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Friends or foes? The interrelationship between angel and venture capital markets ☆

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A B S T R A C T

This paper develops a theory of how angel and venture capital markets interact. Entrepreneurs first receive angel then venture capital funding. The two investor types are 'friends' in that they rely upon each other's investments. However, they are also 'foes,' because at the later stage the venture capitalists no longer need the angels. Using a costly search model we derive the equilibrium deal flows across the two markets, endogenously deriving market sizes, competitive structures, valuation levels, and exit rates. We also examine the role of legal protection for angel investments.

1. Introduction

Investments by wealthy individuals into start-up companies are typically referred to as angel investments. Over the last decade angels have become a more important source of early stage funding for entrepreneurs. According to Crunchbase (www.crunchbase.com) the US angel market grew at an annual rate of 33% between 2007 and 2013. In a 2011 report of the Organisation for Economic Co-operation and Development (OECD), the size of the angel market was estimated to be roughly comparable to the venture capital (VC henceforth) market (OECD, 2011). For 2009, the report estimates the US (European) venture capital market at \$18.3B (\$5.3B), and the US (European) angel market at \$17.7B (\$5.6B). The rise of the angel market coincides with a shift in VC investments towards doing more later-stage deals. As a result the funding path of growth-oriented start-ups typically involves some initial funding from angels, with subsequent funding coming from venture capitalists (VCs henceforth). Facebook and Google, two of the most successful start-ups in

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recent history, both received angel financing prior to obtaining VC.

With this bifurcation in the funding environment of entrepreneurial companies, the question arises how these two types of investors interact, and whether angels and VCs are friends or foes? Angels have limited funds and typically need VCs to provide follow-on funding for their companies. At the same time VCs rely on angels for their own deal flow. As they play complementary roles in the process of financing new ventures it might seem that angels and VCs should be friends. However, in practice angels and VCs often see each other as foes. In particular, there is a concern about so-called "*burned angels*." Angels frequently complain that VCs abuse their market power by offering unfairly low valuations. Expectations of low valuations at the VC stage then affect the willingness of angels to invest in early stage start-ups. Michael Zapata, an angel investor, explains it as follows (Holstein, 2012):

> *In cases where the VCs do see a profit opportunity, they have become increasingly aggressive in low-balling the managements and investors of emerging companies by placing lower valuations on them.* […] *Angels call these actions* '*cram downs*' *or* '*push downs*'. *The market has been very rough on the VCs and they are making it tougher on the angels. They are killing their future deal flow by cramming them down*, *crashing them out.*

The main objective of this paper is to examine the interdependencies between two types of investors, angels and VCs. Our goal is to provide a tractable model of the equilibrium dynamics between two sequentially related markets, and generate a rich set of empirical predictions. We are particularly interested in identifying the underlying determinants of market size and market competition (which depends on the entry rates of entrepreneurs, angels, and VCs), as well as company valuations and success rates. Special attention is given to analyzing the full equilibrium implications of the "*burned angels*" problem.

From a theory perspective, the challenge is to obtain a model of the two connected markets that generates tractable comparative statics for key variables. To this effect we develop a search model with endogenous entry by entrepreneurs, angels, and VCs. Companies require angels for seed investments, and could require VC for funding their growth options. The model generates predictions about the level of competition in both the angel and VC markets. It predicts the expected length of fundraising cycles (i.e., the time it takes to raise angel and VC funding), as well as the rate at which companies fail, progress from the angel to the VC market, or achieve an exit. We also derive equilibrium company valuations at both the angel and VC stage.

Our model has three key building blocks that build on previously disparate literatures. First, we draw on the staged financing literature (Admati and Pfleiderer, 1994; Berk, Green, and Naik, 1999), introducing a dynamic investment structure where start-ups first obtain seed funding in the angel market, then follow-up funding in the VC market. This simple dynamic structure allows us to capture the basic interdependencies between angels and VCs: angels invest first but need the VCs to take advantage of a company's growth options. Central to the model are two feedback loops. The first is the forward loop of how the angel market affects the VC market. The key linkage is that outflow of successful deals in the angel market constitutes the deal inflow in the VC market. Here, we can think of angels and VCs as 'friends.' The second is the backward loop of how the VC market affects the angel market. The key linkage here is that the utilities of the entrepreneurs and angels at the VC stage affect the entry rates of entrepreneurs and angels at the angel stage. A key insight is that at the VC stage, VCs no longer need the angels to make the investment. The angels' investment is sunk and they provide no further value to the company. This creates a primal friction between angels and VCs, i.e., this is where angels and VCs become 'foes.'

Second, we draw on the search literature. Inderst and Müller (2004) explain how a search model à la Diamond-Mortensen-Pissarides allows for a realistic modeling of imperfect competition in the VC market. We expand their model to two interconnected markets. We also augment their specification with a death rate for entrepreneurs. Our model highlights the consequences of imperfect competition in the VC market on the angels' bargaining position: while a monopolist VC would have a lot of power over angels, such bargaining power gets dissipated in a more competitive VC market.

Third, to examine further determinants of the relative bargaining strengths of entrepreneurs, angels, and VCs, we consider the issue of minority shareholder protection (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 2000). In his work on the "burned angels" problem, Leavitt (2005) provides a detailed legal analysis of the vulnerabilities of angels at the time of raising VC. As new investors, VCs can largely dictate terms. They can also use option grants as a way of compensating the entrepreneur for the low valuation offered to angels. Leavitt argues that legal minority shareholder protection can mitigate the burned angel problem, but cannot fully resolve it. Based on this, we consider a hold-up problem between the angel and the entrepreneur at the time of the follow-up round. The term "hold-up" only applies for the ex post relationship between angel and entrepreneur. The VC cannot hold up the angel or the entrepreneur, as he has no prior contractual relationship with them. In our context hold-up means that the entrepreneur colludes with the VC to pursue the venture alone without the angel. While the threat remains unexercised in equilibrium, the hold-up potential redistributes rents from the angel to the entrepreneur and VC. Our analysis traces out the equilibrium effects that such hold-up has on the returns and investment levels of angels and VCs.

Our model generates a large number of comparative statics results. Throughout the analysis we consider the joint equilibrium across the two markets. We find that our within-market effects are consistent with results in the prior literature (e.g., Inderst and Müller, 2004), so our main contribution is the analysis of cross-market effects. Here, we discover several new insights. For example, a standard within-market result is that while higher search