Abstract

This licentiate thesis consist of two essays. Both essays deal with corporate finance and its impact on innovation investment.

In the first essay we use German Community Innovation Survey to identify financially constrained firms. Contrary to previous studies we find that the relationship between financial constraints and firm size is inverted u-shaped and that it is the group of medium sized firms which has the largest funding gaps. This is explained by the fact that these firms have high innovation capabilities but at the same time face high cost of capital. Furthermore, we test if financial constraints have an impact on firm productivity growth. We find negative effects from funding gaps on productivity, but only for investment in tangible capital and not for innovation investments.

The second essay investigates whether there has been a change in the productivity and funding mix of innovative SMEs post stricter bank regulations. Our result shows that the likelihood of using bank loans as a funding source has not changed for innovation investments nor for tangible investments after stricter capital regulations have been announced. On the other hand, sources such as subsidies have increased due to regulatory programs that have been implemented in the aftermath of the recent financial crisis. Furthermore, SMEs productivity has not changed post stricter bank regulations. Overall, the impact from different sources of funding on productivity is rather limited.
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**Introduction**

A firm has essentially two available sources for investment expenditures: internal funding and external funding. In its core essence internal funding originates from retained earnings while external funding consists of various debt contracts such as bank loans. Contrary to the Modigliani-Miller theorem, capital structure matters in imperfect capital markets with presence of information asymmetry. When supplier of credit have less information regarding the quality of a certain investment, they are forced to charge a risk premium reflecting the average risk of an investment project. This creates a wedge between the cost of internal and external capital. Thus, investors are faced with a hierarchy of funding sources were funds with lower cost will be used first. Hence, internal funding will be preferred over debt and debt over equity. Generally this is refereed to as the pecking order theory. Given that internal funding is finite, firms usually need to seek external funding. However, due to market imperfections firms with potentially profitable investment opportunities may not be able to acquire it. Thus, a firm is considered being financially constrained if investment is restricted by its access to internal funding due to the fact that it is unable to acquire sufficient external funding.

Financial constraint is in particular relevant for young and small innovative firms. The availability of external funding has been acknowledge as a significant determination factor for hampering the growth of small and medium sized firms Jarvis (2000), Mina et al. (2013). Moreover, small firms are associated with higher operational risk and consequently with a greater likelihood of bankruptcy. In addition the younger and smaller the firm, the shorter is their track record and the less collateral is available. This creates obstacles for debt funding (Hall & Lerner 2010, Berger & Udell 1998, 2002, Guariglia 2008).

Furthermore, it has long been acknowledged that innovation activity is an essential determination factor for productivity, competitiveness and economic growth. The role of young firms’ innovation capacity has been emphasized since their innovations generate structural change in the economy (Mina et al. 2013). Thus, it is of policy concern that restricted access to funding for innovation investments may hinder economic growth and job creation.

Innovation investments differ from tangible investment expenditures due to its intangible nature of the asset being created as well as due to a high degree of uncertainty. Accordingly, similarly to the case of SMEs, there is a lack of collateral that may be used as security for debt funding. These features of innovation investments make raising external funding for innovation projects more expensive in comparison to tangible investments (Hall 2010).

The empirical literature confirms that firms tend to use internal funds over external funds when financing innovation projects (Hall 1989, 1992, Himmelberg & Petersen 1994, Bougeas et al. 2003, Czarnitzki & Hottenrott 2011). Overall the theoretical and empirical literature suggest that financial constraints depend not only on information asymme-

A neglected factor in the empirical literature is the concept of innovation capability. It is hypothesized that innovation capability has an impact on financial constraints for innovation investment. This implies that a firm’s capacity to generate and achieve new innovation projects, is an important determinant of financial constraints.

In the first part of this thesis the link between innovation capability, firm size and financial constraints is investigated. The results show that relationship between firm size and financial constraints is inverse u-shaped were medium sized firms are the most constrained firms. There may be several explanations for this result. As outlined in the theoretical framework the demand for innovation funding depends on a firms’ innovation capability, thus, the higher innovation capability, the flatter the demand curve for innovation funding. Accordingly, medium sized firms may have a higher innovation capability and thereby a higher funding need then their smaller counterparts. In the same time medium sized firms may also face higher marginal cost of capital in comparison to larger firms.

An additional concern that may affect the availability of external funding for innovative SMEs is the increased demand for stricter bank capital regulation. There is a view among scholars that the crisis was primarily a regulatory failure (Acharya et al. 2012). As a result, the Bank for International Settlements has introduced new regulations, generally referred to as Basel III, which seeks to seal the loophole that was exposed during the financial crisis. In its core essence, Basel III increases minimum capital ratios, tightens the definition of bank capital and requires tighter liquidity requirements (Cosimano & Hakura 2011).

While the benefits of higher capital requirements are rather clear in terms of lower leverage and thereby lower risk of bank defaults, there is less consensus regarding its disadvantages. One major concern is that higher capital requirements will increase the overall cost of capital and thereby increase lending rates\(^2\) and mitigate economic activity\(^3\) (Baker & Wurgler 2015). Theoretically higher lending rates should have a greater impact on innovative SMEs.

The second part of this thesis investigates whether there has been a change in the financing sources for tangible and innovation investments post implementation of Basel III. It investigates if the funding mix, and in particular the use of bank loans, has changed post Basel III and whether this has changed differently for SMEs in comparison to large firms. The result shows that the likelihood of using bank loan as a funding source has not changed post stricter bank regulation for neither tangible investments nor for inno-

\(^2\)see Admati et al. (2013) for a detailed discussion regarding increased capital requirement and capital cost.

\(^3\)see e.g Cummins et al. (1994), Philippon (2009), Gilchrist et al. (2013) for further discussion and evidence on how the cost of capital effects real investments.
vation investments. However, a change in the funding mix of the firms is observed as the probability of using sources such as equity, mezzanine capital and overdraft has decreased while the probability of using subsides has significantly increased. Moreover, strong evidence is found that firm size is an important determinant of the funding mix.

The main results of these two papers yield a better identification of financially constrained firms, which in turn allows for more precise and improved policy suggestions.
References


