DETERMINANTS AND LEGITIMACY OF VENTURE CAPITAL FINANCING: AN EMPIRICAL VERIFICATION

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ABSTRACT

The venture capital activity represents a financing intermediation suitable to the start-up and innovative SMEs' needs, and tries to confirm itself in the economic context. Indeed, such financing mode supports the companies' creativity and development, particularly for the under capitalized SMEs whose access to the traditional sources of financing (bank financing and common stock financing) remain always difficult.

In this field, this work tries to further explore both the key factors stimulating the venture capital activity, and the contribution of such financing mode to wealth creation and to economic growth.

An empirical approach using panel data estimation is inducted here and makes up the contribution of this work. The estimation is relative to two linear regressions which constitute the retained model and tries to test both the effects of key factors on venture capital activity, and the effects of venture capital financings on economic growth.

The considered data covers twelve developed countries (USA and eleven European countries), and all OLS, fixed effects and random effects estimates are applied. With respect to test results; however, only the appropriate estimates are taken into consideration.

The main results show that venture capital depends positively on the R&D activity, and that such financing mode has a positive effect on economic growth. These results are also discussed to make meaningful comparisons with those of previous studies.

Based on the conclusions, it may be recommended to consolidate the positive link "R&D – venture capital – economic growth" by the appropriate policies.

Keywords: venture capital, R&D, stock exchange capitalization, innovation, growth, start-up

GİRİŞİM SERMAYESİ FİNANSMANININ BELİRLEYİCİLERİ VE MEŞRUİYETİ: AMPİRİK DOĞRULAMA

ÖZ

Girişim sermayesi aktivitesi yeni girişimler ve KOBİ'lerin gereksinimlerini karşılamaya yönelik bir finansman aracı sunmakta ve ekonomik bağlamda kendini ispatlamaya çalışmaktadır. Bu finansman modeli yeni şirketlerin kurulmasını ve geleneksel finansman kaynaklarına (banka kredileri ve sermaye piyasaları gibi) erişim zorluğu olan ve düşük düzeyde sermaye birikimleri olan KOBİ'lerin gelişimine katkıda bulunmaktadır.

Mevcut çalışma girişim sermayesi aktivitelerini arttıran temel faktörleri inceleyerek ve söz konusu finansman modelinin servet yaratımı ve ekonomik büyümeye katkılarını tayin ederek konuya katkıda bulunmaktadır.

Panel veri tahmini kullanan bir ampirik yaklaşım çalışmanın temel katkısını oluşturmaktadır. Yapılan tahmin, modeli oluşturan iki doğrusal regresyon üzerinde gerçekleştirilmekte ve temel faktörlerin girişim sermayesi aktiviteleri üzerindeki etkilerini test etmeyi ve girişim sermayesi yoluyla finansmanın ekonomik büyüme üzerindeki etkisini araştırmaktadır.

Değerlendirmede yer alan veri 12 gelişmiş ekonomiyi (ABD ve 11 Avrupa ülkesi) kapsamakta ve tüm olağan en küçük kareler, sabit etki ve tesadüfi etki tahminleri göz önünde bulundurulmaktadır. Yinede, test sonuçları doğrultusunda sadece uygun olan etkiler üzerinde durulmaktadır.

Elde edilen bulgular girişim sermayesinin AR-GE faaliyetleri ile doğrusal ve pozitif pir ilişkisi olduğunu ve bu finansman modelinin ekonomik büyüme üzerinde olumlu etkileri olduğunu göstermektedir. Bulgular daha önce yapılan çalışmalarda sunulan bulgular ile karşılaştırılmaktadır. Sonuçta, elde edilen bulgulara dayalı olarak, uygun politikalar yoluyla "Ar-GE- girişim sermayesi-ekonomik büyüme" arasındaki pozitif ilişkinin konsolide edilmesi önerilmektedir.

Anahtar Kelimeler: Girişim sermayesi, Ar-Ge, Sermaye piyasası kapitalizasyonu, yenilik, büyüme, girişim.

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1. INTRODUCTION

The venture capital activity assumes an important role in financing the start-ups and the high technology SMEs, which both are full of promises but also with a strong default risk.

The venture capital companies are financial intermediaries that collect funds from investors and allocate them to start-ups and to SMEs. They are not only qualified financially; many famous of them are specialized in an industry branch and have several years of experiment in their field of investment. Considering its definition, the venture capital is first of all a top balance sheet financing, i.e. a contribution in shareholders' equities, contrary to debt which is a bottom balance sheet financing. The aim is an appreciation in invested capital at the time of the exit strategy's execution. The funds are generally invested in form of shareholders' equities, rarely comprising guarantees and in companies initially non-quoted on the stock exchange and where the investor is an active intermediary.

In the venture capital "industry", the investment is mainly at the first financing phases of companies which belong to emergent sectors. It might constitute one of the determining factors of such companies' success, as well as a key element of development and technological advance. Thus, in the context of dynamic approach the venture capital development draws itself a widely accepted role as an essential component, consolidating the important success stories generated in many innovative sectors.

The increasing presence of the venture capital "industry", as well as its strategic and dominating role in the young companies' development, whose majority do not have access to traditional sources of financing (banking debts and quotation on the financial markets), highlight its importance and attracts a particular interest on this financing mode.

In this context of legitimacy and mechanisms of propulsion mechanisms of the venture capital financing, this work aims to make an empirical contribution to the related literature identifying the determinant factors of the venture capital offer and expansion, as well as the elements justifying the legitimacy of sources to such financing mode. The methodology used here and constituting the empirical contribution of this paper consists of the estimations and tests carried out on panel data and regressions used identifying causalities.

This work as below exposed is divided in two parts: the first part presents the financial literature considered in this context and identifying the relevant dimensions of the venture capital supply in the economy; the second part is dedicated to the empirical contribution established here and contains mainly the methodology, the model and the deduced results.

2. THE DETERMINANTS OF THE VENTURE CAPITAL OFFER: THE LITERATURE REVIEW

2.1. The financial markets' dynamism

The literature devoted to venture capital determinants insists on the positive relation existing between the invested funds within this activity and the prevailing situation on the financial markets.

Many econometric studies highlight the financial markets' influence on the venture capital investments. These studies use various factors to illustrate the role of financial markets. For Black and Gilson (1998), Gompers and Lerner (1998, pp.149-204) and Jeng and Wells (2000), the IPO (*initial public offerings*) which reflect the potential output of the venture capital are one of the essential determinants of the investments. Black and Gilson conclude that the development of private equity markets is dependent on the existence of dynamic financial markets able to absorb companies' quotation.

In other studies like that of Schertler (2003a), the accent was put on the positive impact of financial markets' liquidity (represented particularly by stock exchange capitalization) on the development of venture capital investments. Gompers et al. (2005) underlined in a study concerning the United States' case that the venture capital activity was very sensitive to some signs such as Q of Tobin emitted by the financial markets.

The study undertaken by Venture Economics (1988) shows that exits in form of IPO are five times more profitable than exits via shares' vending to other companies. The works of Gompers (1995, pp.1461-1489) applied to the United States and those of Schwienbacher (2004) applied to Europe, confirm the best performances of the exit on stock exchange markets comparing to the industrial exit.

Succeeding the IPO allows the venture capital professionals to make known their market experiments on the one hand, and to reduce transaction costs of their relations with companies' leaders on the other hand. Moreover, the realization of successful IPO improves the reputation of venture capital professionals and allows them to raise funds under more favourable conditions.

Lastly, the exit in form of IPO makes possible that venture capital professionals manage better the eventual interest conflict's risks with companies' leaders (Black and Gilson, 1998). Indeed, at the beginning of the stock exchange quotation, the founders' leaders often keep an important influence on the company. In contrary, when a venture capital professional leaves the capital via an industrial exit or by vending his shares to another investment fund, the leaders' dependence is not assured any more.

2.2. The interest rate

According to the economic theory, a low level of interest rates should have a negative impact on the venture capital offer. In periods of low level of interest rates, innovating SME have resources at a potentially weak cost, which can decrease the attraction of venture capital.

Gompers and Lerner (1998, pp.149-204), in their study undertaken on American data covering the period 1969-1994, use a log-linear model having for endogenous variable the logarithm of total invested funds of the venture capital companies. The authors retain among the dependent variables the treasury bills' returns shifted by one period. Their tests show that there is a positive but non-significant effect of the interest rates' structure on the venture capital offer.

This contradiction with theory was explained, according to Gompers and Lerner, by the period that was considered for their study. The venture capital golden age occurred during the beginning of the eighties was going along with an elevated level of interest rates.

Jagwani (2000) used in his tests the same variable during a different period. The results were in conformity with the theoretical bases as for the interest rates' impact on the venture capital offer.

According to Romain and Van Pottelsberge (2004), the relationship between interest rates and venture capital offer can also be explained by the difference between the interest rates' levels in the short and long term (spread). These authors explain that the more important the variation is between the rates, the less the investors would be attracted by private equity.

2.3. The legal and institutional environment

With regard to the impact of the legal and institutional environment, the undertaken works confirm the importance of this element in the venture capital development. Apart from the political or monetary instability which distort the financial markets, works indicate two large important components related to institutional environment: namely "the labour market flexibility" and " the tax system".

Several studies pointed out the relevance of the legal and institutional environment, particularly following the decree on the prudence rule (*prudent man rule*) emitted by the American Ministry of Labour in 1978 and which had a negative effect on the venture capital offer until a clarification has been added one year later. In this clarification, it was stipulated that portfolio diversification is a prudent act, and that devotion of a part of the portfolio in venture capital investments constitutes an efficient mean of diversification and not an imprudent practice.

Gompers and Lerner (1998, pp149-204) wanted to show the relevance of regulation in the venture capital offer by using a latent variable as a proxy of regulation. Such "Dummy" variable takes value 0 before the decree and value 1 after the decree; the purpose is to differentiate both periods. Results showed a positive and statistically significant impact of this event on the venture capital offer.

Jeng and Wells (2000) carried out a study on the venture capital offer's determinants between 1986 and 1995 with data covering 21 countries; for the regulation's factor, the two authors used two variables. The first variable includes "*labour market rigidities*" which is measured by the percentage of total active labour that have worked for a period of more than 10 years for the same employer; the anticipated effect would be negative considering the obstacles caused by such rigidity when it is a question for a new contractor to leave his original job in order to resort to venture capital financing for launching a new project. The second variable that has been used was "*the quality index of the financial accounts' publishing standards*" in each country; the expected effect was positive in this case considering the fact that strict standards facilitate the audit work of the venture capital companies, and promote consequently the venture capital offer.

The empirical results of this study showed a significant negative effect of labour market rigidities on the venture capital offer, which confirms the results of Sahlman (1990) in his works applicable to Germany and Japan.

From a tax point of view, studies show the existence of an opposite relation between the venture capital offer and the capital gain tax. In this case Jagwani (2000) carried out an estimation covering data at the period 1978-1995, and applicable to a linear model where the dependent variable includes venture capital financings during one year. The exogenous variables were the followings: the venture capital performance measured by total venture capital financings of companies financed at majority by such financing mode, the tax rate of capital gain, the total expenditure of Research and Development in the United States for the concerning period, and the return rate of the American treasury bills with a maturity of 30 years.

The results indicate mainly that the regression coefficient of the capital gain tax rate is negative and statistically significant at a confidence degree of 99%. This confirms the importance of this variable since it represents the profit carried out by venture capital companies.

Jagwani also tested this determinant for two samples which differ according to capital source. Results showed the existence of two investor groups having different tax treatments. The first group gathers investors profiting from an exemption of capital gain imposition in the United States, while the second group gathers investors who do not profit from this privilege. For both groups, the estimation rejects the hypothesis of a different reaction. Therefore, an increase in the capital gain tax rate generates a more or less significant fall of the capital offer coming from both groups.

2.4. The R&D intensity

The venture capital, as generally inspired from its definition and its characteristics, is a shareholder's equity financing particularly in start-ups and in innovating SME with a strong growth potential.

Landskkroner and Paroush (1995) make clear that venture capital assumes a fundamental role in both new technologies development and new markets creation. In their study, the two authors also explain the importance of the investments carried out by venture capital companies in financing the Research and Development (R&D) in high technology sectors.

According to Gompers and Lerner (1998, pp.149-204), the increase in R&D expenditures, no matter their origin (private or public, academic or governmental…), supports the development of new technologies which are combinable and which increase technological opportunities for young companies.

Jagwani (2000), as specified above, has includes the R&D variable in his linear model applicable to the United States; the purpose is to estimate the influence of such variable on the investors' tendency to give funds to the venture capital companies.

Patent is a key element of any research and innovation system; several reasons can be advanced within this framework. On the one hand, the patent gives the inventor an exclusive protection on the patented invention which enables him to take advantage commercially and to benefit from such invention, either directly or indirectly by the means of the granted licences; therefore the patent permits to create value. On the other hand, the patent facilitates the technological progress diffusion and the knowledge transfer. Indeed, the invention's disclosure makes possible to provide the scientific community (in public or private domain) the technical information related to the deposited patent; such largely accessible information ensures a better knowledge diffusion and division.

Romain and Van Pottelsberge (2004) confirmed the positive role of the technological environment on the venture capital development level, by conceiving a technological opportunity indicator gathering the knowledge stock and the deposited patents.

In the same way, at the time when Europe had ruled on the software patent, Ueda (2004, pp.601-621) suggested that the powerful property rights have a positive impact on companies' financing by resorting to venture capital.

2.5. The economic growth

The relationship between the venture capital development and the economic growth has a double direction. The two variables are mutually dependent.

On the one hand the venture capital, while contributing to start-ups and to innovating SME financings, encourages wealth creation and growth within the beneficiary economies.

On the other hand, both fast development and economic stability constitute a factor that supports new companies creation and new investment appropriateness. The apparition of new projects on markets stimulates the venture capital demand (Tuller, 1994).

According to Acs and Audretsch (1994), macroeconomic fluctuations generally have an influence on innovating business activity. The increase in such activity can boost the venture capital offer. In consequence there is a positive relation between the economic growth and the venture capital development.

The literature always suggested a positive relation between economic growth and venture capital offer. Jeng and Wells (2000) used the GDP growth to measure the macroeconomic fluctuations. Their results contradict the financial theory; the obtained coefficient is not significant statistically. The authors explain this contradiction by the fact that IPO explain the capital offer in this "industry".

Gompers and Lerner (1998, pp.149-204) tested the same variable by shifting it by one period. The obtained coefficient is positive and statistically significant, indicating an increase in the venture capital offer in case of economic growth.

3. THE EMPIRICAL APPROACH

3.1. Methodology and model

The considered methodology in this work consists in the estimation and tests carried out on panel data applicable to two linear regressions which shape the retained model for this work. The objective is to test at the same time the causality effects that generate the venture capital determinants on the one hand, and the venture capital financings on the other hand. Therefore in this framework the estimation carried out in the first regression tries to test mainly the effects of the necessary determinants on the evolution of the venture capital activity, while in the second regression the objective is to test the effect of the venture capital financing on the economic growth.

In both regressions, the estimations and tests are carried out on panel data covering a sample of twelve developed countries including the United States of America and eleven occidental European countries. The sample is spread out over a period of 15 years (from 1990 to 2004) for the first regression, and of 12 years (from 1990 to 2001) for the second regression.

All ordinary least squares, fixed effects and random effects estimates are applicable at the same time in this work; however only suitable estimates are considered and maintained while taking into account the necessary tests carried on at this level (namely the total and partial homogeneity tests, and the Hausman test).

The first regression tries to estimate the impact of certain determinants which are necessary to the venture capital activity, on the evolution of such activity. In this framework, "*the venture capital progress*" (ΔVC = dependent variable) is positively linked to "*the R-D intensity evolution*" (ΔRD), and to "*the financial markets' dynamism*" as evaluated by "*the stock exchange activity evolution*" (ΔSE).

Even though "*the research dynamism*" (including mainly *the innovation*) is a third major determinant influencing the venture capital activity, it was not retained in this regression as an additional exogenous variable. The objective is to avoid co-linearity risks according to the sensitive correlation that exists between "*innovation*" and "*the R-D intensity*". On the other side the innovation's effects are included in the second regression which retains the consequences on the economic growth.

The equation representing the first regression is the following:

$$\Delta VC_{it} = \alpha_i + \beta 1 \, \Delta RD_{it} + \beta 2 \, \Delta SE_{it} + + \mu_{it}$$

μ_{it} is a white noise; $\beta = (\beta 1, \beta 2)$

$t = 1 \ldots T$ is a time index; $i = 1 \ldots N$ is a country index.

In the second regression, the objective is to estimate the effects of the venture capital activity evolution on the economic growth. In this context, the causality to be tested here considers the positive effects of "*the venture capital progress*" (ΔVC = first exogenous variable) and "*innovation*" (second exogenous variable) on "*the GDP growth*" (ΔGDP = dependent variable).

The innovation as a second exogenous variable is evaluated by "*the demand number of deposited patents*" (PAT). The presence of this variable in the venture capital activity's field on the one hand, and its effects on the economic growth on the other hand, justify its integration in the regression.

The equation representing the second regression is the following:

$$\Delta GDP_{it} = \lambda_i + \phi 1\ \Delta VC_{it} + \phi 2\ PAT_{it} + \varepsilon_{it}$$

ε_{it} is a white noise; $\phi = (\phi 1\ ,\phi 1)$

$t = 1$ ……T   is a time index; $i = 1$ ……N   is a country index.

3.2. Data

The retained data in this work comes from the European Union database (Eurostat), the European Venture Capital Association (EVCA), and the World Bank (WDI: Word Bank Development Indicators, 2003).

As mentioned above, the data is spread out over a fifteen years' period (1990-2004) for the first regression, and a twelve years' period (1990-2001) for the second regression. The sample covers twelve countries, namely the United States of America, Belgium, Denmark, Germany, Spain, France, Italy, Netherlands, Austria, Portugal, Finland and the United Kingdom.

In reference to the annexed notes to the WDI, Eurostat and EVCA data, the variables appearing in both regressions' equations are described as follows:

- Variable ΔVC indicates the annual growth rate expressed in percentage, of the venture capital investments' part in the GDP. The venture capital investment is defined here as the private stockholders' equity held for investment in companies. The data include two investment phases, namely the preliminary phase covering the company's priming, starting and growth beginning (*seed capital and start up financing*), and the expansion and replacement phase covering the company's needs in working capital *(early stage)*.

- The economic growth is represented here by the variable ΔGDP and indicates the annual growth rate of Gross Domestic Product (GDP) at current prices. The variable comes from the World Bank database (WDI, 2003) and is expressed in percentage.

- Research Development is integrated in the variable ΔRD which contains annual growth rate expressed in percentage, of the R&D domestic expenditures' part in the GDP. Precisely, the R&D domestic expenditures are the R&D total expenditures which include companies' expenditures, higher education's expenditures, public administrations' expenditures, and R&D non-profit-making private institutions' expenditures.

  Financed R&D consists in the research and the experimental development which "*include works of creation undertaken in a systematic way in order to increase the knowledge sum, including human knowledge, cultural and societal knowledge, as well as the use of such knowledge sum for new applications*". R&D activities are characterized by massive transfers of resources between units, organizations and sectors.

- The variable PAT includes patent applications presented to the European Patent Office (EPO) per year of priority at a national level. In this context, patents are the reflection of the inventive activity of each country and illustrate the capacity of the country to exploit knowledge and to transform it into potential economic advantages; this deduces the utility of such patents for the inventive performance evaluation of each nation.

  The variable PAT is expressed in number of patent applications per million inhabitants.

- The financial markets' dynamism included in the variable ΔSE indicates the annual growth rate expressed in percentage, of the stock exchange capitalization's part in the GDP. Precisely, the stock exchange capitalization indicates the size and results of the stock exchange markets, and consequently the importance of private investors' capital in the economy; this capitalization is of end of period and is calculated by multiplying the volume of stock exchange's quoted shares by their market prices.

  The series cover privileged and ordinary shares, as well as shares without right to vote. All investment funds, rights, warrants, convertible instruments, options, forward contracts, shares quoted abroad, and companies which the only commercial aim is to hold shares for other quoted companies, are excluded.

Therefore except for the variable PAT, all variables are expressed in percentage of annual growth rate. The series related to variables ΔGDP and PAT are totally complete, while series relating to variables ΔVC, ΔRD, and ΔSE are almost complete. The rare missing data are replaced by the percentage of average annual growth rates at each concerned variable.

3.3. Results

All results are reported in tables 1 and 2. The figures between parentheses correspond to t-statistics.

Table 1. Venture Capital Regression

Dependant variable : Venture capital investments in % of GDP (annual growth in %) : ΔVC Estimation period : 1990 – 2004		
Explanatory variables:	**TOTAL (plain OLS) Estimates**	WITHIN (fixed effects) Estimates:
Constant	**14.1342** *(2.917)* [P-value = 0.004]	------
R-D in % of GDP (annual growth in %) : ΔRD	**2.65878** *(2.349)* [P-value = 0.020]	1.91503 *(1.434)* [P-value = 0.153]
Stock exchange capitalization in % of GDP (annual growth in %) : ΔSE	**0.225783** *(1.508)* [P-value = 0.133]	0.229396 *(1.487)* [P-value = 0.139]
R-squared	**0.2048**	
Durbin-Watson	**1.71302**	
Global homogeneity test (F_1 test)	F_1 = F(33,144) = 0.60917 [P-value = 0.9514]	
Partial homogeneity test of coefficients β_i (F_2 test)	F_2 = F(22,144) = 0.75385 [P-value = 0.7763]	
Partial homogeneity test of α_i (F_3 test)	F_3 = F(11,166) = 0.33059 [P-value = 0.978]	
Hausman test	Q(2) = 0.77972 [P- value = 0.6772]	

Table 2. Economic Growth Regression

Dependant variable : Venture capital investments in % of GDP (annual growth in %) : ΔVC Estimation period : 1990 – 2004		
Explanatory variables:	**TOTAL (plain OLS) Estimates**	WITHIN (fixed effects) Estimates:
Constant	**14.1342** *(2.917)* [P-value = 0.004]	------
R-D in % of GDP (annual growth in %) : ΔRD	**2.65878** *(2.349)* [P-value = 0.020]	1.91503 *(1.434)* [P-value = 0.153]
Stock exchange capitalization in % of GDP (annual growth in %) : ΔSE	**0.225783** *(1.508)* [P-value = 0.133]	0.229396 *(1.487)* [P-value = 0.139]
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Global homogeneity test (F_1 test)	$F_1 = F(33,144) = 0.60917$ [P-value = 0.9514]	
Partial homogeneity test of coefficients β_i (F_2 test)	$F_2 = F(22,144) = 0.75385$ [P-value = 0.7763]	
Partial homogeneity test of α_i (F_3 test)	$F_3 = F(11,166) = 0.33059$ [P-value = 0.978]	
Hausman test	$Q(2) = 0.77972$ [P- value = 0.6772]	

The results of estimations and tests applicable to the first regression show initially the acceptance of the simultaneous coefficient equality hypothesis for both α_i and coefficients β_i at 5% risk. Indeed the global homogeneity test (F_1 test) applicable to F_1 statistic and carried out in the ordinary least squares estimation (OLS) shows a P-value of 0.9514 (superior to 5%). This result is reliable since partial homogeneity tests (F_2 and F_3 tests) separately applicable to F_2 and F_3 statistics in the fixed effects' estimation confirm the stability of coefficients β_i and α_i at 5% risk (P-values are here also superior to 5% i.e. respectively equal to 0.7763 and 0.978).

According to all these tests, it is allowed to affirm that the OLS estimation's results are the appropriate results for the first regression. The Durbin-Watson level (1.7130) excludes the autocorrelation errors hypothesis.

The results found in this estimation confirm the R&D positive and multiplying effect on the venture capital activity's evolution. Indeed, the ΔRD coefficient's estimate is positive (2.6587) and largely significant at 5% risk (P-value = 0.02). This result is in conformity with the affirmations of Gombers & Lerner (1998, pp.149-204), Romain & van Pottelsberge (2004), and deepens the empirical work of Jagwani which is applicable to the United States (2000). Therefore, increasing the R&D expenditure, as well as establishing an active scientific and technological policy directed towards high technology sectors, stimulate the venture capital development. In fact, the venture capital selects young innovative companies characterized by a high number of researchers and innovative goods and services production.

The example of the United States (Silicon Valley particularly) as well as some Northern European countries (Finland, Denmark, Sweden…) is edifying in this context. The R&D active public programs adopted in these European countries selected the highest proportions of researchers. Also innovative projects with strong specialization and exploitable at a worldwide scale required important external shareholders equities and instigated the demand for venture capital financing.

The ΔSE coefficient's estimate is positive (0.2257) but not significant even at 10% risk (P-value = 0.133). Even though this result doesn't cancel out the former literature and econometric works linking positively the stock exchange capitalization and venture capital investments (Black and Gilson, 1998; Schertler, 2003a; Gompers et al, 2005…), it doesn't allow to strengthen such argument affirming the positive influence of the financial markets' liquidity on the venture capital activity's evolution (by better absorption of companies quotation, exit strategies' opportunities for venture capital companies…).

This lack of significance could be explained partly by financial disturbances occurred during the last years on the international financial markets (i.e. during the data period). Such disturbances are derived from financial crises, from speculative behaviours… and can scramble information indicating the financial markets' dynamism.

The constant estimate (α_i) is amply positive (14.1342) and significant at 1% risk (P-value = 0.004). This includes all unchanged and/or similar factors among considered countries and during the covered period; such factors act in favour of the venture capital activity's rising. In this framework, we can evoke for example the entrepreneurial culture's prevalence, tax incentives…

In the second regression, the global homogeneity test (F_1 test) applicable to F_1 statistic in the OLS estimation rejects the simultaneous coefficient equality hypothesis for both λ_i and coefficients ϕ_i at 5% risk (P-value = 0.0162 < 5%). The partial homogeneity tests (F_2 and F_3 tests) applicable to F_2 and F_3 statistics in the fixed effects' estimation affirm respectively the stability of coefficients ϕ_i (P-value = 0.0999) and the instability of λ_i (P-value = 0.0204) at 5% risk.

The panel structure is affirmed, but the remaining work consists in determining the individual effects specification (fixed effects or random effects). In this context, the Hausman test carried out in the random effects estimation confirms comfortably the fixed effects structure for this regression model (P-value = 0.0019 < 5%). Consequently, the results of the fixed effects estimations are the accurate results for the second regression.

The positive effect of the venture capital activity on economic growth is also confirmed in the second regression's results since the ΔVC coefficient estimate is positive and significant at 10% risk (P-value = 0.100). Nevertheless, it is advisable in this context to avoid any interpretation that would reduce the venture capital activity's effect, considering the estimate value which appears relatively weak (0.0037); in fact such value integrates a significant involvement since it includes a contribution to the GDP growth rate.

These results widen all works of Acs and Audretsch (1994), Jeng and Wells (2000) and Gompers and Lerner (1998. pp.149-204) that regarded the opposite causality. Indeed, whereas these precursory empirical works support the statement defending that the economic activity's evolution stimulates the demand of venture capital funding, the results in this work support the reverse direction of the relation and strengthens consequently the literature specifying that venture capital financings, by the means of supporting companies creation and innovative SMEs, contribute favourably to wealth creation and to economic growth for the nations in which they act.

The results for PAT coefficient in the second regression show a positive estimate (0.0165) which is comfortably significant at 1% risk. This amply supports the major role assumed by innovation in the economic growth, in addition to the venture capital activity.

In conformity with the literature supporting the role of patents in technological advance and commercial exploitation, and in harmony with the assertions of Ueda (2004, pp.601-621) defending the positive impact of powerful property rights on the venture capital financing, these results extend the first regression's results relative to the positive effects of R&D expenditures on the venture capital activity. Obviously in the context of a high technology economy, innovative SMEs that require substantial

venture capital funds for financing their R&D, target comparative advantages with strong value added and with favourable exchange terms. They also try to contribute to the exploitation of their results at global scales and adhere to the dynamics of economic growth and development.

Consequently and as marked in this work's results, innovation is inside the activity of venture capital financing; accordingly it contributes actively to wealth creation within the economies.

4. CONCLUSION

The venture capital financing is inside the economic growth process. This legitimates the interest to such financing mode i.e. particularly to its conception, its characteristics, its determinants…

While the former literature and empirical works insist on some determinants' effects on the evolution of the venture capital activity, the results found in this empirical work extend and deepen the thoughts about the venture capital efficiency. Indeed, these results strengthen the triangular relation "R&D and innovation – venture capital – economic growth" and consolidate, for both the sample covered countries as well as for others, the following observations:

- An active scientific and technological policy in which R&D is targeted on high technology sectors, impulses the venture capital activity;

- The venture capital selects the innovating companies which carry out projects leading to patents; such protection in the form of patent is at the origin of a better knowledge diffusion and a value creation;

- Supporting the venture capital generates economic growth and progress; in this context establishing a policy integrating a regulation favourable to the venture capital activity is highly recommended.

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