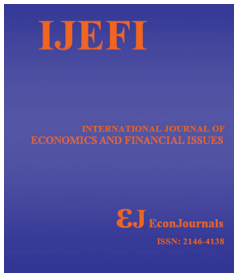

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Institutional Barriers to Financing Technology-based Small Firms through Venture Capital Mechanism: A Study to Explore the Incentives for Investment in Iran

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ABSTRACT

There is a consensus among scholars that access to financial sources is vital for technology-based small firms (TBSFs). Venture capital (VC) financing is the most appropriate external financial source for them. However, VC industry is underdeveloped in most developing countries, e.g., Iran. This paper seeks to discover the causes for "lack of incentives for VC investment" based on institutional theory. In this regard, institutional obstacles constraining the incentives for VC investment in Iran were investigated through conducting 31 detailed interviews. The results suggest that the institutional set-up in Iran motivates the investment in tangible assets, short term projects, large investment schemes and intransparent project rather than TBSFs. Many institutional factors were identified which decrease the incentives for VC investment as: Information disclosure institutions, tax regulations, labor regulations, fiscal institutions, political institutions, commerce and competition regulation.

Keywords: Venture Capital, Technology-based Small Firm, Incentives for Investment
JEL Classifications: G24, G28, G31, G38, O31

1. INTRODUCTION

Technology-based small firms (TBSFs) play a critical role in job creation, promotion of national competitiveness and innovation in each country (Bozkaya et al., 2008; Cassar, 2004; Storey and Tether, 1998). However, there is a consensus among scholars that financing is among the main challenges ahead of TBSFs, especially in their early stages of growth (Bozkaya et al., 2008; Carpenter and Petersen, 2002; Guijarro et al., 2009; Hall, 2010; Klonowski, 2012; Mason and Kwok, 2010; Ou and Haynes, 2006; Storey and Tether, 1998). Financing through banks and debt-based tools are difficult for TBSFs, because:

- The asset specificity of TBSFs is high (i.e., few alternative usages) which impairs its collateral value (Cumming, 2005; Williamson, 1988).
- Market value of TBSFs is highly dependent on intangible assets such as know-how and skilled human resource that are difficult to protect (Carpenter and Petersen, 2002; Cumming, 2005; Gompers and Lerner, 2001; Hall, 2010; Klonowski, 2012; Metrick and Yasuda, 2010; Peneder, 2008).
- TBSFs offer novel products which have no/few market record. It makes the product/firm's precise evaluation too difficult (Berger and Udell, 1998; Lall, 2004; Revest and Sapio, 2012).
- There are several ambiguities in the business environment and market dynamics (e.g., size and share) of TBSFs that leads to high uncertainty in return rate of investment (Berger and Udell, 1998; Carpenter and Petersen, 2002; Guijarro et al., 2009; Klonowski, 2012; Vanacker et al., 2014).

Venture capital (VC) mechanism seems to be the best mechanism for TBSFs at seed and early stages (Berger and Udell, 1998; Carpenter and Petersen, 2002; Gompers and Lerner, 2004; Hall and Lerner, 2010). That's why venture capitalists are the main shareholders of TBSFs (after entrepreneurs) in the world (George

et al., 2005). Accordingly, one main concern for the policy makers is providing access to VC financing for TBSFs in their seed and early stages of growth (Hain et al., 2016; Kortum and Lerner, 2000).

VC funds are the financial intermediaries that raise funds from end-investors and invest in the equity of small innovative firms with high potential for growth. They are not only financial intermediaries, but also play an active role in managerial supporting and providing their access to strategic markets and resources (Gompers and Lerner, 2001; Sapienza et al., 1996; Vanacker et al., 2014; Hain et al., 2016, Metrick and Yasuda, 2011). Also, they appoint key industry expertise in the boards and body of TBSFs to monitor the firm and offer complementary contracts to modify the firms' governance structure (Cumming and Johan, 2013; Cumming, 2005; Vanacker et al., 2014).

In west, particularly USA, VC funds play a critical role in the process of innovation, technology development and commercialization (Kortum and Lerner, 2000; Patricof, 1989). General Doriot, organized the first VC funds in 1946 in the USA (Gompers and Lerner, 2001; Kortum and Lerner, 2000; Lerner and Tag, 2013; Metrick and Yasuda, 2010). Nowadays, after seven decades, American VC industry is a pioneer in the world with annual investment equal to 72.3 billion dollars in 2015 (Ernst and Young, 2016). Formation of VC industry in Europe dates back to 1970's where the first experiences in France (Dubocage and Rivaud-Danset, 2002), Germany (Becker and Hellmann, 2005) and Italy (Bertoni et al., 2007) came across to failure due to institutional barriers. However, VC industry in Europe widely spread out in 1990s, i.e., around half a century after the US (Revest and Sapio, 2012). Annual VC investment in all European countries was 14.4 billion dollars in 2015 (Ernst and Young, 2016), <20% that of the USA. South East Asian countries (except japan) are late comers, but rapidly growing, in VC industry (Ayyagari et al., 2012; Bruton and Ahlstrom, 2003; Bruton et al., 2002; Scheela and Jittrapanun, 2012). For instance, Chinese government, in the mid-1990s, supported the development of VC industry to promote the entrepreneurial activities. Today, after two decades, China is the pioneer of VC industry in Asia (Milana and Wu, 2012). Annual investment in China VC industry reached 49.2 billion dollars in 2015 (Ernst and Young, 2016).

Despite the boom of VC industry in the west and some Asian countries in the late twentieth century, VC investment in Middle Eastern countries (most of which are developing counties) is naïve. For instance, the total VC investment in Middle East and North African countries (including Iran) was <1 billion dollar (i.e., 992 million dollars) in 2015 (Thomson Reuters, 2016). According to the Iranian VC Association (IRVC), the VC investment in Iran had been <30 million dollars in 2016. Furthermore, there also exists a large gap in research on VC investment challenges in middle eastern countries, such as Iran, and western countries, such as USA (Peneder, 2008; Vanacker et al., 2014; Dossani and Kenney, 2002; Fan et al., 2012). In Iran, almost no concise research has been accomplished to investigate the challenges and barriers of VC industry development.

Many studies on VC industry in developed and developing countries, emphasize the application of institutional approach as a conceptual framework. Because the institutional differences between countries affect the structure of VC industry and its evolution process (Ahlstrom and Bruton, 2006; Bruton and Ahlstrom, 2003; Bruton et al., 2002; Cumming et al., 2010; De Lima Ribeiro and Gledson de Carvalho, 2008; Dossani and Kenney, 2002; Fan et al., 2012; Hain et al., 2016; Karaomerlioglu and Jacobsson, 2000; Lerner and Tag, 2013; Lingelbach, 2015; Scheela and Jittrapanun, 2012; Scheela and Van Dinh, 2004). Based on the institutional theory, institutions determine the rules of the game in each society (North, 1990). Institutions not only determine the limits, but also provide the frameworks in which the incentives and relation among all actors, including VC fund and TBSFs, are determined (Bruton and Ahlstrom, 2003; North, 1990; Williamson, 1981). In institutional approach, the extent to which TBSFs have access to VC financing is attributed to institutions such as legal, socio-economic, political and cultural backgrounds (North, 1990). Based on nature and function of institutions, the barriers to financing TBSFs through VC mechanisms can be divided into the flowing categories:

1. Lack of incentive for investment due to infeasibility of innovative and technology-based activities. As institutions provide a framework in which the incentives and behaviors of entrepreneurs and VC funds are governed (North, 1990), there are some institutional barriers that decrease both investors and investees incentives to enter venturing efforts. This subject is often attributed to the nature of technological investment projects that does not meet the criteria of risks and return.
2. Lack of means that provide difficulties in the relation between supply side (VC funds) and demand side (TBSFs). On the other hand, although some projects meet the economic criteria and encourage both investors/investees, the relationship between both parties encounters high transaction cost due to institutional inefficiencies (Williamson, 1981).

Research on difficulties in bilateral relationships, i.e., investors and investees, is prevalent in the literature. as an instance, Berger and Udell, 1998; Carpenter and Petersen, 2002; Cumming, 2005; Gompers and Lerner, 2001; Hain et al., 2016; Hall, 2010; Hall and Lerner, 2010; Klonowski, 2012; Klonowski, 2006; Metrick and Yasuda, 2010, suggest that *adverse selection* and *moral hazard* is the main obstacle for the relationship between investor and investee. However, few scholars have investigated lack of incentives, particularly in developing countries. Hence, the current study is carried out in four following sections to answer the question "*Which institutions (and how) hinder the incentives for VC investment in Iran?*" The literature is critically reviewed in section 2 and Research methodology is presented in section 3. Finally, in sections 4 and 5 results are reported, discussed, concluded and the relevant policy implications are presented.

2. THEORETICAL BACKGROUND

2.1. VC and TBSFs in Iran

The first serious national VC effort in Iran dates back to 2001, when government cabinet passed through the act underlying the formation of "non-governmental research and technology funds,"

hereafter abbreviated as RTF (Islamic Parliament Research Center, 2015). RTFs are public-private partnership financing agents which fund TBSFs in the form of equity and/or debt mechanism. From 2002 to 2016, thirty two RTFs were established, sixteen of which are newly established. Eighteen RTFs with more experience in TBSFs financing are the member of IRVC. IRVC, founded in 2012, has 52 members[1] (including 14 private VC funds, 7 business angels and 6 accelerators). IRVC members offer various financial services to TBSFs (such as loan, risky capital or guarantee). However, according to the IRVC, nearly 150 million dollars were funded by the members in 2016 while the share of VC funding is only 18%. In 2010 the law entitled "supporting the knowledge-based firms" passed through the Iranian parliament. From 2010 to 2017, more than 3000 firms have been entitled to receive the supports predicted in the law (i.e., tax exemption, financing, preferred tariffs and …), 93% of which have been small firms with <50 employees. To prepare the ground for financing such firms, the governmental "innovation and prosperity fund (IPF)" was approved by the cabinet in 2012. In 2014, IPF formally launched the financial services with the budget of 1 billion dollars. The mission of IPF was to support TBSFs through means of financing (loan and/or VC financing). By October 2016, IPF provided 280 million dollars to TBSFs through debt financing (United Nations Conference on Trade and Development, 2016).

In 2016, Iranian "securities and exchange organization (SEO)," approved the regulation of establishing technology-based private equity funds (PEF). Such PEFs can easily offer the TBSFs' stocks through SEO, unlike other VC funds in Iran. Since 2016, 12 technology-based PEFs are approved by SEO, 2 of which have recently started funding TBSFs. Summary of VC industry evolution in Iran is reported in Table 1.

Despite the mentioned efforts, VC industry in Iran is still underdeveloped, so that UNCTAD (2016) has estimated the VC financing in Iran from 2005 to 2015 as only 340 million dollars. Also, based on World Economic Forum (WEF) reports, Iran ranks 125 among 140 in the index of access to VC (Schwab, 2016). So the above mention facts reveal that VC industry in Iran is not fully developed despite the supports from government through formation of several governmental and non-governmental VC funds. It seems that underdevelopment of VC industry in Iran is mainly attributable to the lack of efficient institutions. Based on the WEF report in 2016, Iran ranks 94 among 140 countries regarding the institutional development. Also, in global innovation index (GII index) in 2016, Iran ranks 112 among 128 countries considering the quality of institution (Dutta et al., 2016).

2.2. Institutional Theory

Reviewing the literature on VC and institutions, one will come up with the fact that in the process of developing VC industry, the institutions (formal and informal) matter (Lerner and Tag, 2013; Bruton and Ahlstrom, 2003; Hain et al., 2016; Scheela and Jittrapanun, 2012). Based on the institutional theory, institutions not only facilitate the transactions (through mitigation of uncertainties and transaction cost), but also determine human incentives. In this regard, North (1990) noted that: "*Institutions are the rules of the game in society or, more formally, are the humanly devised constraints that shape human interaction*" (North, 1990, p. 3-5). "*In consequence, they (institutions) structure incentives in human exchange, whether political, social, or economic*" (North, 1990, p. 3-5). Also, he states that "*Institutions consist of both informal constraints (sanctions, taboos, customs, traditions, and codes of conduct), and formal rules (constitutions, laws, property rights)*" (North, 1991, p. 97). Williamson (2000) developed a "4 - level" hierarchy model for economics of institutions. In his model, each economic phenomenon can be analyzed through institutional perspective in the forthcoming four levels:

L1 - Social theory: Informal institutions (customs, traditions and religious norms) previously discussed by North (1991) are placed in the first level (social theory) at the top of the hierarchy. Institutions at this level are very slow changing (100–1000 years last for changing), spontaneous origins and often noncalculative (Williamson, 2000). Second level institutions (L2), explained below, are influenced by institutions at this level (L1). For example Stulz and Williamson (2003) showed that differences in culture, proxied by differences in religion and language, are helpful in understanding how investor (like venture capitalists) rights are enforced across countries.

L2 - Economics of property rights/positive political theory: The second level refers to the formal institutions such as constitutions, laws and property rights. Changes in the institutions at this level occur during several decades (Williamson, 2000). As Williamson (2000) noted: "*The design instruments at Level 2 include the executive, legislative, judicial, and bureaucratic functions of government as well as the distribution of powers across different levels of government (federalism). The definition and enforcement of property rights and of contract laws are important features*."

L3 - Transaction cost theory: The third level in Williamson's (2000) model includes the institutions of governance. Williamson (2000) noted that "*Although property (rights and the contract laws) remains important, a perfectly functioning legal system for defining contract laws and enforcing contracts is not contemplated*." On the other hand, if the institutional environment (L2) represents rules of the game, the institution of governance (L3) delegates the play of the game. At this level, individuals adopt different types of transactions to economize transaction costs. Changes in this level occur during a year to a decade and are dominated by higher institutional levels.

L4 - Neoclassical economics/Agency theory: The forth level is resource allocation which is highly influenced by the three previous levels. Changes at this level is continuous. Hence neoclassical analysis works.

It is noteworthy that each two neighboring level interactively influence each other. In current research, this hierarchy model is employed to conclude how institutions hamper the incentives for VC investment in Iran (as a middle Eastern developing country). Previously, Estrin et al., (2013) adopted this framework to show how institutions encourage entrepreneurial growth aspiration.

1 In 2017.

Table 1: Selected TBSFs and VC related national efforts in Iran (provided by the authors)

Efforts	Managing agency	Years	description
The act underlying the formation of RTFs	Government cabinet	2001	Establishment of 32 RTFs from 2002 to 2016 which can fund TBSFs in the form of equity and/or debt mechanism
The law of "supporting the knowledge-based firms"	Iranian parliament	2010	More than 3000 firms have been entitled to receive the supports predicted in the law, 93% of which have been small firms
Foundation of Iranian VC association	Private sector	2012	IRVC now has 52 members including 18 RTFs, 14 private VC funds, 7 business angels and 6 accelerators
Approvement of the governmental "IPF"	Government cabinet	2012	The initial capital by its mandate is $1 billion that part of which should provide to TBSFs through VC mechanism, but by October 2016 the IPF had provided 280 million dollars to TBSFs all through debt mechanism
Regulation of establishing technology-based PEFs	Iranian securities and exchange organization	2016	Since 2016, 12 technology-based PEFs are approved by SEO, 2 of which have recently started funding TBSFs

IPFs: Innovation and prosperity funds, PEFs: Private equity funds, TBSFs: Technology-based small firms, VC: Venture capital, SEO: Securities and exchange organization

2.3. VC and Institutions

Going through the body of knowledge on the role of institutions in VC industry reveals that some scholars have attempted to provide a holistic framework, i.e., considering both incentives for VC investment and means for relationship between VC funds and TBSFs. Some others have addressed the lack of appropriate institutions for facilitating the relationship. However, most researchers have focused on a single institutional factor as follows:

Karaomerlioglu and Jacobsson (2000) provided a relatively comprehensive framework of institutional barriers to the development of VC industry in Sweden. They argued that the institutional set-up in an economy should provide the access to savings (through allowing pension funds to make substantial investments into VC firms), the incentive structure (through reduction of capital gains, personal income tax rate and providing appropriate governance forms such as limited partnership) and the exit possibilities (especially through IPO in a developed stock market) for VC industry to develop. Jeng and Wells (2000), surveyed the VC industry in 21 developed countries including USA, UK and Norway. They concluded that well-developed institutions such as stock and labor markets, financial reporting standards and efficient government policies play critical role in VC industry development. Becker and Hellmann (2005) studied the challenges of WFG[2] VC fund in Germany. They counted several factors such as insufficient investor protection in contracting, naïve corporate governance, lack of qualified entrepreneurs, lack of active stock market for VC funds and insufficient country's attitude towards entrepreneurship as the main institutional barriers to German VC development. Peneder (2008) counts the nature of knowledge as the main reason for lack of incentives to investment in innovation. As Peneder (2008, p. 519) noted: "*Knowledge has two critical properties which can seriously reduce its commercial value. First, knowledge remains in circulation no matter how many people use it ('nonrivalry' of consumption). Second, as soon as knowledge is disclosed, it becomes difficult to enforce any payment ('non-excludability'). As a consequence, many innovative firms face the following dilemma: How can they communicate to a potential buyer the value of a new idea, without disclosing the idea itself? And once they have disclosed the idea, why should a potential buyer be willing to pay for it?*" So, weakness in property rights lowers the incentives to invest in innovation. He also note that: "*Imperfections in capital markets are the second finance related cause of under-investment in innovation*" (p. 520). This refers to the lack of means to relationship. Lerner and Tag (2013) count the financial market development, legal environment, labor market regulations, tax system and public spending on R and D as the five important institutions which affect VC industry development. They conclude that the main barrier to VC industry development (in the Sweden compared with the USA) can be traced in a tax system (that discourage private equity investments in SMEs) and inefficient regulation of financial markets (which provide various exit opportunities for VC funds and application of stock options to compensate entrepreneurs and other key employees).

The cases reviewed so far (Becker and Hellmann, 2005; Jeng and Wells, 2000; Karaomerlioglu and Jacobsson, 2000; Lerner and Tag, 2013; Peneder, 2008) have investigated developed countries. There are also few studies in developing countries. For example De Lima Ribeiro and Gledson de Carvalho (2008) count many important developments in institutional environment of Brazilian PE/VC industry as: Allowing Pension funds to invest in PE/VC, resurgence of the stock market for profitable exit mechanism through IPOs and also encourage good corporate governance practices, declining interest rates which making PE/VC more attractive to investors and encouraging leveraged buyouts, protective regulation for PE/VC investment, recognizing arbitration in Brazilian legal system as a mechanism to solve conflicts, providing opportunities to PE/VC funds for long-term investments, approval of new bankruptcy law, improving tax regulations and procedures for PE/VC funds and reduction of the tax burden on formal companies, reducing tax rates with full exemption to foreign investors, increasing investor protection through new corporate law and reforming enforcement of rights. Also Dossani and Kenney (2002) investigate the environmental (institutional) barriers for VC industry in India. They noted that: "*Regulations regarding VC continued to be cumbersome and sometimes contradictory.... Impediments to the development of VC also exist in India's corporate, tax, and currency laws*." (p. 247). They also noted that investors' protection regulations are not well-developed in India. There was not even one

2 Deutsche Wagnisfinanzierungs-Gesellschaft.

self-regulatory group. Dossani and Kenney (2002) also believe that tax regulation in India not only discouraged the VC funds but also have not been fiscally neutral for VC funds compared with other domestic PEFs. Based on Dossani and Kenney (2002) findings, inappropriate currency regime in India also inhibited international VC firms from investing in India.

Some other scholars have investigated the impact of institutions on the VC process. Bruton and Ahlstrom (2003) for China, Bruton et al. (2009) for Latin American countries, Ahlstrom and Bruton (2006) for East Asia emerging economies, Scheela and Van Dinh, (2004) for Vietnam, Bruton et al. (2002) for Singapore, Scheela and Isidro (2008) for Philippine and Scheela and Jittrapanun (2012) for Thailand are the main instances. All the mentioned researches have focused on the relationship between VC funds and TBSFs but the role of incentive for VC investments is almost ignored.

Finally, some scholars have addressed the role of institutions on the VC industry focusing on one factor, e.g., tax institutions (Cullen and Gordon, 2007; Cumming, 2005; Djankov et al., 2010; Gentry and Hubbard, 2000; Keuschnigg and Nielsen, 2004) which can discourage the entrepreneurs and VC funds from engagement in technological business venturing or legal institutions such as investor protection and corporate governance (Bottazzi et al., 2009; Cumming and Johan, 2013; Cumming et al., 2010; Cumming and Johan, 2013; La Porta et al., 1998; 2000). Also Lingelbach (2015) investigate the impact of institutional change, not any institutional factors, on the VC process in emerging economies. He found that formal institutional change (both improvement and decline), have a positive impact on the VC development process. He argued that macro institutions, particularly changes in political stability and rule of law, is more important. Higher institutional instability generate more stocks of opportunity and stronger public–private cooperation that encourage VC investments.

There is a consensus among scholars that development of VC industry is highly affected by institutional development. However, few scholars have scrutinized the effect of institutions on the incentives for VC investment in a comprehensive and integrated approach. Also, to date, the case of Iran as a developing country in the Middle East has not been studied. To fill the mentioned gap, current study seeks to explore the institutional challenges of VC industry development in Iran focusing on incentives for VC investment.in this regard, Williamson 4-level institutional model is employed to develop a comprehensive framework for exploring the institutional factors that hamper the incentives in the course of VC investment.

3. METHODOLOGY

In current research, explorative approach has been adopted (Shields and Rangarjan, 2013) to address the research question previously stated in Section 1. As the research is exploratory in nature, grounded theory (GT) approach is employed to explore the role of institutions in hampering the incentive for VC investment. Glaser and Strauss (1967, p. 1), state that "*most writing on sociological method has been concerned with how accurate facts can be obtained and how theory can thereby be more rigorously tested.… (but) We believe that the discovery of theory from data-which we call GT-is a major task confronting sociology today*."

The qualitative GT approach provides opportunities to create new understandings rather than a method to provide rigorous, empirical testing of existing theories. While GT approach is extensively employed in several social sciences, only recently has it been employed in organizational studies (Lee, 1999).

GT approach has diversified since its initial development and the most important variation is between Glaser and Strauss, the founders of GT (Heath and Cowley, 2004). In this research, Glaserian (Glaser, 1978; 1992) approach of GT is adopted which relies on emergence of theory from the data but based on the researcher's interpretation. Indeed, in this approach the theory is discovered rather than constructed based on predetermined framework (Heath and Cowley, 2004).

In the course of research, we collected data through 31 face-to-face, in-depth, semi-structured interviews lasting one hour and ten minutes in average. As the research subject is multidimensional, so the interviewees are selected from different stakeholders in VC industries. Table 2 shows the diversity in the source of collected data through interviews.

Purposive sampling approach was followed in sample selection and subsequent follow-up. This approach calls for selecting participants with specific characteristics (Lincoln and Guba, 1985). In this case, the effort was made to ensure that a range of different interviewees with different experience and viewpoints have participated in building the GT. The interviews were recorded and continued up to the point that the incremental findings derived from the field research showed features of diminishing incremental information and saturated categories (Glaser and Strauss, 1967).

To answer the research question, we analyzed the data in three coding stages (i.e., open coding, selective coding and theoretic coding). The coding stages overlap considerably, and thus are not considered separately but rather undertaken simultaneously for the study (Glaser, 1978; 1992). Open coding, which serves to open up the data, is done on a line-by-line basis and ceases when the core concepts and the major categories are identified (Glaser, 1978; 1992). The core concepts is then selectively coded for in the next coding stage. Possible causal relationships between variables suggested by institutional theories were noted on memos. Finally, once the categories of institutional constrains reached saturation, theoretical coding seeks to provide explanations for these relationships based on theoretical codes.

To ensure the reliability of this research, several mechanism compatible with GT approach were adopted. Firs: The research involved multiple (two) researchers to ensure divergent perspectives and to check reliability (Eisenhardt, 1989). Second: Some interviews were accomplished by two skilled interviewer other than researchers. Third, a graduate student familiar with the literature of VC investment and institutional theory, but not part of the study, aided in identification of categories in the coding steps. Reliability among the codes from different interviewer data

and the three coders (two researchers and one graduate student) was appropriate. Also, to ensure the validity of research, the three following strategies were adopted. First, after all interviews, the extracted codes and their relations were returned back to the interviewees to confirm if these findings were all that they meant. Second, in line with Fried and Hisrich (1994), in each interview replication logic (Eisenhardt, 1989) was adopted. In this strategy information from the previous interviews was presented to the next interviewee for further validation. Third, the findings of interviews and final model were reviewed with four experts in final validation of the model.

4. RESULTS

In the course of data gathering process, all interviews were reviewed and 434 quotation were identified. The quotations were coded in 124 conceptual propositions. In an iterative analytical process the codes were organized in 23 primary categories and 4 secondary categories. Research findings suggest that Iranian institutional framework encourages the investment in (1) tangible assets versus intangible assets; (2) informal business versus formal business; (3) short term projects versus long term projects and (4) large scale projects versus small scale projects. The above mentioned results raise the question that "why technological ventures, particularly small firms, are not attractive enough for both entrepreneurs and investors in Iran?" The following sections are the results of interviews addressing the above question.

4.1. "Tangible Versus Intangible" Assets

The value of TBSFs is highly dependent on intangible assets such as know-how and skilled human resource that are difficult to protect (Carpenter and Petersen, 2002; Cumming, 2005; Gompers and Lerner, 2001; Hall, 2010; Klonowski, 2012; Metrick and Yasuda, 2010; Peneder, 2008). In Iran, It is widely accepted by general public that investment in tangible assets (such as land, house, gold, etc.) is much more profitable than intangible assets such as knowledge-based production. Due to the following institutional factors, investing in tangible assets can be more attractive.

4.1.1. Inappropriate monetary policy (the challenge of inflation)

Inflation has been an inseparable part of Iran economy in the past half century. In the last decade, Iran has been ranked among the 10th high inflation countries (International Monetary Fund, 2016). It is equal to devaluation of cash money as much as 20% per annum:

> *"The major gain in our firm has been the price rise in tangible assets (i.e., lands, building) not from the production and/or the intellectual properties value."*

Table 2: Diversity in the source of collected data through interviews

Data resource group	Number of interviewees
Entrepreneur/manager of TBSFs	10
Venture capitalists	8
Policymakers	6
Experts in TBSFs financing	7
Sum	31

TBSFs: Technology-based small firms

4.1.2. Inefficacy in tax regulation

Tax system in Iran is mainly based on "business tax" and "value added tax (VAT)." While capital gain tax in Iran is neglected. At the first glance, it seems that low capital gain tax rate will increase the incentives for VC investment (Cumming, 2005; Gompers and Lerner, 2001; Keuschnigg and Nielsen, 2004; Lerner and Tag, 2013). However, it's not true in Iran. Since investors prefer to deposit their money in banks or purchase durable tangible assets to make profit from their price rise. Based on the report from national statistics center of Iran[3] (SCI), the average price rise in Iranian real estate sector from 1999 to 2014 was about 1400% (4600% for Tehran, the capital of Iran). While based on the statistics of central banks of Iran[4] (CBI), the inflation rate was 1100% during the same time period:

> "*If we had deposited our money in a bank or real estate sector, we would have gained much more profit exempted from tax with no or little effort. Now, we've started a technology-based firm, spending inundation of money and time. At the end of the year, we're faced with 25% business tax*."

There are some other imperfections in business tax regulations that lower the incentives to invest in intangible assets:

> *"Some costs ... Such as technology procurement cost is rejected as acceptable corporate costs"* and *"employment costs undergo high tax rates (around 40% including social security taxes)."*

While big share of costs in technology-based firms are employment costs and technology procurement, it's quite natural that investors prefer to choose investment opportunities excluded from tax rather than technological venturing.

On the other hand, business tax policies in Iran, does not officially recognize VC funds as financial intermediaries. This fact leads to several difficulties in the process of fundraising for VC funds.

> "*If a financer deposits its funds in the banks, he/she will receive (20-30) % which is tax free interest rate annually. On the other hand, in case of investment in TBSFs, the VC fund undergoes a business tax equal to 25% of net income.*"

Also, if a VC fund raises the external financial resources to invest in a portfolio of technology-based projects, the interest paid to external investors is not considered as an acceptable cost by Iranian Tax Organization. Since the financial intermediaries such as VC funds (Metrick and Yasuda, 2011) are not legitimized in most developing countries financial ecosystem (e.g., India [Dossani and Kenney, 2002]), they are not supported through tax exemptions.

4.1.3. Weakness in property rights (regulation and culture)

Peneder (2008) believes that, in developed countries, the issue of free riding and knowledge market failure is one of the main challenges against investment in technological ventures. The mentioned challenge is even more severe in developing countries due to deficiencies in property rights.

3 Available at https://www.amar.org.ir/english.
4 Available at http:// www.cbi.ir/default_en.aspx.

"*In Iran, TBSFs prefer to register their intangible assets only when it is not protectable as a business secret*." "*…Even after formal registration of an intangible asset, protecting others from free riding through legal system is costly and time consuming*."

4.1.4. Weakness in labor regulations

What is more critical for TBSFs in protecting their intangible assets is protecting and managing expertized human resources? This issue is related to weakness in labor force regulations in Iran:

> *"We undergo high cost and spend several years to train high-skilled human resource in our SME. Large companies hire our skilled experts in return for a bit higher salary and we lose our trained HR. In fact, SMEs are a ladder for transferring skilled human resource. The labor law and regulations do not support SMEs against the mentioned challenge."*

The employment regulation in Iran is such that firms will face much difficulty to keep talented experts because employers are not supported with laws which impose high costs on job switching. That is, experts can easily exit his/her current job with technological skills and business secrets obtained during the employment period facing almost no penalty or cost.

4.1.5. Inefficiency in financial market regulations

The financial system in Iran is bank oriented as mentioned. That is, banks have a substantial share in financing the corporates and projects. However our question is: How the deficiencies in financial market in Iran disappoint the investors from investing in intangible assets?

As previously mentioned, real estates, gold and land have been traditionally interesting for Iranian investors. This fact is also true about the banks. The weakness in monitoring the operation of banks lets them easily invest in tangible assets (instead of loan payment) to safe guard their risks and keep up with the constant inflation. That is why banks dedicate a large share of their investment portfolio (directly or indirectly) to durable tangible assets such as gold, real estates, land and etc. This, in turn, aggravates the issue of inflation which leads to the price rise in tangible assets.

4.1.6. Inefficiency in law enforcement and bankruptcy regulations

Weakness in bankruptcy and law enforcement system has obliged the banks and other financing institutions to base their services on heavy collaterals. Thus, firms will prefer to invest in tangible assets which not only keep their value with inflation but also can be deposited as a mortgage in the bank. Reliance on collaterals in the absence of efficient judiciary and credit-rating system, leads to the demand increase in tangible assets which, in turn, raises the inflation.

4.2. "Informal (Rentier) Versus Formal (Non-rentier)" Business

A large part of economy in developing countries, including Iran, is informal. Thus, part of economic actors are not financially transparent and excluded in the tax and other regulatory constraints. However, TBSFs must be financially transparent since:

- Government is the main customer of TBSFs products and services (the ratio of government income/expenditure to total GDP in Iran is 70%[5]).
- Intransparency in TBSFs result in equity undervaluation and makes difficulty for investors at the exit stage (Ayyagari et al., 2012; Cumming and Walz, 2010).
- Establishment of the production lines (in many cases) entails the governmental permits and undergoes more strict regulations.

De Paula and Scheinkmanl, (2011) believe that transparency or intransparency of economic actors relies mainly on the cost and benefits imposed on each side. In Iran the cost of intransparency (such as financing barrier) is much lower than its benefits. The following institutional deficiencies have made investment in informal business in Iran more attractive:

4.2.1. Inefficacy in tax system

"*I prefer to keep the corporate financial information secret. Since, the tax system is in favor of intransparency. When a company is financially transparent, it must pay more taxes (including business tax, VAT and social security tax). Hence it cannot compete informal suppliers or importers who escape tax payment*."

In such situation, investors prefer investment opportunities that are informal, more profitable and excluded from tax. Certainly, such opportunities are not technological.

4.2.2. Inefficacy in labor regulations

There is a consensus among entrepreneurs and investors that "labor law" and "social security" are the two main obstacles ahead of business development in Iran. Since they increase the costs of starting and development in both small and large enterprises through imposing additional employment costs.

The employment regulation in Iran is such that firms will face much difficulty to lay off unskilled workers (contrary to the mentioned fact that firms will face much difficulty to keep talented experts). It means that employers are reluctant to formally hire the unskilled seasonal and temporary workers they need (Lerner and Tag, 2013):

> *"Formal employment of workforce in Iran is costly. Equal to 30% of each monthly payment to workers is paid as social security taxes. Also in some cases, in addition to the above-mentioned payments, 16.67% of each formal sale contract should be paid to social security system. Such costs are intolerable for all SMEs…. On the other hand, minimum wage law raise the cost of hiring seasonal workers and running new formal projects and plans*."

5 In 2014 the GDP of Iran was about 425 billion US dollar and the total governmental budget of Iran was about 290 billion US dollar (by official exchange rate).

4.2.3. Culture of secrecy and anti-capitalism

> *"In Iranian culture, capital accumulation habit is highly disapproved in general public. That's why capitalists and private owners of large enterprise do not disclose their financial assets and do not tend to involve in investment projects which entails transparency"*
> "*Information disclosure and developing transparent financial databases have several obstacles since the culture of secrecy is prevalent in the society*"

This is consistence with the findings of Ferasatkhah (2015) on Iranian ethos.

4.3. Short-term (Speculative) Versus Long-term (Productive)" Projects

Investment in innovation and technological production, in contrary to trade and services, is a long term investment (Lall, 2004). TBSFs have to spend plenty of time and money on R and D activities before they lunch their products to market. This entails long term planning:

> *"In case I had started my activities in trade (short term business), I could be more successful with higher economic gain."*

The above mentioned fact reveals that the economic return in business areas such as trade and brokerage is higher than direct investment in production and particularly technological ventures. Investment in short term business in Iran is more attractive due to the following institutional deficiencies:

4.3.1. Economic/political instability

The macro-economic factors (prices, laws and regulations, currency exchange rates and etc.) in Iran, as many other developing countries (e.g., India [Dossani and Kenney, 2002]) is not stable. Based on GII index in 2016, Iran ranks 106 among 128 countries in political stability sub-index (Dutta et al., 2016). Also based on Global Competitiveness Report (2016) the *Policy Instability* is reported as the second most problematic factor for doing business in Iran (Schwab, 2016). This prevents the investors from long term predictions, analysis and investment:

> "*We've made several attempts to access the know-how for technological products. Each time, we failed to launch the product to market due to unprecedented changes in government regulations such as tariffs, tax rates and so on.*"

Our finding highly contradicts Lingelbach (2015) finding about the role of institutional change on VC activities.

4.3.2. Imperfect commerce and competition regulation

One key success factor for TBSFs is the market guarantee (Storey and Tether, 1998; Zhu et al., 2012). Almost all TBSF managers in Iran counted the issue of market as their main challenge. "*In case we could assure a certain amount of market and sale we would overcome other difficulties, even financing gaps*" said the CEO of a TBSF. Also, market manager of a VC fund said: *"Government-sponsored enterprise (direct and indirect) are the main customer of TBSFs products and services in Iran"* This "*… rentier behavior of government-sponsored enterprises disappoints the private VC funds to invest in TBSFs.*"

Based on the interviews, since the main economic actors in Iran are directly or indirectly government-sponsored:

- The market atmosphere is not competitive and actors do not continuously improve their performance through application of new technologies. In contrary, most of (governmental) enterprises prefer to move in the safe side and are not risk taking. This, in turn, decrease the demand for technology productions.
- The contracting mechanisms are corrupted in governmental bodies.
- There is no stable structure to offer long term contracts which guarantee the markets and provide the economic scale for technological products.
- The contracts are completely one side to the benefits of customers (government) and the payments are delayed and irregular.
- In case the government does not abide by its commitments, the seller has no access to strong tools to defend its rights.

> *"After struggling for several years we manage to sign a contract with a SOE[6]. After depositing a heavy guarantee, we received the advanced payment. We also had to raise fund from external resources. After accomplishment of the whole project, the contractor imposed one-side termination on the contract. However they were not entitled to do so, if we decide to claim against the contractor we have to undergo heavy budgets and lose a big share of market (i.e., other SOEs)."*

Inefficient trade policies such as import and export tariffs, may impose substantial risk to technological product markets. Developing countries are supposed to adopt protective policies on local products to reach the required maturity and competitiveness (Lall, 2004). Iran is subject to high rate of contraband import due to the corruption and inefficient customs system. So, the incentive to set up a technological venture is low since "*Competition with illegal importers (importers with zero tariffs) is impossible*."

4.3.3. Inefficiency in financial market regulations

As previously mentioned, trade and brokerage are high profit making activities with RoR more than 10% in the period of 2–3 mounts. No technology-based venture can economically produce such short term economic gains. Absence of proper supervision and regulation on banking system guide them to fund such projects. This, in turn, facilitate the short term activities such as trade and brokerage.

Banking system also encourages rentier activities. The interest rate of bank loans is determined by the CBI. In 2016, CBI determined the interest rate of banks loans up to 18% per year. In an economy with the 10-year average inflation rate of around 20% per annum (CBI), receiving a loan with any interest rate lower than that of inflation is a rent. Thus, access to the bank loans entails a corrupted, bureaucratic and rentier process. Thus, TBSFs will have a very small chance to use such financial resources:

6 State owned enterprise.

"We applied for only a 30000$ loan. After spending a six-month period and passing tiring bureaucratic process we have been asked to deposit a heavy mortgage. In practice, it means NO to our loan requests."

4.3.4. Speculative culture

Production uncertainties along with abrupt and sharp fluctuations in foreign currency rate, stock prices and fixed asset prices, motivates the economic agents to involve in the short-term brokerage activities. Continuation of such economic situation has led to the prevalence of brokerage inclination and speculation culture (informal institutions) in different economic actors. This culture leads to more speculative efforts in a faulty cycle.

4.4. Large Scale Versus Small Scale" Projects

An important fact pointed out by interviewees was: *"The bigger the amount of capital brings higher economic gain."*

"The economic situation in Iran is so that if you have 1000 $ you can only open a bank deposited with an annual interest rate of 20%. However, if you are the owner of multi million dollars you can easily gain more than 40% annual return!"

Piketty (2013) in his book "capital in 21th century" discusses the fact that how big capitals produce significantly higher economic gains than small capitals. This relationship is even stronger in Iran. That is, the difference between big and small capital gain in Iran is at least 10% per year, while this is 3–5% in the USA (Piketty, 2013). This is why the investors are reluctant to invest in TBSFs from both risk and rewards aspects. The question remained unanswered is: How do institutions in Iran affect such issues? The existing institutional barriers have been explored as follows:

4.4.1. Inefficiency in inter-firm linkages and competition regulations

SMEs face much difficulty in competing large enterprises due to scale constraints and infrastructure limitation especially in developing countries (Mesquita and Lazzarini, 2008). This problems leads to high production cost and low rate of return in small investments. On the other hands, as Nooteboom (1999, p. 793) argued: *"In order to produce high added value and novelty, by utilizing the opportunities of complementary competencies, firms need to make relation-specific investments which creates risks of "hold-up" and "spill-over.""* There are different instruments to control such risks including formation of large firms or formation of networks among SMEs through durable linkages (Nooteboom, 1999). Hence, SMEs can exploit complementary competencies to overcome their scale and relation-specific investment problems through networking (Mesquita and Lazzarini, 2008; Nooteboom, 1999). Forming extensive collaborative ties, SMEs can lower the "transaction costs" as well as "production costs" to compete the large companies. However, in Iran the linkages among small firms (in the form of supply/logistic chain management, clustering, strategic alliance and so on) is weak and immature:

"*In Iran, SMEs are not productive. No sustainable supply chain is formed. Associations and unions are not working efficiently. Thus, bargaining power of SMEs is negligible.*"

Also, there are cultural barriers against collaboration networks in Iran:

"Low team working culture, distrust in others and individualistic behaviors are the main sources of collaboration failure in Iran."

This is consistence with the findings of Ferasatkhah (2015) on Iranian ethos.

Along with the above mentioned challenge, in Iran, SMEs face the issue of excessive production capacity:

"*Every new application for production is passed without considering the market demand. This is not an efficient competition policy.*"

4.4.2. Inefficacy in tax system

Piketty (2013) suggest that capital gain tax system can moderate the gaps between large versus small capital gain rates. However as mentioned in s 4-1-1 there is no capital gain tax in Iran.

4.4.3. Inefficiency in Financial market regulations

Since big projects and corporates return more economic benefits to investors, banks also prefer to dedicate their resources to such big projects and corporates. In this situation, small and medium enterprise will have lower chance to access the loans and other bank services. In Iran, banks provide large capitals through collecting small deposits. Absence of proper supervision and regulation on banking system let them fund their big project (through their subsidiaries). On the other hands, they do not carry out their financial intermediation duties (Beck and Demirgüç-Kunt, 2006).

The Iranian banks compete in absorbing deposits through offering more interest rate up to 25% annually. So, even most small investors who are planning to invest in small business, find bank deposit more profitable and less risky:

"If I had deposited my money in the bank instead of setting up my new business, I would have obtained higher gain with much lower and efforts."

5. DISCUSSION AND CONCLUSION

Investigating the barriers to VC investment in each country entails deep understanding of its local institutional framework. Based on nature of institutions, the barriers to VC investment can be divided into two main categories: (1) Lack of incentive for investment; and (2) Lack of means to relationship between VC funds and TBSFs. We focused on the first category of barriers, because few researchers have previously considered the issue of incentives for VC investment (e.g., Karaomerlioglu and Jacobsson, 2000; Peneder, 2008). Although several scholars have studied the role of some institutional factors such as tax, legal, currency, financial and regulations in promoting the incentives for VC investment (e.g., De Lima Ribeiro and Gledson de Carvalho, 2008; Dossani

Table 3: Institutional deficiencies that hamper the VC investment in Iran (proposed by authors)

Inst. Barriers to VC dev. Level of inst. analysis	Section 4-1	Section 4-2	Section 4-3	Section 4-4
L1: Social Theory (embeddedness, informal institutions, customs, traditions, norms)	Job hopping habits Subjective habit to inflation Cultural ignorance of property right	Culture of capitalism disapprobation Culture of secrecy Corruption	No trust to local capabilities Speculation culture	
L2: Economics of property rights/ positive political theory (institutional environment, formal rules of the game)	Imperfect tax regulations Imperfect labor regulations The challenge of inflation (imperfect fiscal institution) Weakness in property rights regulation Imperfect financial market regulation (bank system specially)	Inefficiency of information disclosure institutions Imperfect tax regulations Imperfect financial market regulation (bank system specially) Prevalence of SOEs Imperfect commerce and competition regulation	Political instability (imperfect political institution) Prevalence of SOEs Imperfect commerce and competition regulation Weakness in guarantee institutions Imperfect financial market regulation (bank system specially)	Imperfect tax regulations Imperfect financial market regulation (bank system specially)
L3 and 4: Transaction cost theory and neoclassical economics (economizing level, play of the game, allocation of resources)	Incentives for investment in tangible assets (versus intangible)	Incentives for investment in informal/intransparent economies (versus formal/transparent)	Incentives for investment in short-term opportunities (versus long-term)	Incentives for investment in big project (versus small)

SEO: Securities and exchange organization

and Kenney, 2002; Lerner and Tag, 2013), however, to date, no comprehensive research is carried out, particularly for developing countries. This is also true for Iran, as a developing country in the Middle East. This subject is often attributed to the nature of technological investment projects that does not meet the criteria of risks and return. Risk and return analysis is the main measure for both investors and entrepreneurs to choose their appropriate projects. That is, investors/entrepreneurs mainly decide based on three factors: (1) Financial return on investment project; (2) risk of investment project (3) the return on the riskless investment alternatives (Maginart et al., 2002; Mason and Harrison, 2002).

We identified four categories of institutional barriers which lower the incentives to invest in TBSFs including: (1) Investing in "tangible assets versus intangible" assets, (2) investing in "informal versus formal" businesses, (3) investing in "short term versus long term" projects and (4) investing in "big versus small" projects.

We attempt to depict the concluding remarks of current study in Table 3 using the 4-level Williamson (2000) institutional framework. The main characteristic of proposed model is the circular causation among all the stages and levels (i.e., if one changes, others will change in response).

As policy implications regards, current research findings imply that reforming the following institutional factors are necessary in socioeconomic policies to overcome the so-called challenge "*Lack of incentive for VC investment*" as: Information disclosure standards, Tax and labor regulations, financial market regulation (bank system specially), fiscal institution, political instability, commerce and competition regulation and property rights regulation.

Thus, it can be concluded that many institutional factors (including legal, social, political, economic and financial) have prepared the ground for underinvestment in VC industry in Iran as a developing country with bank-based financial systems. However, filling this gap is more complicated than simply establishing new VC funds (governmental or nongovernmental). As pointed out earlier, such wrong approach has been previously adopted by other countries such as Germany (Becker and Hellmann, 2005), France (Dubocage and Rivaud-Danset, 2002) and Italy (Bertoni et al., 2007). In other words, the missing elements are not merely VC funds (governmental or private) in Iran. The solution is "an institutional set-up that encourage incentives for investing in technological, small, transparent and long-term projects." Government has critical role in creating such set-up. To build the appropriate institutional set-up for VC investment, we should begin our reforms considering the institutions' path dependency which stresses the incremental changes in institutional reforms (North, 2003). Thus, we seek to apply incremental institutional reforms that lead to appropriate framework for VC investment. Learning plays an important role in the process of institutional reforms (Mantzavinos et al., 2004). As collective learning takes place correctly, the problem-solving capacity of the society grows over time. So, the current paper aimed at improving the collective learning by presenting a correct interpretation of the problem entitled "low incentive to VC investment" for making a better direction for institutional changes in Iran. We made three key contributions. First, the current research has provided comprehensive integrated insights into how institutional set-up lower the incentive for VC investment in

a developing country, i.e., Iran. Second, our paper is among the first studies that apply Williamson (2000) model to investigate VC industry underdevelopment. Third, the current research expands the knowledge about the role of both formal and informal institutions in VC industry underdevelopment.

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