

How Does Policy Uncertainty Affect Corporate Venture Capital Investments?

Sunu Kim*

KAIST College of Business

Yongwook Paik**

KAIST College of Business

Strategically reacting to changes in the external environment and adequately allocating internal resources are crucial tasks for a firm's competitive advantage(e.g., Barney, 2001; Penrose, 2009; Porter, 1991; Wernerfelt, 1984). In recent years, the systematic practice of making minority investments in new innovative ventures through corporate venture capital (CVC) activities(Gompers & Lerner, 2000) has become one the most prominent ways firms strategically adapt to the changing environment and sustain their innovation capabilities (Basu et al., 2011; Benson & Ziedonis, 2009; Dushnitsky & Lenox, 2005a, b). Reflecting this upswing in practical importance, academic research in the CVC literature has also proliferated in recent years(Dushnitsky, 2006; Dushnitsky et al., 2020; Maula, 2007). For example, one noteworthy stream of research in this space focuses on the various drivers of CVC investments(e.g., Bae & Lee, 2021; Dushnitsky & Lavie, 2010; Dushnitsky & Shaver, 2009; Kim, Steensma, & Park, 2019; Sahaym, Steensma, & Barden, 2010) because understanding the driving factors of CVC investments is important not only to theoretically make sense of a firm's strategic behavior but also to practically appreciate how the entrepreneurial financing market functions for investee ventures when receiving CVC investments. Given the significant effect the CVC investment relationship has on both the investing firm(e.g., Dushnitsky & Lenox, 2005b, 2006; Wadhwa & Kotha, 2006) and the investee venture after forming an investment tie(e.g., Alvarez-Garrido & Dushnitsky, 2016; Di Lorenzo & van de Vrande, 2019; Paik & Woo,

2017), much of the prior research has focused on identifying the characteristics of the investing corporation(e.g., Basu et al., 2011; Dushnitsky & Lenox, 2005a) or the investee venture(e.g., Bae & Lee, 2021; Kim et al., 2019) that drive CVC investments.

While prior studies provide us with valuable insights into how CVC investments are formed, scholars have paid much less attention to systematically examining macroeconomic factors, such as government policies, that are external to the investor-investee dyadic relationship but are nonetheless important drivers of CVC investments. To fill this gap in the literature, in this study, we focus on examining a particular type of macroeconomic factor that is important to all firms, industries, and markets. Specifically, we consider how policy uncertainty affects CVC investments. Policy uncertainty refers to a situation in which an economic agent cannot predict exactly whether, when, and how the government will change economic policies. For example, the government may contemplate either providing subsidies to the traditional oil and gas industry for developing new technologies that can reduce the carbon footprint or, alternatively, providing subsidies to the renewable energy industry to develop new technologies that can replace oil and gas altogether as sources of energy. Policy uncertainty can, for instance, result from the government's decision to settle its budget, changes in political leadership, or changes in rules and regulations governing taxes and investment. Frequent changes, or undecided directions, in government policies can make a

* sunu@kaist.ac.kr

** ywpaik@kaist.ac.kr

firm's operating environment complex, volatile, and difficult to predict, and ultimately, such uncertainties can materially affect the use of various investments including CVC investment strategies. Given the significant role uncertainty plays in making investment decisions, economists and finance scholars have long been interested in understanding how firms make investment decisions under uncertainty (e.g., Abel, 1983; Bermanke, 1983; Bloom et al., 2007; Dixit & Pindyck, 1994; Lucas Jr & Prescott, 1971). In this study, we borrow insights from the finance and economics literature and investigate how policy uncertainty affects the strategic use of CVC investments.

There are many ways in which firms respond to uncertainty. Typically, firms become cautious and limit investment when facing uncertainty (Dixit & Pindyck, 1994; Pindyck, 1993). For example, prior studies show that firms reduce their internal R&D investments (Bhattacharya et al., 2017), merger and acquisition (M&A) activities (Bonaime et al., 2018; Lee, 2018b), and corporate investments such as capital expenditures (Gulen & Ion, 2016; Julio & Yook, 2012) when policy uncertainty increases. Relatedly, when policy uncertainty increases, venture capitalists also reduce their investments (Tian & Ye, 2018). In other words, when investment projects are not reversible, firms have an incentive to postpone their investments that can be delayed as long as possible when uncertainty increases because uncertainty increases the value of a wait-and-see option, i.e., firms reduce their current investment when there is a possibility of a negative outcome (Bermanke, 1983). However, CVC investment is a governance mode that is relatively reversible and requires less commitment (Van de Vrande et al., 2006) from a transaction cost economics perspective (Williamson, 1975, 1979) compared to fully integrated governance modes such as R&D activities, M&As, alliances, or joint ventures. In fact, Tong & Li (2011) show that firms use CVC investments more often than fully integrated M&As when uncertainty is high, and Ceccagnoli et al. (2018) show that firms use CVC investments more frequently when uncertainty is high before fully committing to a technology licensing agreement. In addition, firms may have incentives to diversify their operations and market segments via CVC investments through a portfolio approach in search of better market opportunities when uncertainty is high. Moreover, when uncertainty is high, the corporate investor, as an acquirer of

equity of entrepreneurial ventures, may have greater bargaining power vis-à-vis target ventures (Lee, 2018a) that make CVC investments attractive, especially because there is a reduced supply of venture capital during times of high uncertainty (Tian & Ye, 2018). Thus, for firms with a CVC program, we argue that policy uncertainty is positively related to the amount of resources committed to CVC investment. However, not all firms respond equally to economic policy uncertainty (EPU). We argue that demand- and supply-side moderators alter the positive relationship between policy uncertainty and CVC investment. Firms that are more dependent on government spending for their revenue will face greater demand uncertainty, rather than better market opportunities, when EPU increases, thereby attenuating the positive relationship between EPU and CVC investment by employing a prolonged wait-and-see strategy. Furthermore, firms with higher R&D intensity will likely commit more of their resources internally to a particular technology path, making such organizations less flexible to environmental changes and more susceptible to uncertainties (i.e., making a prolonged wait-and-see option more attractive), thereby attenuating the positive relationship between policy uncertainty and CVC investment.

We test our theoretical arguments by empirically investigating the effect of EPU on CVC investments made by U.S. publicly traded firms from 1997 to 2020. While it may be challenging to measure EPU, we follow the standard measure extensively used in the economics and finance literature (e.g., Bhattacharya et al., 2017; Bonaime et al., 2018; Gulen & Ion, 2015; Julio & Yook, 2012; Lee, 2018a; Tian & Ye, 2018) and use an aggregate index developed by Baker et al. (2016) to measure policy-related economic uncertainty. We discuss the construction of this index in more detail in our empirical section. Using this index and data from VentureXpert, Compustat, and other sources, we show that, on average, firms commit more resources to CVC investment activities when EPU increases, consistent with the idea that CVC investment is a firm strategy with a low degree of investment irreversibility that provides flexible option value to the investing firm. At the same time, we find substantial firm heterogeneity in CVC investment patterns when firms respond to EPU. For example, we find that firms that are more dependent on government spending become more conservative in CVC investments than otherwise, consistent with the idea

that an increase in demand-side market uncertainty makes firms curb all types of investments in the short run. We also find that a firm's higher R&D intensity negatively moderates the positive relationship between EPU and CVC investment, consistent with the idea that a firm's internal R&D investments and CVC investments are substitutes in the short run from a supply-side innovation strategy perspective. Moreover, to validate our arguments, we interviewed several CVC investors, founders of entrepreneurial ventures, policymakers, and regulators to gain clarity regarding CVC investments made between incumbent firms and entrepreneurial ventures when policy uncertainty arises.

Our paper makes several important contributions to the literature. First, our study extends the literature on CVC investments by considering an important macroeconomic factor(i.e., EPU) that affects CVC investment between an incumbent firm and an entrepreneurial venture. Prior work in the CVC literature has predominantly focused on either understanding the characteristics of the investing incumbent firm or the investee entrepreneurial venture that determine the formation of a CVC investment between them(e.g., Bae & Lee, 2021; Dushnitsky & Lenox, 2005a; Dushnitsky & Shaver, 2009; Kim et al., 2019) or understanding the pros and cons of the CVC investment relationship for the investing firm(e.g., Basu et al., 2011; Benson & Ziedonis, 2009, 2010; Dushnitsky & Lenox, 2005b, 2006; Sahaym et al., 2010; Wadhwa & Kotha, 2006) or for the investee venture(e.g., Alvarez-Garrido & Dushnitsky, 2016; Chemmanur et al., 2014; Di Lorenzo & van de Vrande, 2019; Kim & Park, 2017; Pahnke et al., 2015; Paik & Woo, 2017; Park & Steensma, 2012, 2013). While these prior studies offer a good understanding of the nature of a CVC investment within a dyadic relationship, they do not systematically examine macroeconomic factors that are exogenous to the dyadic investor-investee relationship, such as the role played by the government or its economic policies. Nonetheless, macroeconomic factors are important concepts managers have a keen interest in that profoundly affect all industries, firms, and markets. In this study, we provide a systematic investigation of the relationship between EPU and CVC investments, thereby extending the investor-investee dyadic relationship framework to formally take into consideration government policy uncertainty as a driving force of the formation of the relationship. A couple of notable prior

studies related to our paper examine the relationship between technological uncertainty and CVC investments(e.g., Ceccagnoli et al., 2018; Tong & Li, 2011). The concept of technological uncertainty, usually measured by industry-level stock market volatility, can also be conceived as an antecedent exogenous to the dyadic investor-investee relationship and relates to the decision of which technology a firm should invest in for its production capabilities. However, the EPU that we consider in this study is not only related to how a firm invests in preparing its production capabilities but also relates to how firms cope with demand uncertainties in the market when commercializing its product. Thus, by systematically investigating the effect of EPU on CVC investments, this study offers new insights to the CVC literature and invites more scholars to seriously consider various antecedents outside of the dyadic investor-investee relationship.

Second, this study contributes to the emerging literature on the various effects of EPU on firm investment outcomes. Regarding firm investment decisions, Bloom et al.(2007) find that uncertainty in general makes firms prefer to a "wait and see" approach(i.e., firms become more cautious about their investment behavior) rather than undertake a costly action when consequences are uncertain. In this sense, by choosing not to proceed with an investment decision until uncertainty is substantially resolved, firms obtain implicit insurance that protects them from downside losses. Consistent with this general framework, prior empirical studies show that EPU negatively affects firms' investment activities. For example, Julio & Yook(2012) and Gulen & Ion(2016) show that uncertainty associated with future policy and regulatory outcomes negatively affects firm-level capital investments, such as capital expenditures, and Bonaime et al.(2018) and Lee(2018a) show that uncertainty negatively affects M&A activities. Moreover, Bhattacharya et al.(2017) show that EPU, rather than policy per se, negatively affects innovation activities, such as R&D expenses and patents. We contribute to this stream of literature by showing that EPU can in some cases increase a certain type of investment, such as CVC investment. Thus, our study provides a balanced view of the prior literature.