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The moderating role of innovation capability on the relationship between slack and firm performance

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Autor/a: Mengmeng Zhang

Director/a: Sr. Josep Maria Argiles Bosch

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Abstract

The impact of organizational slack on firm growth always attracts a great academic concern. however, the investigation about the external factor that will affect the above-mentioned relationship can be barely found. This study undertakes an empirical analysis with regards to the moderating effect of innovation capability on the relationship between organizational slack and future firm growth. We applied a sample of 280 firms in Europe and 2520 years observation from 2011-2019. The result from fixed-effect model shows that unabsorbed slack positively affects future firm growth, also innovation capability can positively moderate the relationship between unabsorbed slack and firm growth. However, we didn't find any evidence to support our same hypothesis in terms of absorbed slack. Additionally, we find that PP&E investment will promote the firm growth while the firm size has negative effect on firm growth.

Key word: Slack, Innovation capability, Firm growth.

1. Introduction

The resource-based theory argued that the growth of the firm depends on the current pool of available resource. The rate and the direction of firm expansion is also decided by the firm's unique portfolio of tangible and intangible resource (Penrose, 1959). slack, which was firstly defined as a pool of extra resource that the firm holds for the potential utilization. in other words, slack is a surplus of firm's resource after its current business activities being satisfied (Cyert and March,1956). Subsequently, some other scholars argued that the resource slack serves as a cushion for the fluctuation of firm's performance or a back-up for the unexpected and unfavorable event (Bourgeois, 1981; Zona, 2012). A large body of academic studies has contributed to the question about the relationship between slack and firm performance (Usually is measured as the growth rate and profitability), and the research direction is divided in twofold, which are , the linear relationship ((Argiles-Bosch et al., 2016; Mäkitie, 2020a; Mishina et al., 2004) and the curvilinear relationship (Argilés-Bosch et al., 2018; George, 2005; Tan and Peng, 2003). The direction of relationship between slack and firm performance basically depends on

slack characteristics According to the previous studies ,the criterion for the classification of slack shows a great variety, and the most prevailing way is categorize it as absorbed slack and unabsorbed slack according to the discretional managerial use (Bradley et al., 2011;) The absorbed slack is commonly defined as excess of unused resources with low discretionary use, which refers to high constraint and restriction to convert them into alternative uses to adopt them into the current business activities. A typical example of the absorbed slacks is the ratio of selling, general, and administrative expenses to sales (Singh, 1986). While unabsorbed slack is uncommitted resources in an organization that with high discretionary use so as to the manager can easily redeploy it even use it in the expanding business market, such as financial slack, cash slack and equity-to-debt slack (Huang and Li, 2012). Either from the academic results or the intuitiveness, the unabsorbed slack shows a more favorable influence on future firm profitability than absorbed slack mainly due to its flexibility to be redeployed. With respect to the absorbed slack, on the other hand, shows a weaker promotion effect even a negative sign to the particular indicator of firm performance because it increases the operational inefficiency and shows a low possibility to be transferred to other area. (Argiles-Bosch et al., 2016; Bradley et al., 2011).

For the summary of already explored knowledge in this field provided by so many researchers , a large body of academic research focus on the relationship between the slack and firm performance , there are rarely few articles focus on the mechanism through which the mentioned relationship is resulted from ,and most importantly, as an implication for those managers, which factor could make the slack be more valuable and adoptable to the current business expansion . Fortunately, this academic gap is receiving increasing attention and in the last few years, there are investigations involving the mechanism of resource slack adoption and firm's innovation activities. for example, (Mäkitie, 2020) investigated the resource redeployment through the engagement of innovation in the oil and gas industry. Additionally, (Hu et al., 2021) emphasized the importance of innovation research on the reusing, integrating, reconfiguring and gaining resources. Although the information conveyed from the above referred literatures seemingly indicated that the slack is mainly adopted in the new opportunities, the answer about how to maximize the promotion effect of slack is still unclear. This study

would like to contribute this gap by analyzing the moderating effect of innovation capacity on the relationship between slack and firm performance. As suggested by (Mishina et al., 2004), the slack could be beneficial in the product expansion strategy and the emergent business opportunities is the main area where the slack could present their usage, specially the slack in more fungible financial resource provides manager with flexible unused resource resolve unforeseen product complications. Additionally, (Kaul, 2012) found that new knowledge developed through innovation prompted a redeployment of resource slack into previously unexplored areas of opportunity and in turn, offering potential for better performance. Both of the two last mentioned studies indicate the basic rationale for the moderating role of innovation capability to the promotion effect of resource slack on the firm performance, which is, the innovation capability will allow the resource slack to make most use of it. Moreover, Luo (2019) argued that the resource slack relaxes a firm's resource constraints for exploration and grasps emergent business opportunity, also helps improve operational efficiency of current exploitation activities. Which demonstrates the ambidexterity of moderating role of innovation. As two main forms of innovation, both exploration and exploitation activities can inspire the potential of resource slack and enhance its advantage to the firm growth. Our main objective is to empirically test whether the innovation capability could induce a stronger relationship between slack and firm performance.

The rest of this paper will be divided in four parts: First we will construct the theoretical framework by reviewing the relevant literatures; Second is the design of the methodology to test our hypothesis derived from literature review; The third part is the result analysis and the discussion; And in the final part we will summarize our contribution to this topic, as well as the implication to the managerial area.

2. Literature review

The literature review will comprise of threefold: First, we will construct the theoretical conception about the two types of slack: absorbed slack and unabsorbed slack. Second, we will review those articles with regards to the relationship between firm performance and two types of resource slack. Third, an analysis about the moderating role of innovation capability for above mentioned relationship will also be presented according to the relevant arguments of

scholars.

2.1 The theoretical conception of two types of slack

The original definition of slack could be traced back as early as 1956, when Cyert and March (1956) defined the slack as a pool of excess resources that helps firms to adjust to unexpected situations. Subsequently, more scholars conceptualized the slack from different angle. For example, (Bourgeois and Iii, 1981) defined slack as a buffer for the firm's unexpected and unfavorable scenarios in the future, the organizational slack will serve as the potential resources which can be utilized by firms to deal with the external business pressure, such as the competitiveness from peer counterparts and the change of policy as well as the initiation of internal strategy change to adapt the external environment. Besides those definitions for the intuitive purpose, there are also some direct and more specific ones. Cyert and March (1956) stated that slack is "disparity between the resources available to the organization and the payment required to maintain the coalition". a more simplified one was given by (Cohen et al., 1972): "The difference between the resources of the organization and the combination of demands made on it". Finally, Dimick and Murray (1978) conceptualized it from the discretionary point of view, the resource slack are those resources which an organization has acquired which are not committed to a necessary expenditure. In essence, these are resources which can be used in a discretionary manner". As a summary of all of the definitions provided above, the slack, which we specify as organizational slack, is the surplus resource that the organization holds after the expenditure of the current business activities, which can also be described as the difference between the resource available and the resource required by organizations. The classification for organizational slack shows a great diversity, but the most accepted way is to classify it as absorbed and unabsorbed slack (Argilés-Bosch et al., 2018; Argiles-Bosch et al., 2016; Chiu and Liaw, 2009; Mishina et al., 2004; Tan, 2003). Which is determined by the degree of discretion, one of particularly important characteristic of slack, referring to the flexibility to convert the slack to alternative utilization when arise the new opportunity (e.g., Sharfman et al.,1988), The more specific a resource is to a particular use, the less discretion management has in deploying excess amounts to alternative uses (Montgomery and Wernerfelt, 1988). Similarly, the notion of "resource stickiness" by Penrose (1959) also

conveys the same conception, is the extent to which the slack could be easily adopted to the business expansion. The sticky resource, which is corresponded to the above mentioned absorbed one, cannot be reshaped easily to invest the new purpose. On the contrary, the liquid resource can be transformed with lower cost and higher discretion degree (Bradley et al., 2011). The absorbed slack has a higher degree of resource constraint, which is committed to the firm's particular task. although can be adopted for the current business exploitation and expansion, they can hardly be redeployed for the alternative use due to their low degree of discretion. Which means, they can only be made use of specific task. On the other hand, the unabsorbed slack, as an uncommitted resource, allowing greater managerial discretion ,can be easily utilized to fuel the various business activities , they are less constraint resource and have a superiority over the absorbed one with regards to the resource redeployment (Argiles-Bosch et al., 2016). Example for absorbed slack includes human resource slack, it may take time to productively transfer human resource slack from one department to another (Bradley et al., 2011) . other absorbed slack includes several ratios of corresponding asset or expense to sales such as the ratios of inventories to sales , property, plant and equipment to sales and selling, general and administrative expenses to sales(Argilés-Bosch et al., 2018a; Argiles-Bosch et al., 2016) .Such kinds of slacks are already embedded to their original usage can hardly be withdrawn and committed to a new embeddedness. example for unabsorbed slack includes financial slack, cash slack and Equity-to-debt slack etc. (Argiles-Bosch et al., 2016). Compared with the former type , these resource slacks are much more readily to be reconfigured for the convenience of management.

2.2 The effect of resource slack to firm growth.

The theory of firm growth is firstly presented by Penrose (1959), who describe the firm growth from the resource-based point of view, the valuable and strategic resources held by firms provide the foundation to develop firm capabilities that can lead to superior performance over time. In turn, the main factor to restrain the firm expansion in product dimension o market dimension, is the constraint of a firm's current pool of available resources. Mishina et al. (2004) made assumption on the base of Penrose's resource-based growth theory and pointed out that the firm growth is primarily affected by the management choice to conceptualize and use firm's

resources, the organizational slack was regarded as the driver of firm growth rather than the total quantity resource that the firm hold. Additionally, Bradley et al. (2011) summarized the Penrose's growth theory by to mechanical processes. First, the growth of firm depends on the reutilization of idle resource for the new emerged opportunities, the resource slack can fuel the unexpected demands in the future as long as is needed. Second, the growth of firm can also be realized by reconfiguring the existent resource to meet the requirement and preference change of customers. Which demonstrates that both the reutilization and recombination of resource slack can be the enabler of firm growth. Furthermore, (Bradley et al., 2011)suggested that the resource slack supplies both the mean and incentive for firm expansion, the process of firm expansion must be associated with more or less the unoccupied resource by other purpose. Amit et al. (1990), Helwege and Liang (1996) addressed this issue from the perspective of managers whose responsibility is to outperform the company to their competitors as well as save the total cost, so the availability of the excess resource will produce the motivation and convenience for managers to jump out the current routine and explore the new business scenery. On the other hand, when pursue the business expansion, managers prefer to exploit the existent resource from the internal pools as the priority instead of turning to the outside because of the much higher cost to apply the external resource and the risk of information asymmetry. This argument is consistent with famous pecking-order theory in the financial field (Myers and Majluf, 1984). which illustrated that owing to the information asymmetry, companies prioritize their sources of financing by a particular order. first by internal financing, and then debt, equity comes as the last option. From this point of view, if the company is confronted with the gooseneck during the business development, the resource slacks will be adopted with a high probability if they can be identified. For managers with many ambitions, they presser the lower slack level and might regards the organizational slack as a type a "waste" as well as an indicator of inefficiency of firm operation, which will inspire their spirit of entrepreneurship to make use of these resource slack as soon as possible to realize the firm growth, the resource slack thus produces the motivation for ambitious managers to exploit internally and refine the operation process (Bhide, 1992). Besides the manager entrepreneurship, the firm's growth strategy also matters, Mishina et al. (2004) illustrated that the growth strategy can be classified as market expansion

and product expansion. the resource slack could be much more liquid and profitable when the firm is oriented to the market expansion or sales growth, such as the slack in human capital, the excess of human resource could be assigned to new market, but this effect will be less obvious when the company holds the product expansion strategy, because the product expansion requires much more suitable resource than that of market expansion, the criterion of qualification will be so rigorous. Some investigations addressed the issue of slack's function on the product expansion demonstrate that the increase of unabsorbed slack will more or less promote the firm's orientation on product experimentation (March and Shapira, 1987). the internal rationale for which is ,the resource slack will serve as a cushion for the uncertainty and unfavorable events happened in the future (Bourgeois, 1981; Zona, 2012),like the economic downturn even the crisis, slack could acts as a buffer in periods of economic difficulties, facilitating resource redeployment and strategy .adjustment in the face of unanticipated contingencies (Daniel et al., 2004) . Moreover, the slack will encourage the risk-taking (Pitelis, 2007) and the pursue of long-horizontal instead of short-term profit (March, 1991) . If the firms don't have the adequate resource slack, they will probably postpone the upcoming investment opportunities as well as the innovative projects, because the outcome of these projects show a great uncertainty so the potential profit will be missed in the firms of lose aversion. And the lack of slack could also inhibit the firm's capability to mobilize the necessary resource and restrict the strategy adjustment, which is not acceptable for the firms with the aggressive goal (Huang and Li, 2012). Meanwhile ,with the resource slack the manager will possess much more confidence for the uncertainty and encourage them to undertake proactive initiatives because with the use of slack, those project can be regarded as a zero margin cost investment since it is already obtained (Pitelis, 2007). And the mitigation effect of resource slack on the lost aversion will also prompt the longer pay-off investment rather than the speculative investment (March, 1991). Similarly , (Hope and Thomas, 2007)summarized the positive effect of slack from the point of view of organizational theory , that is ,the essence of slack will probably encourage those positive business actions such as experimentation ,innovation and risk-taking, also the existence of resource slack helps to release the constraint from the resource restriction, thus the resource slack will guarantee more strategic choice for the firms and the

firms will have more space to choose the development strategy which is anticipated as the most productive(Huang and Li, 2012). Therefore, an increase in slack is associated with a subsequent firm growth. According to (Nohria and Gulati, 1996), the resource slack , no matter at low o high level, will help to outperform the manager's work with two different mechanism respectively. When resource slack at low level, all the resource must be assigned to the most suitable and urgent task, because there is a limited space for resource waste, which in turn will enforce the manager to exploit all the currently applicable resource and construct the resource structure at most efficient way, so the operation efficiency will be enhanced, the total cost can also be reduced subsequently. On the other hand, when the resource slack at high level, the managers are free from the resource constraint and start considering jump out the conventional routine that the firm adhered before and implement some value-added decisions, although those unconventional routine might not bring the profit immediately, an overpay-off will be definitely realized at the long-horizon. Another important approach to exploit the slack is through resource redeployment. The mechanical process of resource redeployment is transferring the resource from the less profitable area to the more profitable one (Penrose, E ,1995), for example, extract the resource in the market with diminishing opportunities and reinvest the same bunch of resource to the market with rising opportunities, because the failure of exiting the declining business will also harm the total performance (Sull, 1999)

Although a large body of studies shows a positive association between slack and firm growth by the intuitiveness, the empirical results illustrate that there is a nuance between the absorbed and unabsorbed slack. The unabsorbed slack can positively affect the firm growth as predicted by the arguments we elaborate before (Argilés-Bosch et al., 2018; Argiles-Bosch et al., 2016; Chiu and Liaw, 2009; Huang and Li, 2012; Murro et al., 2016; Tan, 2003), meanwhile ,the absorbed slack usually presents a negative relationship with all kinds of indicators of firm growth (sale growth ,profitability , innovation performance etc.) (Argilés-Bosch et al., 2018; Argiles-Bosch et al., 2016; Mishina et al., 2004)The empirical results demonstrate that only unabsorbed slack could be regarded as an enabler for firm growth, the absorbed slack , however , shall better be described as "burden" rather than "enabler" for firms. The underlying rationale for the inverse effect of absorbed and unabsorbed slack is the

difference of discretion and the flexibility to use. The absorbed slack which is already committed to the particular production process can only be used to feed other area with major effort. On the other hand, the unabsorbed slack that has not been committed is easily accessible (Huang and Li, 2012). According to (Dreyer and Grønhaug, 2004), it's not rational at all to expect that all kind of slack to have the same performance-enhance effect, it is necessary to distinguish the slack between "wasted resource" or "excess resource", the wasted resource shows the operational inefficiency will be hardly redeployed. In the unstable external environment, whether the resource slack could bring in the organization benefit depends on how discretionarily and flexibly they can be adopted in the production process, the excess of resources will be the organizational cost instead of benefit unless they are liquid and readily available to be assigned to the new mission, the less flexible resource which has committed to the product factors shall be expected to have a negative influence to the firm growth. (Tan and Wang, 2010).

For the summary of theoretical framework, we have constructed with regards to the association between organizational resource slack and firm growth. The following two hypothesis could be induced:

Hypothesis 1: The unabsorbed slacks will positively affect future firm growth, given their high degree of discretion and flexibility to use.

Hypothesis 2: The absorbed slacks will negatively affect future firm growth, given their low degree of discretion and flexibility to use.

2.3 The moderating effect of innovation capability

Slack could be identified and redeployed in the new domain to maximize their potential value (Argilés-Bosch et al., 2018; Bradley et al., 2011; Daniel et al., 2004; Mishina et al., 2004) ,the managers can take advantage of new emergent business opportunity with the unused resource (Mishina et al., 2004) but not all the organizational slacks have the opportunity to play their role ,as the theory constructed before , the organization slack can only be utilize unless they are flexible and liquid, which means ,the unabsorbed slack. The absorbed slack, meanwhile, will probably be regarded as the "waste resource" due to their low degree of discretion and the difficulty to be transferred (Tan and Wang, 2010; Dreyer and Grønhaug, 2004). Moreover, even

for the unabsorbed slacks you cannot expect that they can be utilized thoroughly and with a perfect embeddedness. According to the routine-based view of firm growth, although the firm growth primarily comes from the change of their traditional routines, almost all the firms prefer to persist their existing routine (Nelson and Winter ,1982), because for majority of firms just keeping the current routine to run successfully is already a uneasy work. For managers, the firm growth coming from the replication of existing pattern will be far easier than that from building new routines or the creative recombination of old routines. Which implicates that either the extension or the recombination is not an effortless approach through which the excess resource can be possibly utilized, most of resource slacks, no matter absorbed o unabsorbed, are actually be wasted. The resource slack needs an arena to function and perform effectively, but the scarcity of the new opportunity induces the failure to realize their values. According to (Mayanja et al., 2019), the process of opportunity recognition needs the ecology of innovation, the ecology of innovation will guarantee the development of new product & service as well as the process optimization to increase the company's competitiveness. The innovation provides firms with the mean and path to exploit opportunity (Daryani and Amini, 2016). Both of the ambidextrous strategies of innovation, which includes exploration and exploitation, will open up channels through which the available resource will be assigned (Soetanto and Jack, 2018). There are a great number of studies specialized in the ambidextrous characteristic of innovation, and an universally accepted perspective is that the resource slack provides both the exploration and exploitation activities with the necessary resource (Voss et al. 2008).

The innovation capability also guarantees the firms to redeploy its excess resource. Nelson and Winter (1982) defined the innovation in from the resource perspective, the innovation 'consists to a substantial extent of a recombination of conceptual and physical materials that were previously in existence', this definition clearly demonstrate that the process of innovation will help to redeploy both the tangible and intangible excess resource in the new explored area. The innovation capability refers to the ability of firms to assemble ,connect and transform the existing resource into the different one it also represents the managers's ability to deploy the existing resource adequately and explore the new investment opportunities to ensure the long-horizon competitiveness(Menguc et al., 2014). Additionally,(Mannan et al., 2016) also argue

that the innovation is the basic foundation to ensure firms exploit the opportunity, when entrepreneurs identify the new opportunities, they will also take the firm's innovation capability into consideration for evaluation. In an innovative environment, the creativity and innovativeness of workers will be stimulated and often can conduct the opportunity exploitation to take full advantage of the material in-hand (Acton et al., 2019; French et al., 2022).The new opportunity and knowledge explored through innovation will prompt the redeployment of resource into previously uninvolved business field (Kaul, 2012). (Drucker, n.d.) referred that innovation will endow the resource with the new ability to generate the wealth, the innovation capability of enterprise will ensure the combination of current resource in the creative and effective approach. Which exactly prove the function of innovation to configure the excess of resource. (Galunic and Rodan, 1998) analyzed the relationship between resource recombination and firm's knowledge structure and pointed out that companies are encouraged to innovate by searching out the new way to use the existing resource, which will serve as the basis for the expected business opportunities. For a well-established company, engaging in technological and non-technological innovation will substantially increase the possibility that the organizational resource could be redeployed, the resource redeployment will take place when developing a new specialized knowledge or technologies, the likelihood of resource combination will also be determined by distinct characteristic of knowledge created by the innovation process (Magnusson et al., 2005). For example ,in the open innovation strategy ,the financial resource will be needed when acquiring the external knowledge (Mäkitie, 2020). Moreover, for innovative company, the sustainable competitiveness is firm's main superiority against those of less innovative (Ullah et al., 2021), the sustainable competitive advantage will determine the ability that the firm to reconfigure and renew its idle resource (Mäkitie, 2020).

Another important function of innovation capability is to stimulate managers' entrepreneurship (Drucker, n.d.) through reviewing the relevant literatures with regards to the slack and firm performance. The main negative influence of slack on firm performance resides in that the resource slack will result in the managers' complacent (Argilés-Bosch et al., 2018; Bradley et al., 2011; Gibbert et al., 2014; Sinclair et al., 2000). The excess resource will reduce the incentive and motivation of firm to experiment, managers will become complacent with the

resource slack and tend to be more administrative rather than entrepreneurial in their management. On the other hand, the managers prefer to protect their current achievement rather than taking the risk for the uncertainty when the resource is sufficient (Sinclair et al., 2000). More specifically ,(Bradley et al., 2011) analyzed the negative effect of slack on entrepreneurship from six aspects, (entrepreneurial strategic orientation, entrepreneurial resource orientation, entrepreneurial management structure, entrepreneurial reward philosophy, entrepreneurial growth orientation, entrepreneurial culture). As the innovation capability is the important mean for entrepreneurship, the opportunities explored by the innovation is the key motivation for firms to engage in entrepreneurship.(Drucker, n.d.). So the negative effect of resource slack on the entrepreneurship will be mitigated even inversed by positive effect donated from the innovation. With a strong innovative-orient strategy, we can expect that the excess resource will motivate the managerial entrepreneurship to implement the exploration rather than staying in their current position (An et al., 2018).

Hence, for the summary of all elaborated theories, we can induce the following two hypothesis regarding the moderating role of innovation capability.

Hypothesis 3: The innovation capability will positively moderate the relationship between absorbed slack and firm growth.

Hypothesis 4: The innovation capability will positively moderate the relationship between unabsorbed slack and firm growth.

3. Methodology

3.1 Model and measures

In this paper, we investigate the impact of type resource slack on the future sales growth of firms and the moderating effect of innovation capability for the hereinabove mentioned impact. To proceed our investigation, we would like to collect the panel data and apply the fix-effect regression to run our model. We elaborated the following formular to integrate all the variables involved in this study.

$$\frac{S_{i,t+1}-S_{i,t}}{S_{i,t}} = \beta_0 + \beta_1\, FSLACK_{i,t} + \beta_2\, GASLACK_{i,t} + \beta_3\, R\&D\_Re_{i,t+1} + \beta_4\, RD \cdot$$

$$GASLACK_{i,t+1} + \beta_5\, RD \cdot FSLACK_{i,t+1} + +\beta_6\, LogAsset_{i,t} + \beta_7\, AGE_{i,t} + \beta_8 \frac{PPE_{i,t+1}}{PPE_{i,t}} +$$

$$\sum \beta_9 Industry_i + \sum \beta_{10} Country_i + \sum \beta_{11} Y_{i,t} + \varepsilon_{i,t} \quad \text{Eq. (1)}$$

where all the variables refer to firm i in year t, $FSLACK$ indicates Financial slack ; $GASLACK$ indicates absorbed slack; LogAsset indicates the logarithm of total asset; AGE indicates the age of firms in every year; $\frac{PPE_{i,t+1}}{PPE_{i,t}}$ indicates the investment growth in property, plant & equipment; R&D_Re means the ratio of R&D investment to Revenue ; $RD \cdot GASLACK$ and $RD \cdot FSLACK$ indicate the interacting effect of R&D_Re with absorbed and unabsorbed slack respectively; The rest three are dummy variables indicating the Industry, Country and Year. In the following part we will illustrate the measurement for each variable.

Dependent variable

In this paper our dependent variable is firm growth. The sales growth is most applied indicator to capture the firm growth in the previous literature.(Bradley et al., 2011; Mishina et al., 2004; Shepherd and Wiklund, 2009). The sale growth is calculated as the sales difference of two consecutive years divided by the sales of former year and then time the 100% (Mishina et al., 2004). The formular to calculate the sale growth is shown below:

$$Sale\ growth = \frac{Sales_{t+1} - Sales_t}{Sales_t} \times 100\%$$

The t is the sales at the end of current year and t+1 is the sales at the end of following year. So from this equation we will get the Sales growth of t+1 years on the based period of t year. Which will reflect the lagged effect of slack on the firm growth as well as to alleviate the concern of inverse causality (Bradley et al., 2011a). The one-year lag structure is consistent with the suggestion of (Bromiley, 1991; Tan, 2003), because the more than one-year lag may increase the possibility of over-estimation for relationship between variables. Although some articles argued that the slacks may need more than one year to take the effect, especially for that less liquid slack. In this article we will use the financial slack as the independent variables, the most liquid one among all type of slacks, which will help to alleviate this concern.

Absorbed and unabsorbed slack

There are various terminologies for the classification of resource slack, (Argiles-Bosch et al., 2016b; Huang and Li, 2012b)distinguished them by the degree of discretion which is also the most universal definition. Penrose (1959) referred the degree of stickiness of resource while (Mishina et al., 2004b)deferred them by liquidity. And(Bradley et al., 2011b) applied indicators

of potential, recoverable, and high-discretion slack. The underlying ideas are identical among all kinds of terminologies although they applied different descriptions. As a summary, those high-discretionary, more liquid and less sticky slack could be identified as the unabsorbed type, and those with inverse attributes should be identified the absorbed one. There are numerous kinds of resource slack in each category and the choice about the most appropriate one is always a debated subject, to verify our hypothesis, we would like to select most representative absorbed and unabsorbed slack respectively. The unabsorbed slacks are those excess resource that can be redeployed and utilized with great flexibility and discretion. the financial slack is most widely used indicator for unabsorbed slack in various literatures due to its great discretion and flexibility (Bradley et al., 2011a; Chiu and Liaw, 2009b; Huang and Li, 2012b; Lee, 2015; Nohria and Gulati, 1996). So we will chose the FSLACK (financial slack) as our indicator of unabsorbed slack , according to the prior works, the measurement for this variable is defined as the difference between working capital available and working capital required, more specifically, it is calculated as the ratio of current assets less current liabilities to total assets (Argiles-Bosch et al., 2016b). With respect to the absorbed slack. We will use the GASLACK (the ratio of selling, general and administrative expenses to sales) to captures slack absorbed in salaries, overhead expenses, and various other administrative, the SGA is widely considered as the most typical and accessible measurement for absorbed slack (Liu et al., 2014; Symeou et al., 2019). For both kinds of slack, we will measure them from the t year's data so they can be expected to capture the promotion effect to sales growth of t+1 year.

Moderator

The moderator of our study is innovation capability. The measurement to capture firm's innovation capability also presents a great diversity. For example, Liu and Wang (2003) used the new product sale as a proxy for the innovation. however, as argued by (Li, 2011), this measurement is quite controversial because the procedures for new product approval are neither completely standardized nor comparable between regions, Additionally, The degree of newness of products is a relatively arbitrary and geographically-bounded concept. Considering that our sample consists of data from several European countries, selecting the new product sale as the proxy for innovation capability may result in the geographical bias. Another noteworthy

measurement is the patent information. A large body of literatures applied the patents number as the evidence of firm's innovation capability(Hall and Howell-Moroney, 2012; Li et al., 2019; Wang et al., 2019). But the patent information is too narrative due to the failure of including all the technological innovation and cannot reflect the importance if distinct innovations, so it's a pitfall equating the patenting and the innovation activities (Li, 2011). Finally, a more universally accepted indicator to reflect firm's innovation is the R&D expenditure, in recent years the R&D expenditure has been a prevailing indicator in the firm level studies to uncover the firm's innovation capability. (Amélia and Teixeira, 2007) investigated the evolution of innovation capability in Portuguese firms and demonstrated that R&D has been seen as an essential element of the foundation on which innovation could be built. This study also defined the function of R&D as 'comprising creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications. Which proves that the R&D capture the firm's innovation ability with a complete dimension. In this vein, R&D investment emerges as key factor for building firms' innovation and technological adoption capabilities. Therefore, the R&D expenditure is an appropriate indicator to represent the innovation capability in our study. According to (Chao and Kavadias, 2013), we will use "R&D_Re", which is the ratio of R&D expenditure to revenue in the regression model to reduce the effect of extreme value. and for the interaction effect, we will use the "RD·GASLACK" and "RD·FSLACK" indicate the interacting effect of R&D ratio with absorbed and unabsorbed slack respectively.

Control variables

Firm size is widely considered as an important factor to influence the firm performance. As the larger firms usually take advantage of more resource and bigger market share. Also compared with small firms, large firms are expected to have wider access to credit market and lower financial cost (Beck and Demirguc-Kunt, 2006). To mitigate the effect of extreme value, the firm size is universally operationalized as the logarithm of total asset at the end of financial year, as represented by "LogAsset" in our model. *Firm age* is another factor that need to be taken into account as the older firms are more experienced in the market and have better opportunities to develop their resource base (Mishina et al., 2004b) Additionally ,older firms

typically have more access the resource which allows them to develop different business strategies to redeploy the resource slack (Amélia and Teixeira, 2007). We will directly use the "AGE" in our model to represent this factor. And we can also expect that the *Investment in PPE* will produce the significantly effect on the sales growth. Because under the certain level of slack, the expanded production equipment is the precondition to meet the sales growth. Inversely ,cuts in firms' productive equipment will induce the restriction on the production and subsequent sales (Argilés-Bosch et al., 2018b). we will use the growth of the tangible fixed asset to represent the investment on the PPE($\frac{PPE_{t+1}}{PPE_t}$). The nominator is the total fixed tangible asset at the end of t+1 year and the denominator is the fixed tangible asset at the end of t year. Finally, given that our sample consists of firms from different industries, we would like to control the *Industry effect,* which is captured *by* $\sum Industry$ in our model. the study of (Argiles-Bosch et al., 2016b)applies the industry profitability and industry sale growth to capture the industry effect of model. As we cannot obtain the industry information from AMADEUS, we will use the dummy variable to control the broad industry effect on sales growth(Mishina we et al., 2004b) . The firms in our sample could be grouped into 4 categories according to the ISIC code (Manufacturing, Construction, wholesale & retail and transportation), based on which we will construct the industry indicators, for each. An industry indicator was coded '1' if a company fell into a given industry category and '0'otherwise. *Country effect,* our sample comprises of firms from 5 countries, as an analysis in a multinational dimension, a country effect control appears to be necessary. Similarly, we will also use dummy variable$\sum Country$ to construct the country indicators on our model (Dogan et al., 2019).

3.2 Research design and Sample collection

To conduct the research design, we need consider two important concerns given the characteristic of the relationship between dependent & independent as well as the moderators. Firstly, we need to decide whether the cross-sectional o panel data shall be applied in the model. the cross-sectional method mainly highlights the variance between firms and the panel data will involve the evolution information of every firms. As suggested by (Argiles-Bosch et al., 2016; Bradley et al., 2011), the sample of firms observed over a long period provides a more appropriate dynamic approach. And the result derived from a long period sample will be more

reliable because it will relatively be free from the bias coursed by the unusual o phenomenal performance in a short-lived episode. Secondly, we need consider the lag between the measured slack and the firm performance for most kinds of slacks (Argilés-Bosch et al., 2018; Argiles-Bosch et al., 2016; Chiu and Liaw, 2009; Mishina et al., 2004; Tan, 2003) ,they will need a certain period to be applied in the alternative use. the positive effect cannot appear immediately when the slack is identified. That's why the cross-sectional design usually tests the negative relationship (Bradley et al., 2011). And the degree of discretion of slack will also determine the lag length. A more discretionary slack such as financial slack will be applied faster than the less discretionary one.

The final sample was collected from the database AMADEUS, we focus four industrial sectors based on ISIC code. (Manufacturing, Construction, wholesale & retail and transportation) (Bradley et al., 2011). We excluded the service company due to their distinct business pattern (Argiles-Bosch et al., 2016). We also excluded the start-ups and requested that the companies have at least 10 years account records in AMADEUS. Because start-ups can hardly have or manage financial slack due to the business stage they are staying (Mishina et al., 2004). To construct a panel dataset, we selected the data from 2011 to 2019 and excluded the data after 2019 to avoid the bias coursed by COVID-19. All the Financial and accounting measures to construct our dependent & independent variables were taken from database. We originally got 9891year observations and 1099 firms from different countries in Europe. but unfortunately, all the annual sales for those firms from UK and Turkey are not available in AMADEUS. So we eliminated all the firms from these two countries, we also eliminated those firms without data of R&D investment which will be regarded as the moderator in the final model. Our final sample contains totally 2520 firm-year observations and 280 firms from five countries (Germany, France, Sweden, Belgium, Austria). The geographical and industrial distribution of our sample are listed below.

Table 1:-The number of firms in each country and industry.

N ttheo. of observations	Germany	France	Sweden	Belgium	Austria	Total
Manufacturing	64	16	85	3	4	172
Construction	11	3	13	2	0	29
Wholesale&Retail	7	5	29	1	1	43

Transportation	12	4	19	0	1	6
Total	94	28	146	6	6	280

The descriptive statistics and correlation between variables are also shown as follows:

Table 2 The descriptive statistics of all variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Salesgrowth	2240	1.91	20.044	-100	118.277
FSLACK	2240	.424	.419	-.163	9.609
GASLACK	2230	.237	.243	-.968	1
R&D_Re	2240	3.561	3.513	-1.721	14.179
RD·FSLACK	2230	1.176	4.986	-201.492	31.344
RD·GASLACK	2240	2.559	3.663	-1.721	16.308
LogAsset	2159	12.571	1.877	1.907	19.591
AGE	2240	47.157	32.205	10	171
PPE growth	2133	1.034	.25	.036	2.78

Table 3 The correlation matrix of all variables

	Salesgr~h	FSLACK	GASLACK	RD_Re	RD·GASL~K	RD·FSLACK	LogAsset	AGE	PPE_gro~h
Salesgro~h	1								
FSLACK	0.0793***	1							
GASLACK	0.0125	0.106***	1						
RD_Re	0.401***	0.0549*	0.0184	1					
RD·GASLACK	-0.00436	0.125***	0.297***	0.00549	1				
RD·FSLACK	0.0621**	-0.0178	0.0249	-0.0654**	-0.0138	1			
LogAsset	-0.0257	0.121***	-0.0956***	0.00563	0.0132	-0.0172	1		
AGE	0.00292	-0.0389	-0.131***	-0.0234	-0.0869***	0.00656	0.100***	1	
PPE_growth	0.262***	-0.0171	0.0594**	0.191***	0.00797	-0.0205	0.0152	-0.0293	1

* p<0.05, ** p<0.01, *** p<0.001

From the correlation metric we can identify some preliminary relationship between dependent and independent variables. For example, the FSLACK and RD·FSLACK positively correlate with Sales growth and so as to the RD_Re and PPE_growth. Additionally, the correlations between all the independent variables are very low, which demonstrates that our model is free from problem of multicollinearity.

4. Result and discussion

Given the panel data structure of my sample I ran panel data estimations with fixed effect, we also ran a random effect regression simultaneously. After which I ran a Hausman test to identify the correlation between individual effect and explanatory variables. And the result show P-value equals 0.000(<0.05), so we reject the null hypothesis of Hausman test that there is no correlation between individual effect and explanatory variables. In this case the random effect regression will show an inconsistency compared with fix-effect's result. Although the

coefficients obtained by fix-effect regression is less efficient compared with those of random effect, we still apply the fix-effect regression due to its consistency. The following shows our regression result.

Table 4 The fix-effect regression result

VARIABLES	Model 1 Fixed Effects	Model 2 Fixed Effects
FSLACK	3.030**	3.029**
	(1.481)	(1.440)
GASLACK	-3.675	-3.416
	(3.202)	(3.108)
R&D_Re	2.061***	1.564***
	(0.118)	(0.123)
RD·FSLACK	-0.0554	-0.0598
	(0.0902)	(0.0876)
RD·GASLACK	0.437***	0.412***
	(0.112)	(0.109)
LogAsset	-8.725***	-8.055***
	(1.533)	(1.511)
AGE	0.175	-0.168
	(0.176)	(0.224)
PPE_growth	15.18***	10.09***
	(1.704)	(1.717)
Constant	79.05***	94.71***
	(19.68)	(20.51)
Observations	2,123	2,123
R-squared	0.229	0.279
Number of Firm_num	278	278
Firm FE	YES	YES
Year FE		YES

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Results are shown in Table 4. Column 1 displays estimations when we just apply the firm fix-effect. The dependent variable is future sales growth. The R-square is 0.229; The Column 2 displays estimations when we apply the both the firm and year fix-effect, the R-square is 0.279. Both models present a relatively good fitness. The coefficients for the year, country and industry dummies are eliminated in the fix-effect regression due to the collinearity, because those dummies barely change over years. First of all, For our interest variable, we can see that in both models the FSLACK (financial slack) shows a significantly positive influence to the future sales growth (for $p<0.05$) as expected, **our hypothesis 1 is supported by this result.** This

result is consistent with the theories in the literature we have previously reviewed. The unabsorbed slack could be regarded as an enabler of firm growth due to its high degree of discretion and the great flexibility to be redeployed into alternative business field. (Argilés-Bosch et al., 2018; Argiles-Bosch et al., 2016; Chiu and Liaw, 2009; Huang and Li, 2012; Murro et al., 2016; Tan, 2003). As the most representative unabsorbed slack, the financial slack can be viewed as a buffer for the fluctuation of external environment and whatever unfavorable change of corporation (Bourgeois and Iii, 1981). In the other side, it can also be applied immediately to fuel a new emerged business chance once it is appearing (Bradley et al., 2011). Both of scenarios are favorable for the future growth of sales.

However, our **hypothesis 2 is not supported according to the empirical result,** the coefficient for GASLACK is -3.675 and -3.416 in two models respectively but neither is significant. which is not surprising because the low degree of discretion makes the adoption of absorbed slack unfeasible, also the managers may don't have a clear identification of absorbed slack and much less to redeploy it for the business growth, the absorbed slack will probably be regarded as a "burden" instead of "buffer" for the forecasting business period (Chiu and Liaw, 2009; Mishina et al., 2004; Tan, 2003). All of which lead to the ambiguity regarding the relationship between absorbed slack and firm growth. In terms of our most interested factor, innovation capacity. We can see that the ratio of R&D to revenue has a significantly positive relationship with the firm growth. Which is consistent with most of the academic results, the R&D investment will contribute to diverse the product line and refine the firm administration (Chao and Kavadias, 2013). Which in turn, will naturally promote the sales. Most importantly, we can see that the interacting variable RD·FSLACK shows a positive effect on sales growth with a 0.01 significance level. which is completely in favor of our hypothesis 3. Therefore, from the empirical result we can assert that the innovation capacity indeed can positively moderate the relationship between unabsorbed slack and sales growth of firm, this result contributes the main academic value of our study. A firm with higher innovation capability will obtain more advantage with a certain quantity of unabsorbed slack, in other words, the innovation capability can enhance the value of unabsorbed slack to firm's future growth. This significant result also demonstrates the validity of what we theoretically constructed regarding the moderating effect

of innovation capacity for the relationship between slack and firm growth. The innovation capacity can promote the utilization and redeployment of unabsorbed slack by exploration, exploitation and entrepreneurship enhancement. On the one hand, the innovation activities will help to open channels through which the available resource will be assigned (Soetanto and Jack, 2018). On the other hand, the process of innovation will help to redeploy both the tangible and intangible excess resource in the new explored area (Nelson and Winter ,1982). As we discussed previously ,The innovation capability can reflect the ability of firms to assemble ,connect and transform the existing resource into the different one, it also represents the managers' ability to deploy the existing resource adequately and explore the new investment opportunities to ensure the long-horizon competitiveness(Menguc et al., 2014).Finally ,the innovation can enhance the entrepreneurship of manager, which will mitigate the possibly negative effect of slack on entrepreneurship due to the managers' complacent when they have excess resource on-hand. The managers will be inspired to explore new opportunities though innovation (Drucker, n.d.). Compared with the strongly supported hypothesis 3, the hypothesis 4 is not supported by neither the signal of coefficient nor the level of significance. A similar situation with hypothesis 1 and hypothesis 2. The comparison between two type of slack is so clear, both of exclusive and interacting effect of unabsorbed slack have the significantly positive relationship to sales growth, however, neither exclusive nor interacting effect of absorbed slack have the significant influence. Which is a further demonstration of ambiguity and inconvenience to utilize the absorbed slack.

in term of control variables, we can observe that only firm size and the PPE investment show the significant influence. The PP&E investment has a strong positive influence on sale growth as what we expect. which is consistent with the argument that the expansion of production equipment and the plant are foundation for the firms to expand their market and enhance the sales. Meanwhile, the firm size shows a strong negative effect in both models, which is inverse to our expectation. The appropriate explanation for this could be that although large firms usually take up much more resource and have more accesses to acquire external resource than SMEs, they are probably at the stage of maturity, which is characterized by the stable performance while the low growth, the increase of firm size can breed the inefficiency

and even lead to the negative sales growth due to their large base number of sales in previous period (Yadav et al., 2022). Curiously, we didn't find significant effect of firm age on sales growth although a positive coefficient derived from both models.

5. Conclusion

Penrose's resource-based theory points out the importance of available resource on the growth of the firm. Based on a large body of previous studies concentrated on this topic. We embarked on the topic gap and specially examined the moderating role of innovation capacity to the relationship between organizational slack and firm growth. More specifically, we test our hypothesis based on two types of slacks, absorbed and unabsorbed type. According to the result, we find that unabsorbed slack will be the enabler of future sales growth and absorbed slack didn't show the significance influence. Which is basically in line with our expectation according to the literature review. the absorbed slack is already committed to particular task and shows a low degree of discretion and flexibility. The unabsorbed slack, on the contrary, is not committed and can be redeployed with low cost. And most importantly, we also find evidence that the innovation capability will positively moderate the relationship between unabsorbed slack and sales growth. Which demonstrate that the firms with greater innovation capability will take more advantage of their unabsorbed slack to realize the firm growth. The main contribution of this study lies on that this is the first ever research focusing on the moderating role in the topic of slack, almost all the previous studies only investigated the either linear o curvilinear relationship between various slack and all kinds of indicators of firm performance but ignored the external factor that could affect this relationship. This study answered a very important question in both the academic and managerial circle. "How can we utilize the organizational slack better to benefit the firm?" We assumed that the innovation capability of firm could help to maximize the value of slack and we got a relatively favorable empirical result. We provided a crucial implication for the managers that the R&D invest will not only exclusively promote the firm performance by a direct way, but also can indirectly promote the firm growth through providing a better condition for resource redeployment.

As a master thesis, our study presents several limitations. First, in the summary statistics we can see that some variables (Sales growth, RD·FSLACK, RD·GASLACK) have relatively

big standard deviation compared with their mean value. which shows a great dispersion and too many outliers in our sample. maybe we should have conducted a winsorization of raw data before the regression to produce a more reliable result. Second, we proved our hypothesis with empirical result and demonstrated the moderating role of innovation capability, however ,the pure statistic result may just appear the superficial result as we don't have a deep comprehension about how this process will be carried out. One of most relevant future study shall be qualitative research to conduct the single or multiple case study to trace the mechanical process by which the resource slack is utilized, which shall fill up this academic gap by construct a qualitative theoretical framework for this process. Third, due to the limitation of our database, we have to construct our sample from various countries and industries. The characteristics of different countries and industries will cause the unfavorable influence of our study although we applied the fixed effect to mitigate this kind of effect. The diversity of the observations in our sample may increase the generativity of our conclusion but decrease the feasibility. In the future a study with a more uniform sample shall be conducted to consolidate our conclusion. Last but not least, we just generally proved that the innovation capability will positively moderate the relationship between unabsorbed slack and firm growth. However, as we elaborated in the section of literature review, the innovation activities may produce the influence by three dimensions of function: exploration, exploitation and entrepreneurship. For the limitation of database, we cannot analyze the effect of these three dimensions respectively. Another valuable study in the future could focus more precisely on these three dimensions and find out which one contribute more for their total moderating effect.

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