Company Growth or Business Growth?

Business Group Formation as an Entrepreneurial Growth Strategy

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ABSTRACT

This study explores the relative advantages of a growth strategy based on the creation of different organizational entities –business group growth– over traditional company growth. By developing a formal model, we argue that entrepreneurs who create a business group adopt a flexible growth strategy through which they modularize the problem of managing a large company. Doing so, entrepreneurs form several smaller business units with low interdependence between them. Such low interdependence between units, in turn, limits the negative effects resulting from a problem in one unit on the others. This structural configuration can reduce the risk that entrepreneurs face in involving partners in their business while facilitating the access to external resources. In turn, these additional resources can fuel a faster business growth. We test our theory using a unique longitudinal dataset consisting of a sample of more than 3500 entrepreneurs. The novelty of the study is the focus on the individual –entrepreneur– rather than the company as the focal unit of analysis to study business growth. In this way, we are able to document and study how business groups are formed and devised for business growth in entrepreneurial initiatives.

INTRODUCTION

The entrepreneurial growth lies in the center of the studies on entrepreneurship. Successful entrepreneurs pursuing a growth strategy might consider dimensional growth –i.e., traditional company growth. Interestingly, a substantial group of entrepreneurs could follow a different growth strategy deciding to create and manage more than one company –i.e., business group growth (Birley and Westhead 1993; Rosa 1998; Iacobucci and Rosa 2010). This latter form of growth leads to having a set of companies that are legally and organizationally distinct yet belong to the same individual (Westhead and Wright 1998; Iacobucci and Rosa 2010). While there is a considerable body of literature on how large business groups are created and managed (Morck and Yeung, 2003; Chang, 2006; Belenzon and Berkovitz, 2010; Belenzon, Berkovitz and Rios, 2012; Mahmood, Zhu and Zaheer 2017), we have less empirical evidence on this organizational form in the context of nascent ventures (Iacobucci and Rosa 2010). The extensive literature on entrepreneurial growth either confounds the spaces of entrepreneurs and firms or focuses exclusively on the space of firms (Sarasvathy, Menon and Kuechle 2013). In this paper, we aim to explore the relative performance of entrepreneurial growth strategies based on business group growth vs. company growth.

Managing the growth process of a new business is complex (Hellmann et al. 2016). Most of the time, this process requires a match between an entrepreneur with a brilliant business idea and external partners who believe in that idea and can offer various resources. Yet, achieving such a match is not that straightforward. From one hand, entrepreneurs are usually not willing to expand their business through opening their company to partners because of the fear of losing control, facing partners with conflicting goals/visions, and being accountable to others (McKenna and Oritt, 1981; O'Farrell and Hitchens 1988; Cruz and Justo 2017). On the other hand, it is extremely risky for partners to invest in a new company because of low transparency and moral hazard (Burchardt et al. 2016). Creating separate legal entities arranged as a business group could serve as a remedy to

the abovementioned concerns. We argue that, under some conditions, entrepreneurs who expand their business as a business group can access more external resources and grow faster than those that grow their business under a single legal and organizational entity.

We develop a formal model to show that business group growth is more effective than traditional company growth in environments characterized by high partner risk. To test our propositions, we draw on a longitudinal dataset of Italian entrepreneurs. Doing so, we construct a matched sample of entrepreneurs who created their first company in 2003 and track them for a period of 6 years. In line with our theoretical model, our findings reveal that entrepreneurs who grow their business as a group of separate companies can expand faster than other entrepreneurs. This faster growth rate is stronger in cities characterized by a high partner risk and low institutional quality. In addition, we find that this mode of growth is more common when access to traditional resources like credit is constrained.

Our paper contributes to the literature on strategy and entrepreneurship in several aspects. First, bridging the strategy literature on business groups to studies on entrepreneurial growth, this paper adds to the studies on the organizational design of young ventures (Beckman and Burton 2008; Colombo and Grilli 2013), showing how a specific organizational structure –i.e., business group, influences the growth rate of a new venture. The novel aspect of this study is to use the entrepreneur rather than the business as the focal unit of analysis. This new perspective allows us to capture a phenomenon frequently overlooked by previous research on entrepreneurship –i.e., business group growth. In addition, by focusing on the early stages of a new venture, this paper can shed light on how large business groups might form and evolve (Iacobucci and Rosa 2010; Belenzon, Berkovitz and Rios, 2012; Manikandam and Ramachandran 2014; Castellacci and Mahmood 2015). Finally, this paper provides empirical evidence about some theoretical intuitions

developed by Almeida and Wolfenzon (2006) and Lechner and Leyronas (2009) regarding the advantages of a business group structure in attracting external resources.

THEORETICAL BACKGROUND

Business Growth in Strategy and Entrepreneurship

Ever since Penrose (1959) pioneering work firm growth has been one of the central themes in the strategic management research. Prior research has extensively explored different growth strategies companies can pursue as well as their relative advantages. Companies can diversify their business to redeploy their valuable resources or stick to their main market to leverage their core competence (Prahalad and Hamel 1990). Firms can either enter new markets organically through internal development or acquire a firm that is already established depending on the firm's set of resources and capabilities (Lieberman and Lee 2009). Most of these theories have studied firm growth through an organization-level perspective with a focus on large multi-divisional companies. In the context of entrepreneurial and small businesses, however, the growth strategy is an individual-level decision made by the founder in which personal preferences play a significant role. Related to this, founders could show quite different attitudes when considering growing their business (Wiklund , Davidsson and Delmar 2003). Some entrepreneurs may not be willing to grow their business because they expect less control and more problems with a bigger company, while others may keep expanding the same company.

Despite the different way small businesses are organized in comparison to large corporations, extant studies have paid little attention to growth strategies available for entrepreneurs, and instead, treated business growth as a unitary concept that only takes place at the company level (Sarasvathy et al. 2013). A lack of theoretical and empirical knowledge on when and how entrepreneurs form business groups (Iacobucci and Rosa 2010) is quite surprising considering that owning more than one business is quite common in the small business sector. To address this

gap in the literature, this paper provides a theoretical framework at the founder-level to elaborate on different organizational growth modes for young ventures. This framework can be used to explain under which conditions an entrepreneur might prefer to grow its business as a group of separate companies rather than a single organizational entity. The focus of this study is mostly on business groups that are not diversified to isolate the effect of organizational structure (business group) on growth. In principle, however, our suggested framework can be extended to companies engaged in related diversification. Indeed, entrepreneurs that diversify their activities face the same strategic decision explained here –i.e., business group growth *vs.* company growth.

Business Group as a Growth Strategy

Business groups have been traditionally associated with large firms (Mahmood and Mitchell 2004; Manikandan and Ramachandran 2014), with an emphasis to explore the advantages of group affiliation on firm performance (Locorotondo, Dewaelheyns and Van Hulle 2015; Mahmood, Zhu and Zaheer 2017). Such advantages include having an efficient internal capital and labor market with low transaction costs (Khanna and Rivkin 2001; Belenzon, Berkovitz and Rios, 2012; Belenzon, and Tsolmon 2016), high mutual insurance (Khanna and Yafeh 2005), and strong market power (Morck, Wolfenzon and Yeung 2005). This paper adopts a considerably different perspective to business groups. Rather than a focus on group affiliation in the context of large companies, this study focuses on understanding the process through which a business group is created in an entrepreneurial setting and relative advantages that this organizational structure provides for entrepreneurs in comparison to the traditional company growth.

Growing a business is a daunting process that often involves substitutional changes in key organizational routines. Implementing such changes can threaten the very survival of a company. Consider a successful manufacturing start-up that is looking for increasing its capacity. Doing so, the entrepreneur might consider building a new factory in China to benefit from low labor costs.

This investment can somehow be considered high-risk which its failure might endanger the local business of the entrepreneur. Instead of establishing a new factory under the same organizational entity, we suggest that the entrepreneur can follow a flexible growth strategy by adopting a business group structure. In this case, the entrepreneur can set-up a separate new venture in China to avoid any negative ex-post spillovers on her domestic business. This strategy enables the entrepreneur to increase the overall size of her business while minimizing the risks associated with the domestic business. In other words, the entrepreneur can modularize the problem of creating and managing a large company by breaking it down into different small pieces with low interdependence between them (Campagnolo and Camuffo 2010). The low interdependence between business units limits the negative effects that one unit can have on the other ones. For example, in case a company within the group is bankrupted, the legal independence among the companies prevents propagation of financial problems to the whole group (Bianco and Nicodano 2006).

The advantages that entrepreneurs obtain from the modularization of different businesses increase as the risks associated with single company growth increase. As a general set-up assume that the entrepreneur would like to increase the size of her business from k to k^{Max}, where k^{Max} is the size of the company that maximizes profits. Such expansion, however, involves a risk factor p such that if a certain event occurs (e.g., investment in building a new plant in China fails), the whole business will be at risk. In this case, modularization of the business in two separate entities can be a more plausible growth strategy as it mitigates the negative spillovers across different businesses. Related to this, it is worthy to mention that business growth involves several types of risk. In this paper, we focus on a specific type of risk that is particularly important for early-stage entrepreneurs and can have a strong effect on their growth strategy –the risk arisen from involving other parties in one's business (hereafter, simply partner risk).

Involving Partners in the Entrepreneurial Business: Benefits of the Business Group Growth

There are several explanations for why small and successful businesses are reluctant to grow (McKenna and Oritt 1989). Many of these explanations are linked to the entrepreneur's lack of interest to delegate (Storey 1994) or more in general, her indisposition to involve other parties in the business. Family firms, for instance, are unwilling to deal with external investors and partners since they are interested to have the complete control of their business and to be fully accountable to others (McKenna and Oritt 1981; O'Farrell and Hitchens 1988; Croci, Doukas and Gonenc 2011). Some entrepreneurs do not entirely possess the necessary skills to manage a large company, yet are reluctant to hire experienced managers as a matter of a lack of trust in outsiders (Bloom, Sadun and Van Reenen 2012; Hellmann et al. 2016).

We argue that a business group can be the optimal organizational form to grow since it mitigates the challenges that entrepreneurs face while involving partners. This argument is in line with existing qualitative evidence revealing that forming a business group and involving external partners frequently occur together (Iacobucci and Rosa 2010). On the partner perspective, we argue that creating a business group facilitates external parties' engagement in two ways. First, transparency of a business group structure incentivizes partners to invest in the business (Almeida and Wolfenzon 2006). This motivation is because the business group configuration reduces the entrepreneur's ability to divert assets or cash from the new initiative to the established one and mitigates the associated moral hazards. Next, creating separate entities gives partners a realistic buy-out option for the future (Lechner and Leyronas 2009). Here is a quote from an entrepreneur interviewed by Lechner and Leyronas (2009):

"*When I had an idea but not all the competences, I was looking for partners inside or outside the firm to develop the activity. So I decided to give them the activity upfront, invest in the*

company and take a stake in it…... You only can attract top people if you give them real responsibility, a stake in the project, and a buy-out option for the future."

From the entrepreneur perspective, also, an organizational separation through business group configuration has several advantages. First, involving wrong partners in the business can have severe consequences for early-stage ventures. For instance, dealing with more individuals who possess decision-making power can slow down the overall decision-making process. In addition, partners might require the entrepreneur to be more accountable and to set-up effective control systems (Kazanjian 1988). Finally, partners might engage in opportunistic behavior and take advantage of the company resources for their own benefits. The business group structure allows the entrepreneur to access external resources and grow the business while reducing such risks. The legal and organizational separation between firms in the same group reduces the partners' influence on the original company and gives more flexibility to the entrepreneur. In presence of a strong conflict or incompatibility with partners, the entrepreneur can simply exit from the new activity and retain her original business. Lechner and Leyronas (2009) document this behavior of entrepreneurs in their detailed case studies of business groups. In a similar vein, Cruz and Justo (2017) found empirical evidence that creating a group is a way to increase the wealth of a family business in a manner that "externalizes risk outside the boundaries of the core family company". To provide additional evidence on the underlying motivations and theoretical mechanisms, we conducted six in-depth interviews with entrepreneurs that have formed a business group. Our theoretical mechanisms based on risk reduction and flexibility were frequently highlighted by the interviewed entrepreneurs. Here is a quote from an entrepreneur that we interviewed:

"*It is much better to have a partner in another company rather than a chief executive in your company. So, when you realize that is the right moment to go, you can go. In hindsight, I'm really happy I exited from that company. We had a lot of problems* (Anonymous entrepreneur)*"*.

It is worthy to remark that in our definition of partners, we take into account both pure investors as well as providers of other external resources like capabilities. Furthermore, we do not differentiate between such partner groups for two reasons. First, the distinction between pure investors and providers of other resources is blurred in early-stage companies (Landström 1998). Informal investors (like friends, community members, and other entrepreneurs) usually bring their expertise and capabilities to the business, not merely financial resources. Second, the two types of contributions provided by partners are somehow substitutable. A partner can either directly engage in the business, through bringing her expertise and accomplish a task or provide the entrepreneur with financial resources to hire someone else to perform the same task.

MODEL

As explained, the business group structure facilitates partners' engagement in the business. Having access to more external resources helps to speed up the overall business growth. In the previous section, we outlined the main benefits of business group configuration for partners as well as the entrepreneur. Next, we formalize the provided arguments with a highly stylized model to guide the empirical analysis. Our intent is not to develop a generally applicable model but rather to use it to formalize the previous qualitative intuition. For simplicity, our model focuses on the advantages of a business group structure from the entrepreneur perspective. As detailed, however, the business group structure provides several advantages also to partners.

General Framework

A successful entrepreneur introduces a new product to the market. We assume that the entrepreneur is resource constrained in the short-term and that the capacity of her firm is limited to k. In order to maximize profit, the entrepreneur can ask for external resources a to reach the optimal firm size $(k + a)^{Max}$. The entrepreneur can find external resources a through involving (equity) partners in the business. Engaging partners, however, has implications for the entrepreneur. As explained,

partners can slow down the decision-making process or behave opportunistically. To include these concerns in the model, we assume that with probability *p* the partner found by our entrepreneur is a good partner and the business runs smoothly. With probability (1-*p*) the partner turns out to be a bad partner. For example, the entrepreneur and partner have opposing visions of the business, or the partner behaves opportunistically. As a result, the company makes zero profits. We generically define (1-*p*) as *partner risk*. The entrepreneur observes the *p* of the potential partners before the agreement and decides to accept external resources only if the expected benefit is higher than the expected risk. In this latter case, the entrepreneur makes a partnership agreement with the partner and makes the partner a shareholder of the initial company. For simplicity reasons, we assume that in the short-run the entrepreneur interacts with one potential partner[1] that is randomly drawn from the distribution *f(p)* with an upper bound $U \leq 1$ and a lower bound of 0. Equation (1) displays the profit function of the entrepreneur in the short term. We assume a specific functional form for the entrepreneur's profit function to derive our propositions analytically[2]. We use standard assumptions to represent this function: internal and external resources are perfect substitute and have constant returns Ž. The cost of external resources is increasing in *a*. In case the *p* of a partner is sufficiently high, the entrepreneur opens the company to that partner.

$$(1)\ \pi\_Partnership = p\,\check{Z}(a+k) - \frac{1}{2}a^2$$

If an entrepreneur does not find a suitable partner, she is resource constrained and obtains the following profits:

$$(2)\ \pi\_NoPartner = \check{Z}k$$

[1] Entrepreneurs are time constrained and searching for a partner is costly.
[2] Our propositions can be derived assuming more generic functional forms.

As anticipated, a partnership is a risky arrangement for the entrepreneur's original company. With probability (*1-p*), a (bad) partner may cause the business failure (zero profits). The entrepreneur can reduce this risk through undertaking an organizational separation. In this way, the entrepreneur and partner invest in a separate company that is legally and organizationally distinct. In this way, the entrepreneur creates a business group and concentrates the partner risk just on the second company. If the entrepreneur realizes that the partner is a bad partner, she can exit from the second company and preserve her original one. In sum, the business group structure provides a flexible growth strategy: the entrepreneur has access to partner resources but reduces the risk associated with her original company. It is important to remark that without this option the entrepreneur would have preferred to not involve any partner. Following this intuition, we can represent the profit function of a business group as follows:

$$(3)\ \pi\_Group = Z(ap + k) - \frac{1}{2}a^2$$

The comparison between equations (1) and (3) summarizes the key benefit of a group strategy: by modularizing the growth process, the entrepreneur can isolate partner risk in the marginal new company without involving her original company. It is reasonable to assume, however, that an organizational separation is not costless. A business group structure has higher coordination costs between activities and less economies of scale and scope. Thus, we assume that a group structure provides a lower return $Z < \check{Z}$. For simplicity reasons, we write $\check{Z} = bZ$ with b>1.

Partnership Choice and Organizational Structure

Let us assume that instead of having just one entrepreneur there is a group of entrepreneurs with equal characteristics. They interact with a similar number of partners whose *p* are uniformly distributed between 0 and *U*. The variable *U* represents the upper bound of the *p* distribution and is

either lower or equal to 1. For simplicity, we assume also that $U > 1/b$. Entrepreneurs are rational agents who choose the growth strategy that maximizes their profits. They anticipate the amount of resources a needed to maximize the profit function in each option and then choose the most convenient one. The parameters $a^{*partner}$ and a^{*group} present the optimal amount of external resources in each option:

$$(4)\ \frac{d\pi\_Partnership}{da} = 0: \quad pbZ = a^{*partner}$$

$$(5)\ \frac{d\pi\_Group}{da} = 0: \quad pZ = a^{*group}$$

Using the above functions, we can derive the threshold values of p:

$$(6)\ \pi\_Group^{*} > \pi\_NoPartner^{*} \quad if\ p > \sqrt{\frac{2(bk-k)}{z}} = p^{l}$$

$$(7)\ \pi\_Partnership^{*} > \pi\_Group^{*} \quad if\ p > 1/b = p^{h}$$

Although the amount of resources a is endogenously determined by the entrepreneur, the choice of the best growth strategy is influenced by the exogenous parameter p. Entrepreneurs who face reliable partners (partners with a high p) choose to growth through partnership. Entrepreneurs who face partners with an intermediate p choose to grow through the creation of a business group. We can call the threshold value in the choice between partnership and business group p^{h}. Finally, entrepreneurs who face unreliable partners (low p) stay resource constrained (no partner). We can call the threshold value in the choice between no partner and business group p^{l}. The choice of growth strategy, in turn, determines the organizational structure of the business. In this way, partnership and no partner entrepreneurs are evident in observing one-company organizational structure while creating additional organizational entities naturally is reflected in having a business group. Table 1 summarizes the different growth strategies available for entrepreneurs.

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Insert Table 1 about here
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Company and Business Group Size in Equilibrium

The overall business size is determined by the entrepreneur's total amount of resources collected ($k + a$). In equilibrium, the average business size for the three groups are:

$$(8)\ \ Average\ Size\ NoPartner = (\frac{1}{p^l}) \int_0^{p^l} (k)dp = k$$

$$(9)\ \ Average\ Size\ Partnership = (\frac{1}{U - p^h}) \int_{p^h}^{U} (k + pbZ)dp = \frac{(bZU + 2k - Z)}{2}$$

$$(10)\ Average\ Size\ Group = (\frac{1}{p^h - p^l}) \int_{p^l}^{p^h} (k + pZ)dp = (\frac{1}{p^h - p^l})((\frac{k}{b} + \frac{Z}{2b^2}) - (kp^l + \frac{(p^l)^2 Z}{2}))$$

It is important to remark that the average business size of one-company entrepreneurs consists of the average size of two types of entrepreneurs, *NoPartner* and *Partnership* as explained earlier.

$$(11)\ \ Average\ Size\ OneCompany = k + \frac{Z(b^2U^2 - 1)}{2(bp^l + bU - 1)}$$

$$(12)\ Average\ Size\ Group = k + \frac{bp^l Z + Z}{2b}$$

Propositions

We are interested in comparing *average business size* for entrepreneurs with a business group *vs.* those with one-company. Notice that the average size of one-company businesses, in comparison to that of the business groups, crucially depends on the share of *NoPartner* entrepreneurs. In equilibrium, this share is determined by the distribution *p*. An increase in the number of partners with *low p (*decreasing the upper bound of the *p* distribution *U*) has a twofold effect. On one side, it

increases the number of one-company entrepreneurs who decide not to involve partners. On the other side, it reduces the amount of external resources a requested by the entrepreneur in case of both partnership and business group. The reduction in a, however, is larger for the partnership category than the business group one. In sum, these two combined effects reduce the average business size of entrepreneurs with one company. Mathematically, we can show that the difference between *Groups* and *OneCompany* decreases as we add more partners with high *p* (we increase the upper bound of the *p* distribution *U*):

$$(13)\ \frac{d(Average\ Size\ Group - \ Average\ Size\ OneCompany)}{dU}$$

$$= -\frac{bz\ (b^2U(2p^l + U) - 2bU + 1)}{(2b(p^l + U) - 1)^2}$$

Thus[3], we propose:

Proposition 1: *In environments characterized by high partner risk (many partners with low[4] p), entrepreneurs that grow their business as a business group reach a larger average size in comparison to entrepreneurs that grow their business as a single company.*

Proposition 2: *The relationship outlined in Proposition 1 is explained by a larger amount of external resources that business group entrepreneurs can collect. Without this resource collection mechanism, the relative advantage of business group entrepreneurs to one-company entrepreneurs disappears.*

In our framework entrepreneurs seek external resources when their personal resources k are not enough to sustain business growth. In the real world, however, entrepreneurs can secure

[3] Equation (13) is always negative.
[4] Another way to model a low p environment is to assume a *f(p)* distribution skewed to the left.

additional resources in form of debt. We treat debt as additional resources available to entrepreneurs and assume $k = k_0 + D$. The variable k_0 represents the entrepreneur's personal resources and the variable D is the amount of debt the entrepreneur is able to secure. For simplicity reasons, we assume that D is exogenously determined by credit supply in the economy and is homogeneously distributed among entrepreneurs (every entrepreneur has the same level of D). In other words, the parameter D simply determines the initial level of resources k entrepreneurs start with. Due to a substitution effect, an exogenous increase in credit availability reduces the number of entrepreneurs who are looking for partner resources[5]. In other words, the option *No Partner* becomes more attractive as the amount of resources k increases (keeping all the other parameters constant)[6]. This argument suggests that an increase in credit supply increases the share of one-company entrepreneurs in the economy. Conversely, the share of one-company entrepreneurs decreases in case of a reduction in credit supply. Mathematically, we can show that the share of business group entrepreneurs in equilibrium is decreasing in k:

$$(14)\ \textit{Share of Business Group Entrepreneurs in Equilibrium} = \frac{1}{b} - \sqrt{\frac{2(bk-k)}{z}}$$

Thus, we propose:

Proposition 3: *An exogenous decrease in credit supply increases the share of entrepreneurs who opt for business group growth.*

As additional documentation, Appendix 1 provides a numerical solution to the formal model.

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[5] The first derivative of $\pi\_nopartner$ with respect to k is greater than the derivative of $\pi\_partner$ and π_group.

[6] We know that: $\frac{d\pi\_nopartner}{dk} = \frac{d\pi}{dk} > \frac{d\pi\_partner}{dk} = p\frac{d\pi}{dk}$ and $\frac{d\pi\_nopartner}{dk} = \frac{d\pi}{dk} > \frac{d\pi\_group}{dk} = \frac{d\pi^g}{dk}$

EMPIRICAL ANALYSIS

Data and Sampling

We collected a sample of 3,549 Italian entrepreneurs who founded their first business in 2003. Our sample covers all the businesses created by these entrepreneurs from 2003 to 2008 (6 years). This data is provided by the business register of the Italian Chambers of Commerce, UnionCamere. The UnionCamere database is publicly available and offers official information about all Italian companies and their founders. A European business intelligence company helped us in the process of data collection. Italy is an appropriate setting for our study for several reasons. The country has a low level of trust[7] among individuals (Guiso, Sapienza, and Zingales 2006), companies tend to be small and family-owned (Economist 2011), and investor protection is relatively low (La Porta et al. 1998). These characteristics suggest that partner risk is an important issue to consider for entrepreneurs. Indeed, many Italian entrepreneurs do not expand their business because they are not comfortable to open their company to external parties (Croci et al. 2011). In this context, forming business groups can be considered as a market-driven solution to a particular institutional environment. Our analysis is divided into two steps. First, we focus on the whole sample of Italian entrepreneurs without making any regional distinctions. Second, we draw on the regional variation between Italian regions to test the moderating effect of partner risk.

Our empirical analysis includes two sections. First, we use a cross-sectional configuration to examine the relative advantage of business group entrepreneurs to one-company entrepreneurs in environments with high partner risk (Proposition 1) and explore the underlying reasons behind such an advantage (Proposition 2). Second, we use a longitudinal sample to test the entrepreneurs' use of business group structure when traditional ways of access to resources are limited (Proposition 3). In

[7] Italians managers, for example, trust managers from other countries more than other Italian managers

order to test the predictions of our model in Propositions 1 and 2, we matched our entrepreneurs on the demographic and their initial business characteristics at the time when they started their first company (2003). The characteristics of the business are extremely important since our predictions hold for constant levels of the key parameters. We matched firms on the (log) amount of equity provided by the founder (*Initial Equity*), first-year (log) revenue (*Initial Revenue*), location[8], sector[9] and firm revenue growth rate in the first year (*First Year Growth*). We ended up with a sample of 1133 entrepreneurs. These companies belong to similar sectors, are in similar locations, have a similar initial size (revenue) and first-year growth rate. The owners of these businesses have a similar age (*Entrepreneur Age*) and no previous entrepreneurial experiences.

Dependent Variables

Business Equity and Business Revenue. Our first dependent variable is the size of the business at the end of the 6th year both in terms of *Equity* and *Revenue*. As anticipated, the equity and revenue of business groups are computed as the sum of equity and revenue of all the companies involved in the group. We excluded companies that change ownership or have founder characteristics that do not meet our definition of an entrepreneur[10]. We take the logarithm of both variables to reduce the skewness of the distribution and weaken the influence of the outliers.

Time to Target Size. We construct another set of dependent variables, namely *Time to 1Million equity* and *Time to 1Million revenue*, to capture the growth speed of the business. These variables represent the time that companies need to reach a target size. To test Proposition 1, we set the target size equal to 1 million in equity and revenue that is the 90th percentile of the size distribution

[8] The geographic location of the company. We used Italy's second NUTS administrative level (Region).
[9] The sector of the company. We use the 2 digits NACE classification. Sectors are reported in the appendix. This variable should take into account the fixed cost to start a new business F.
[10] The definition of an entrepreneur is thoroughly outlined in the "Business Group Structure" paragraph, in the independent variable section. An entrepreneur, in our definition, is the founder and owner (in relative terms) of a company.

(considering all the years from 2003 to 2008). As a robustness check, we test with different targets, namely, 75th, 95th, and 99th percentiles. The results do not change.

Firm Added to Business Group. Our last dependent variable, *Firm Added to Business Group*, is a binary variable to test Proposition 3 equal to 1 if an entrepreneur introduces a new company to the group at time t (relative the number of companies at time t-1) and 0 otherwise. All the entrepreneurs start with only one firm. In order to remove the serial entrepreneurs –those that create more companies sequentially– we exclude entrepreneurs with 0 companies at any point in time from our sample.

Independent Variable

Business Group Structure. The first independent variable to test Propositions 1 and 2 is *Business Group*, a dichotomous variable equal to 1 if an entrepreneur decides to create a business group, at any point in time between 2003 and 2008, and 0 otherwise. In order to assign an entrepreneur to business group category, we adopt a strict definition of the business group to rule out confounding explanations. One of the most important factors is the ownership structure. Ideally, the ownership structure has to be the same in both business group and one-company entrepreneurs. Thus, we define an entrepreneur as the individual who owns the (relative) majority stake in the company, owns at least 50% shares in the business and qualifies as a founding member when the new firm is created. When a company in our sample changes ownership or the characteristics of the initial founder do not meet the above requirements, we drop the company from our sample. Consequently, we define a business group as a group of businesses owned and controlled by the same entrepreneur, according to the previous definition. Given the above definition of an entrepreneur, we don't consider minority investments and acquisitions of established companies as determinants of business group growth. Our definition ensures that business group entrepreneurs have the ownership of all the companies in the group. Related to this, we measure the "involvement of

external partners" as the *presence of equity partners* in the company. Following our definition of entrepreneur and business group, equity partners cannot own more than 50% shares in the company.

Another confounding factor could be diversification. Entrepreneurs might create two different companies simply because they perform totally different activities. Thus, we decided to exclude new companies belonging to sectors (2 digits NACE code) that are different from the sector of the initial firm as part of the group. In other words, according to our definition, the only difference between group growth and company growth is that the former includes forming a different organizational structure. All the companies in the group belong to the same sector[11]. Finally, it is worth to remark that we do not consider companies owned by other companies (subsidiaries) as part of the group. Indeed, creating a holding pyramid might be motivated by tax benefits or other legal issues (Bebchuk, Kraakman and Triantis 2000). Business groups that do not fall in the defined category are not considered in the analysis.

Because of matching, the entrepreneurs who decide to grow their business as a single entity have the same initial characteristics of the entrepreneurs who opt for the group growth (*Business Group*). Likewise, their starting businesses in 2003 have the same size, first-year growth rate, sector and location. As a result of a strict definition of business group the number of business group entrepreneurs is relatively small: out of 1133 entrepreneurs, only 4% opted for group growth. We relax the previous definition of business group to test the sensitivity of our results in the robustness checks section. Depending on the definition, the share of business group entrepreneurs ranges from 4% to 12%, while the key findings remain unchanged.

[11] As a robustness check, we run the analysis without considering such limitation. The key results remain the same.

Credit Crunch. Our independent variable to test Proposition 3 is the intensity of *Credit Crunch*. This variable measures the reduction in the number of loans provided by banks –at the sector-, region- and year-level from 2008 to 2013[12]. Credit crunch measures the reduction in credit supply in a specific region, industry, and year. We can confidently state that the variation in *Credit Crunch* is related to factors that are exogenous to entrepreneurs' skills and preferences. Positive values of *Credit Crunch* mean a credit reduction. Conversely, negative values of the variable mean a credit expansion. In case an entrepreneur owns more companies that are located in different regions, we take the average level of credit crunch experienced by all of them.

Moderators

Contentiousness. Borrowing from the literature on trust and social capital (OECD 2014), we develop a measure of the risk of partner opportunistic behavior at the community level, *Contentiousness*. This variable is simply the raw number of civil trials every 100,000 inhabitants in the city where our focal entrepreneur resides (Carmignani and Giacobelli 2009). We assume that entrepreneurs who live in cities characterized by high levels of *Contentiousness* have less trust in other individuals and perceive a higher partner risk (Guiso et al. 2006; Bottazzi, Da Rin and Hellmann 2016). Consequently, we hypothesize that the benefit of a business group structure is higher in those cities. We test this hypothesis using *Contentiousness* as a moderator of the relationship between business group structure and growth.

Trials Length. As an additional robustness check, we use the variable *Trials_Length* as a proxy of the institutional quality of a city. *Trials_Length* is the average length –in terms of days- of civil trials in the city where our focal entrepreneur resides (Carmignani and Giacobelli 2009). In cities characterized by high values of *Trials_Length* the enforceability of contracts and investor protection

[12] Source: Bank of Italy

is relatively weaker. Without reliable legal protection entrepreneurs and external resource providers are more vulnerable to opportunistic behaviors. Also in this context, the benefit of an organizational and legal separation between entrepreneurial initiatives is more valuable.

Controls

To test Proposition 3, we control for the lagged business growth rate and year dummies. The variable *Growth* has a value equal to 1 if the company or business group displays a positive growth rate in the previous period ($\log Revenue_{t-1} - \log Revenues_{t-2} > 0$) and 0 otherwise.

RESULTS

Table 2 displays the descriptive statistics of all the variables used in this study. Table 3 reports the results of the matching process. The results suggest that the initial companies of one-company and business group entrepreneurs do not differ in terms of revenue, first-year growth rate, equity, region or sector in the first year (2003). The same is true for entrepreneurs demographic characteristics like age.

****
Insert Tables 2 and 3 about here
****

Proposition 1 Main Results. We use an OLS regression to test this proposition. Results are represented in Table 4. After 6 years from the foundation, the average business size of entrepreneurs who grow their business as a group of separate companies is larger both in terms of equity and revenue that one company entrepreneurs. Our findings show that business groups are about 4 times bigger than standalone companies. Tables 5 and 6 provide the results of the cox models to estimate the time to obtain 1 million in revenue or equity, while table 7 shows a visual representation of the results. These results provide strong evidence that business group entrepreneurs grow faster in comparison to single company entrepreneurs. In each year, a business

group entrepreneur is at least twice more likely (100%) to hit the 1 million revenue/equity threshold.

****
Insert Tables 4, 5, 6 and 7 about here
****

Next, we delve deeper into the theoretical mechanism to explain the faster growth of business group entrepreneurs. Results provided in Tables 8 and 9 support the moderating role of *Contentiousness* and *Trials Length* on business group size. *Contentiousness* has no significant direct effect on the size of companies, while it is a powerful moderator of the relationship between business group structure and size. The interaction term is significant even if we control for the city fixed effect (Model 3). *Trials Length* has a negative direct effect on size, however, it positively moderates the relationship between business group growth and size. Also in this case, the interaction term is significant even if we control for the city fixed effects (Model 3). These findings lend support to Proposition 1.

****
Insert Tables 8 and 9 about here
****

Proposition 2 Main Results. Our theory suggests that a business group structure facilitates involving external partners in the business, which in turn helps entrepreneurs grow faster than one-company entrepreneurs. This reasoning implies that without involving external partners, forming a business group *per se* shouldn't have any effect on size or growth rate. We test this proposition by limiting the sample to business groups in which the entrepreneur owns 100% of the shares in the marginal company. In this case, by definition, creating a business group is not associated with involving external resource providers. Table 10 reports the results of the OLS regressions. The results show that creating a business group does not have any effect on total business size as long as external partners are not involved. These findings provide evidence in favor of the proposed

theoretical mechanism and rule out potential alternative explanations on why business groups grow faster than standalone firms.

****
Insert Table 10 about here
****

Proposition 3 Main Results. Our framework suggests that entrepreneurs are more likely to select business group growth when their resources (personal or external like debt) are limited. This proposition can be tested using the 2007-2008 financial crisis as an exogenous shock affecting credit availability. We run a fixed-effect OLS panel regression which requires using the full sample without invariant control or matching technique. The full regression is the following:

$$Firm\ added\ to\ Business\ Group_{\ it} = \alpha + \beta 1\ Credit\ Crunch_{\ t} + \beta 2\ Growth_{t-1}\ + \beta 3\ Credit\ Crunch\ t \times Growth_{t-1} +\ Year + \mu + \varepsilon_{it}$$

****
Insert Table 11 about here
****

The results, represented in Table 11, suggest that just a small fraction of entrepreneurs (0.4%) create a new company at each point in time. An increase in credit crunch, however, has a large effect on the probability to create new companies. In addition, our theory predicts that such effect is limited to those entrepreneurs who are growing their business but are resource constrained. For this reason, we introduce the lagged growth variable of the business/group as moderator of the relationship. As expected, successful entrepreneurs who are growing their business are more likely to create a group when the credit crunch is particularly strong. Credit crunch has no effect on businesses that are not growing (Model 2). As explained, entrepreneurs who opt for a group growth are mainly those interested to grow their business but face resource constraints. These results provide support for our Proposition 3.

ROBUSTNESS TESTS

In this section, we aim to rule out alternative explanations (with a major focus on Proposition 1) and show that our findings are robust to different definitions of business group and alternative samples**.**

Business Groups and Tax Benefits. One possible confounding factor of the above analysis is the presence of shell corporations, designed primarily to lower or avoid taxes. Prior literature documented that the diffusion of this phenomenon is mainly linked to the creation of holding pyramids, in which one company is controlled by another company subject to a favorable taxation (Bebchuk et al. 2000). Tax benefits, however, are negligible if companies are directly controlled by an individual and operating in the same country and industry[13]. Qualitative interviews with business group entrepreneurs confirm the minor role tax benefits play in determining their growth strategy (Iacobucci and Rosa 2010). Therefore, this alternative explanation of tax benefits is minimized by our purposive sampling. We consider a company part of a business group only if it is owned and controlled by an individual –the entrepreneur and exclude companies owned by other corporations (subsidiaries) as part of the group.

Entrepreneurial Growth Orientations. One concern related to our findings on proposition 1 is the unobserved heterogeneity in entrepreneur's growth motivations. It is possible to assume that one-company entrepreneurs are simply not interested or capable to grow their business. We address this issue by matching our entrepreneurs on an additional variable, namely business size at the end of the 10th year (2013). In theory, even resource constrained (*No Partner*) entrepreneurs can reach k^{Max} reinvesting their profits over time if they are given enough time. Table 12 reports the results of the survival analysis (time to target size) when all the businesses (one-company and business

[13] In Italy, the corporate income tax (IRES) is constant and does not depend on the income level.

group) have the same size at the end of the 10th year. These results suggest that even controlling for end-of-period business size, business group entrepreneurs reach a given target size faster than one-company entrepreneurs. Thanks to the matching at the end of the period, the same shares of single-company and group entrepreneurs reach the target size, effectively controlling for heterogeneous growth orientations.

****
Insert Table 12 about here
****

Replication. As a robustness check, we repeated the analysis with a different sample of 4,000 Italian entrepreneurs. This time, all the companies were founded in 2008 instead of 2003. The key results of our analysis remain the same[14].

Diversified Groups. In this paper, we adopted a strict definition of a business group in order to rule out potential confounding effects like business diversification. In the previous definition, we excluded companies belonging to sectors that are different from the sector of the original firm. As a robustness check, we repeated the above analysis relaxing this previous definition of a business group. More specifically, we considered any new business founded by the same entrepreneur as part of the group independently of the sector. In a similar vein, we reduced the ownership stake needed to consider a business as part of a group from 50% to 20%. These modifications increase the number of business group entrepreneurs in the sample and slightly change the magnitude of the regression coefficients, while the key findings remain unchanged[15].

[14] Results available upon request.
[15] Results available upon request.

CONCLUSIONS AND DISCUSSION

There are many reasons why young yet successful businesses do not grow. The extant literature has explained some of such underlying explanations including, the lack of trust between founder and external managers (Bloom et al. 2012), personal preferences on having a certain lifestyle (Hurst and Pugsley 2011), and the reluctance to give control and/or be accountable to other parties (McKenna and Oritt, 1981; O'Farrell and Hitchens 1988). The common element of many of these motivations is the entrepreneur's inability to open up the company to external resource providers (Storey 1994; Cruz and Justo 2017). In this paper, we theorize and empirically show that creating an organizational structure based on separate legal entities facilitates involving external resource providers in the business and fuels its growth. In this framework, the business group structure becomes an antecedent and driver of growth.

We test our propositions using a sample of Italian entrepreneurs. Our findings lend support to our proposed theoretical framework. Entrepreneurs who opt to design their business as a business group increase their business equity and revenue faster than other entrepreneurs who expand their business under a single organizational entity. Such a differential effect is stronger in cities characterized by a high partner risk and low institutional quality. In addition, we found evidence that this mode of growth through business group structure is more common in periods characterized by a relatively low supply of alternative resources like credit.

The main contribution of this paper is integrating the strategy literature on business groups with the literature of entrepreneurial growth. From the perspective of entrepreneurship research, the novelty of this study is the use of the entrepreneur as the focus of analysis rather than the company. Adopting this novel perspective (Sarasvathy et al. 2013; Scott et al. 1996), we are able to study a growth strategy –creating different organizational entities by the same entrepreneur– that has been overlooked by previous research (Beckman and Burton 2008; Colombo and Grilli 2013; Sarasvathy

et al. 2013). From the perspective of strategy research on business groups, we are providing a useful framework and empirical evidence concerning the motivation behind business group formation (Iacobucci and Rosa 2010; Manikandam and Ramachandran 2014; Castellacci and Mahmood 2015). Finally, this paper provides empirical evidence regarding the advantages of a business group structure in attracting external resources (Almeida and Wolfenzon 2006; Lechner and Leyronas 2009).

The main limitation of this paper is a focus on just one country –Italy. As outlined in the theoretical part, the results of this paper might not be generalizable to countries with different institutional or cultural characteristics. The literature on business groups, indeed, shows that this organizational form is more common in developing countries with weak institutions and less sophisticated financial systems (Belenzon and Tsolmon 2015; Chittoor, Kale and Puranam 2015). Future research can expand the findings of this paper by undertaking a cross-country comparison.

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Table 1. Summary of Growth Strategies

Growth Strategies	Expected Profits	Business Size	Organizational Structure
No Partner	$\pi\ (k)$	k	One Company
Partnership	$p\ \pi\ (k, a)$	$k + a^{*partner}$	One Company
Business Group	$\pi^{g}(k, \tilde{a})$ $\tilde{a} = p * a$	$k + a^{*group}$	Business Group

Table 2. Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Business Group	1133	0.037	0.175	0	1
Initial Revenue	1133	8.673	4.867	0	17.097
First Year Growth	1133	2.518	4.227	-12.736	16.505
Initial Equity	1133	9.276	0.739	8.517	16.811
Entrepreneur age	1133	41	11.278	18	89
Manufacturing	1133	0.496	0.500	0	1
Time to 1Million equity	1133	4.680	0.287	0	5
Time to 1Million revenue	1133	3.421	1.056	0	5
Equity	741	12.56	1.942	7.130	42.153
Revenue	801	12.83	2.306	6.037	42.345
Contentiousness	806	790	206	507	1254
Trials Length	808	976	316	555	1599
Firm added to Business Group	20,132	0.008	0.093	0	1
Credit Crunch	20,132	0.101	0.120	-0.160	0.563
Growth (t-1)	20,132	0.546	0.497	0	1
Year	20,132	2010	1.707	2008	2013

Table 3. Entrepreneur's and Initial Business Characteristics at time zero (2003). OLS.

VARIABLES	(1) Business Group	(2) Business Group	(3) Business Group	(4) Business Group
Initial Revenue	0.000589	-8.62e-05	-0.000103	7.85e-05
	(0.000989)	(0.00139)	(0.00139)	(0.00142)
First Year Growth		-0.00111	-0.00118	-0.000964
		(0.00160)	(0.00160)	(0.00163)
Initial Equity			0.00384	0.00441
			(0.00654)	(0.00659)
Entrepreneur Age				-0.000223
				(0.000429)
Manufacturing				-0.00602
				(0.00993)
Constant	0.0266***	0.0352**	-4.39e-05	0.00474
	(0.00984)	(0.0159)	(0.0622)	(0.0638)
Observations	1,133	1,133	1,133	1,133
R-squared	0.000	0.001	0.001	0.001

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4. Business revenue and equity at the end of the 6th year (2008). OLS.

VARIABLES	(Matching) Equity	(Matching) Revenue	(No-matching) Equity	(No-matching) Revenue
Business Group	5.612***	3.965***	5.674***	4.818***
	(1.383)	(1.479)	(1.384)	(1.407)
Initial Revenue			0.0830***	0.189***
			(0.0181)	(0.0212)
First Year Growth			0.0947***	0.205***
			(0.0213)	(0.0237)
Initial Equity			0.567***	0.328***
			(0.0860)	(0.0596)
Entrepreneur Age			-0.00144	-0.00365
			(0.00409)	(0.00451)
Regional Dummies	No	No	Yes	Yes
Sector Dummies	No	No	Yes	Yes
Constant	12.35***	12.69***	6.783***	8.047***
	(0.0532)	(0.0557)	(0.857)	(0.911)
Observations	741	801	1,355	1,479
R-squared	0.224	0.107	0.336	0.348

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5. Time to 1 million equity. Cox Duration Model coefficients.

VARIABLES	(Matching) Time to 1 million equity	(No-matching) Time to 1 million equity
Business Group	2.060***	1.967***
	(0.248)	(0.268)
Initial Revenue		0.101***
		(0.035)
First Year Growth		0.131***
		(0.037)
Initial Equity		0.480***
		(0.094)
Entrepreneur Age		0.008
		(0.007)
Regional Dummies	No	Yes
Sector Dummies	No	Yes
Observations	1,085	1,991

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6. Time to 1 million revenue. Cox Duration Model coefficients.

VARIABLES	(Matching) Time to 1 million revenue	(No-matching) Time to 1 million revenue
Business Group	0.829***	0.857***
	(0.241)	(0.238)
Initial Revenue		0.647***
		(0.059)
First Year Growth		0.671***
		(0.059)
Initial Equity		0.283***
		(0.066)
Entrepreneur Age		-0.002
		(0.666)
Regional Dummies	No	Yes
Sector Dummies	No	Yes
Observations	1,085	1,991

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7. Time to 1 million revenue (2003-2008).

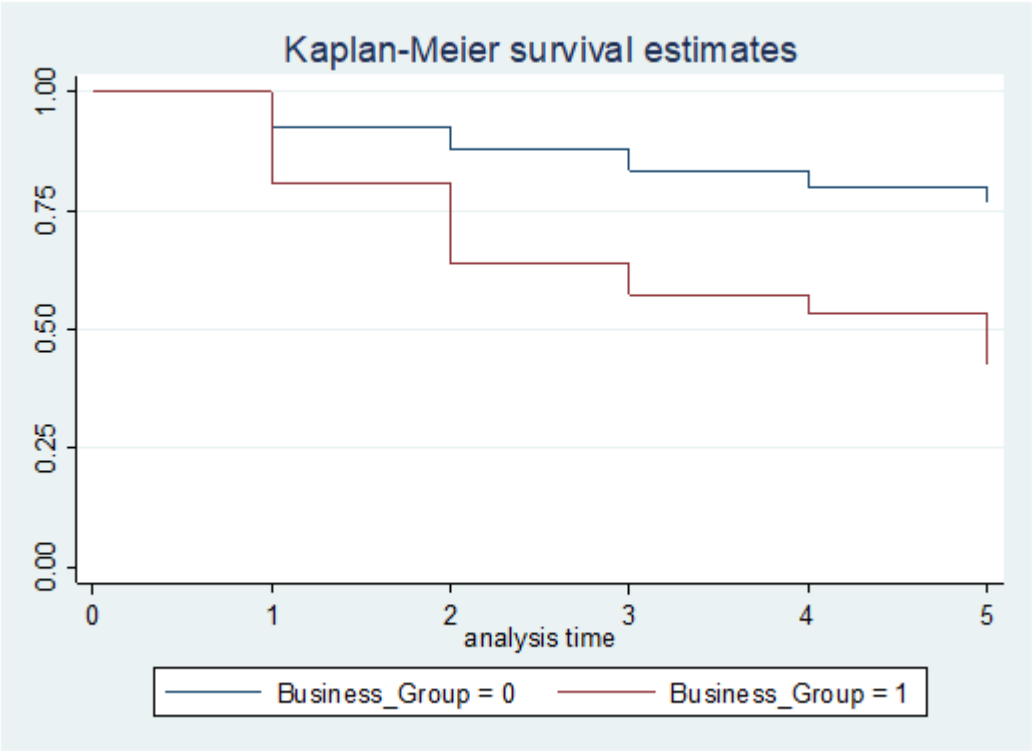


Table 8. Business revenue at the end of the 6th year (2008) and Contentiousness. OLS.

VARIABLES	(1) Revenue	(2) Revenue	(3) Revenue
Business Group	-0.791	-2.799	-2.738
	(4.819)	(3.715)	(3.736)
Contentiousness	0.000065	0.000294	
	(0.000173)	(0.000216)	
Business Group* Contentiousness	0.00734	0.00980**	0.00977**
	(0.00493)	(0.00360)	(0.00365)
Initial Revenue		0.154***	0.144***
		(0.0346)	(0.0405)
First Year Growth		0.167***	0.159***
		(0.0364)	(0.0403)
Initial Capital		0.339***	0.326**
		(0.114)	(0.118)
Entrepreneur age		0.000927	0.00340
		(0.00818)	(0.00760)
City Dummies	No	No	Yes
Sector Dummies	No	Yes	Yes
Constant	12.51***	8.282***	9.450***
	(0.265)	(1.104)	(1.159)
Observations	806	631	631
R-squared	0.152	0.389	0.410

Robust standard errors in parentheses. Errors clustered at the regional level.
*** p<0.01, ** p<0.05, * p<0.1

Table 9. Business revenue at the end of the 6th year (2008) and Trials Length. OLS.

VARIABLES	(1) Revenue	(2) Revenue	(3) Revenue
Business Group	1.510	-9.264**	-9.170**
	(5.566)	(4.078)	(4.012)
Trials Length	-0.000269	-0.000458*	
	(0.000201)	(0.000242)	
Business Group* Trials Length	0.00438	0.0157***	0.0156***
	(0.00695)	(0.00475)	(0.00470)
Initial Revenue		0.149***	0.149***
		(0.0353)	(0.0394)
First Year Growth		0.165***	0.163***
		(0.0360)	(0.0392)
Initial Capital		0.356***	0.356***
		(0.1000)	(0.103)
Entrepreneur Age		-7.39e-05	0.00266
		(0.00719)	(0.00655)
City Dummies	No	No	Yes
Sector Dummies	No	Yes	Yes
Constant	12.81***	8.952***	9.052***
	(0.215)	(1.072)	(1.115)
Observations	808	633	633
R-squared	0.144	0.432	0.455

Robust standard errors in parentheses. Errors clustered at the regional level.
*** p<0.01, ** p<0.05, * p<0.1

Table 10. Business revenue at the end of the 6th year. Business Groups with 100% ownership.

VARIABLES	(Matching) Revenue	(No-matching) Revenue
Business Group (100%)	-0.0989	-0.0371
	(0.550)	(0.329)
Initial Revenue		0.180***
		(0.0118)
First Year Growth		0.178***
		(0.0130)
Initial Equity		0.342***
		(0.0486)
Entrepreneur Age		-0.00407
		(0.00335)
Regional Dummies	No	Yes
Sector Dummies	No	Yes
Constant	12.69***	7.353***
	(0.0560)	(0.556)
Observations	771	1,449
R-squared	0.000	0.361

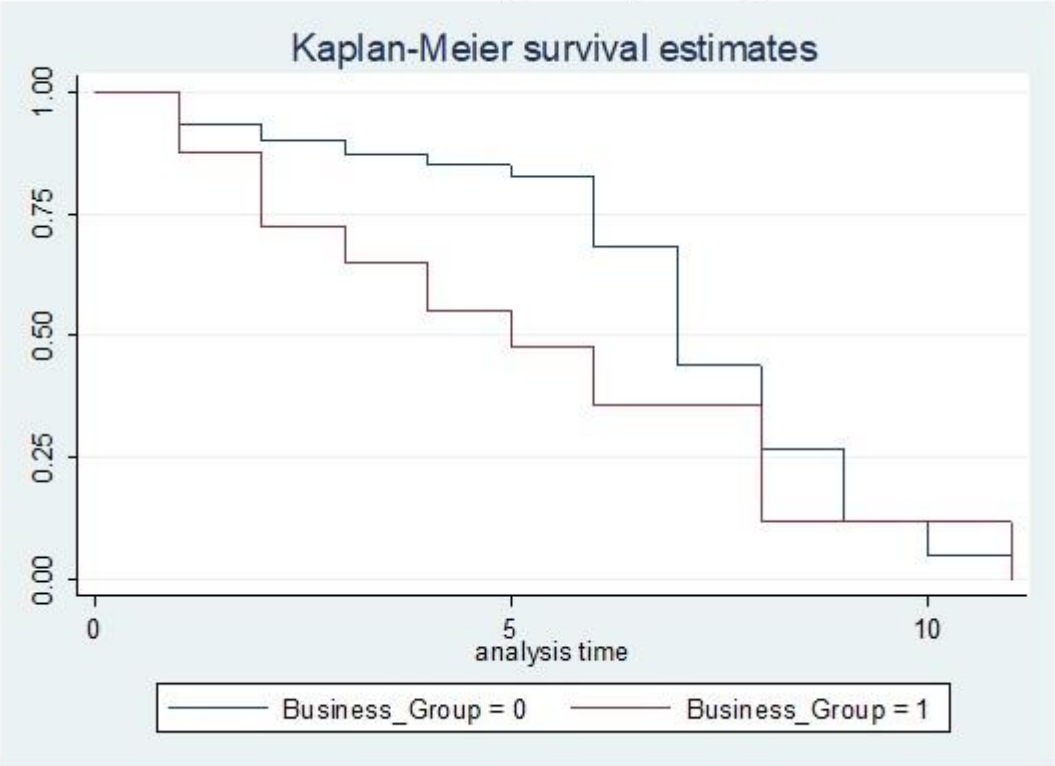
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 11. Credit Crunch and Group Growth. Fixed-Effect Panel regression.

VARIABLES	(1) Firm added to Business Group	(2) Firm added to Business Group
Credit Crunch	0.0446***	-0.00114
	(0.00690)	(0.0123)
Growth (t-1)		-0.0121***
		(0.00186)
Credit Crunch*Growth (t-1)		0.0657***
		(0.0186)
Year Dummies	Yes	Yes
Constant	0.00449***	0.0148***
	(0.000703)	(0.00491)
Observations	20,132	20,132
R-squared	0.005	0.009
Number of ID	3,549	3,549

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 12. Time to 1 million revenue (2003-2013). Matching on 2013 revenue.



Appendix 1

We assign some values to the parameters to find a numerical solution to Proposition 1: *k=1*, *b=8/7*, *z=3/4* and *U*=1.

$\pi\_Group^* > \pi\_NoPartner^* \quad if\ p > 0.62$

$\pi\_Partnership^* > \pi\_Group^* \quad if\ p > 0.875$

$Average\ Size\ NoPartner = \frac{1}{0.62}\int_0^{0.62}(\ 1)dp = \frac{1}{0.62}\int_0^{0.62}(1)dp = \frac{1}{0.62}(0.62) = 1$

$Average\ Size\ Partnership = \frac{1}{0.125}\int_{0.875}^{1}(\ pbZ + 1)dp = \frac{1}{0.125}(0.428 + 1 - 0.328 - 0.875) = 1.8$

$Average\ Size\ OneCo = 0.84(1) + 0.16(1.8) = 1.128$

$Average\ Size\ Group = \frac{1}{0.237}\int_{0.62}^{0.875}\left(\frac{p3}{4} + 1\right)dp = \frac{1}{0.237}(0.287+0.875-0.144-0.62) = 1.67$

$Average\ Size\ Group - Average\ Size\ OneCo = 0.54$

Appendix 2

Sector	Freq.	Percent
Manufacture of fabricated metal products	153	13.75
Administrative Management and General Management Consulting Services	140	12.58
Architectural and engineering activities	116	10.42
Packaging activities	76	6.83
Information service activities	70	6.29
Manufacture of machinery and equipment	65	5.84
Manufacture of food products	62	5.57
Professional and scientific activities	48	4.31
Financial services	42	3.77
Repair and installation of machinery and equipment	42	3.77
Manufacture of leather and related products	39	3.50
Other manufacturing	36	3.23
Manufacture of rubber and plastic products	36	3.23
Printing and reproduction of recorded media	36	3.23
Manufacture of wood and of products of wood	31	2.79
Agriculture and fishing	30	2.70
Manufacture of textiles	29	2.61
Waste collection, treatment and disposal activities	17	1.53
Manufacture of motor vehicles, trailers and semi-trailers	17	1.53
Telecommunications	13	1.17
Manufacture of other transport equipment	8	0.72
Electric power generation, transmission and distribution	7	0.63
Total	1,113	100.00