has mainly examined publicly traded
19 companies of the family type (Anderson and Reeb, 2003; Sacristán-Navarro *et al.*,
20 2011), scarce are studies that explore the indirect effect that family involvement exerts
21 on firm performance in the field of unlisted companies, representing the majority of
22 family businesses all over the world, and its role on the adoption of a specific business
23 model. Further investigations on this topic would therefore constitute valuable
24 contributions to the present academic debate on the relationship between the firm's
25 governance structure, performance, adopted business model, and firm capabilities.
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37 A few limitations of our research should be noted. The first one relates to the possibility
38 that firms may adopt types of BMs beyond those investigated in this study. For
39 example, it might just be the case that certain enterprises concomitantly pursue BMs
40 oriented at searching for operational efficiency and development of new transaction
41 systems while looking for innovations and new product launches. Hybridization of
42 different hypothesized BMs is, as a matter of fact, a possible and feasible business
43 option (cf Willemstein *et al.*, 2007). Accordingly, we propose that longitudinal studies,
44 able to identify and take into account all variables involved, could be useful to further
45 clarify the dynamics of this phenomenon.
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9 The second limitation is due to the way investigated variables were operationalized.
10 Firm absorptive capability and marketing capability were measured by using proxies
11 that may possibly provide only partial information. In the case of absorptive capability,
12 the measure could fail to fully assess the real capability of a firm to assimilate new
13 knowledge. In relation to such a topic, see the discussion about using R&D investments
14 to operationalize the firm absorptive capability provided in the work of Lane et al.
15 (2006). In the case of marketing capability, the proxy could fail to integrate the plurality
16 and complexity of the knowledge and skills connected to the firm's marketing function.
17 In this regard, we note that Vorhies *et al.* (1999) claim that marketing capabilities are
18 fostered by enterprises through the persistent employment of knowledge and skills
19 (intangible resources) to solve marketing issues. Furthermore, Orr *et al.* (2011) state that
20 these marketing skills and knowledge are applied to deliver outputs that are valuable for
21 consumers and enhance firm performance. Future studies could benefit from integrating
22 further variables in the operationalization of firm marketing capabilities to strengthen
23 the obtained results. Furthermore, firm performance was measured using a self-
24 assessed scale that, albeit validated by the literature (De Luca *et al.*, 2010), may
25 represent a potential source of common method bias. The last limitation is due to the
26 data used for the study that are of an observational type. Although we used an
27 econometric model to account for possible mutual causation among variables treating it
28 as unobserved heterogeneity at the firm level, the cross-sectional nature of the data does
29 not allow us to completely remove this drawback.
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