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Factors Explaining Firm Investment: An International Comparison

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Abstract

This paper examines the determinants of firm investment decision. Our study analysed four countries: Moldova, Romania, Russia and Serbia. The sample contains 170 firms for each country for a period of 8 years from 2003 to 2010. Using the data panels method, the empirical results indicate that profitability positively and significantly influences the firm investments for the markets of Moldova and Romania under two alternatives, and for the other countries under one specification. However, the positive effect of cash holdings is only observed for the firms of Moldova and Serbia. Furthermore, the higher the size of the firms of all countries is, the more the managers are encouraged to invest more. Finally, the sensitivity analysis of our models on activity sectors, shows differences in the factors explaining the investment decision for the market of Moldova. Indeed, profitability significantly and positively explains firm investment for the service and real estate sectors. This result is found for other countries for two sectors. In contrast, for country Russia, an increase in the profitability for mining and agriculture firms, does not stimulate managers to invest more.

Keywords: firm investment, determinants, firm age, profitability, activity sectors

1. Introduction

The investment decision is a very important financial decision for the firm (Aghion & Howitt, 1992). Investment decision can favourably affect shareholder wealth. Therefore, it is important to test the factors behind this decision (Bhagat & Welch, 1995; Bond, Harhofff, & Van Reenen, 2005; Singh & Faircloth, 2005; Czarnitzki & Hottenrott, 2010). Kaplan and Zingales (1997) highlight that the cash fows, and firm size significantly affect the investment decision. Similarly, Cleary (1999) and Fazzari et al. (1988) assume that investment of a firm depends heavily on the presence of cash holdings. Lai Yung Feng and Lin (2015) test factors explaining investment in intangible assets. The empirical validation was done on three countries; Taiwan, Korea and Japan. They conclude that, for the cases of Japan and Korea, non-statistically significant effects of profitability and capital structure on investment decision. However, in the case of Taiwan, the authors highlight a significant effect of profitability on investment. Similarly to the work of Bond and Meghir (1994); Bond et al. (2003); Brown et al. (2009); James Brown, Bruce, and Petersen (2014) identify the determinants of firm investment. They consider as independent variables, sales, cash holdings, cash flows, changes in cash holdings and equity issues. The empirical results highlight significant influences of cash flow and cash holdings on firm investment. Similarly, Duchin et al. (2010) test the association between investment and cash flows. The same way, this study tries to test the determinants of firm investment decision. The empirical examines three countries: Romania, Russia and Serbia. The next section will review the main studies that highlight the factors explaining the investment decision. In Section 3, we introduce our sample, tested models and our variables. Section 4 highlight the descriptive statistics and our empirical results. A sensitivity analysis of our results by sectors is made in section 5. The last section concludes with our main results.

2. The Literature Review

In line with the work of Heshmat (2002), Dany and Hwang (2008) test the determinants of investment for ICT firms. The authors use different variables to measure the investment; investment in tangible assets ratio, total debt over total assets ratio. The authors test an adjustment model of investment decision. They consider the investment target as determined by all factors including, debt ratio, firm cash flows, firm size and activity sectors. The sample consists of 2782 companies listed on the US market for a period of 11 years from 1995 to 2005. The authors identify the determinants of investment using two samples of firms. They conclude that the effect of cash flows on investment decision is independent of activity sectors of firms. On the other side, they conclude that firm size

negatively affects firm investment.

Like Chen (2001), Clark (2003), Liu and Sun (2005), Qi and al. (2000), Xu and Wang (1999), Alex, Hong Zhang, and David (2013) tried to empirically test the impact of ownership concentration and the controlling shareholder on the investment decision of a firm using a sample of 786 non-financial firms in the China market over a period of 7 years from 1998 to 2004. The authors use several alternative measures of investment, including cash flows and sales. To measure ownership concentration, the authors use the share of capital owned by shareholders and the share of capital of the largest 5 and 10 shareholders. The authors measured ownership concentration using the Herfindahl index. By testing the dynamic panel data method as described by Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998), the authors highlight to a non-significant effect of cash flows of the firm on investment decision. However, the authors conclude that ownership structure can explain firm investment.

3. Data and Methodology

3.1 Sample Selection

The data in our sample are extracted from the Amadeus DATABSAE. Our sample consists of 170 firms of Moldova, 170 firms of Romania, 170 firms of Russia and 170 firms from Serbia for a period of 8 years from 2003 to 2010.

3.2 Choice of Variables and Hypothesis

The dependent variable:

Firm Investment: To measure firm investment, Harford (1999) use a probit model to identify the likelihood that a firm will engage in a new acquisition. However, in our article, and according to the work of Fazzari and al. (1988), Hoshi et al. (1991) and Almeida et al. (2004), Massimo, Annalisa, and Massimiliano (2013), we use a dependent variable, alternatively, three measures:

- The first variable measures the investment as the changes (measured by growth rate) of total assets of the firm.
- The second variable measures the investment as the changes (measured by growth rate) of tangible fixed assets.
- The second variable measures the investment as the changes (measured by growth rate) of intangible fixed assets.

The independent variables:

Profitability: Taeyoung and Taeyoon (2015) measures profitability using return on equity ratio. However, and like David et al. (2014), we measure profitability as the following ratio of Net income divided by the value shareholders funds. A higher profitability of firms causes more liquidity available. According to the Free Cash Flows theory of Jensen (1986), the owners try to minimize agency costs of shareholders equity by changing firm investments. The coefficient on this variable is expected to be positive. Hypothesis 1: The profitability positively affects firm investment.

Liquidity: Like James and Bruce (2014), we measure the liquidity effect on firm investment. Liquidity is measured as the ratio of cash holdings of the firm over total assets (David Audretsch & Elston, 2002). Indeed, a large amount of liquidity will stimulate managers to invest more. Therefore, the coefficient on the liquidity variable is expected to be positive. Hypothesis 2: Liquidity positively affects firm investment.

Firm size: Kadapakkam, Kumar, and Riddick (1998) measure firm size as log of sales over fixed tangible assets. However, in this study, size is identified by the logarithm of the total assets. Indeed, information asymmetry is decreasing function of firm size (Rajan & Zingales, 1995). Thus, managers can get sources of funding (debt or equity) to finance investment. The coefficient on the variable size is expected to be positive. However, the larger the firm is, the less interested managers are in increasing the asset value of their firms. Hypothesis 3: Size affects positively or negatively firm investment.

Firm age: Like Rebecca Zarutskie (2006) and Kazuo Ogawa (2015), we measure the effect of firm age on firm investment behaviour. Firm age is approximated by the period between the current date and the foundation year. Indeed, the higher the firm age is, the higher the firm is recognized, which will encourage managers to increase the size of their firms through investment. Hypothesis 4: firm age negatively affects firm investment.

Table 1. Variables and expected signs

Variables	Abbreviation	Formulation	Expected sign
Firm investment	INVTA	growth rate of total assets	Dependant variable
Firm investment	INVTANG	growth rate of tangible fixed assets	Dependant variable
Firm investment	INVINTANG	growth rate of intangible fixed assets	Dependant variable.
Profitability	PROF	Net income / Shareholders equity	+
Liquidity	LIQ	Cash holdings/ TA	+
Firm Size	SIZE	Ln(TA)	+/-
Firm age	AGE	number of years between the current date and the foundation year.	-
TA: total assets.			

3.3 Models to Be Tested

Like Richard Bilsborrow (1977), Lai Yung, Feng, and Yi (2015) and Farla (2014) and and based on discussion above, we try to test following models to identify factors affecting firm investment;

$$INVTA_{it} = \alpha_0 + \alpha_1 PROF_{it} + \alpha_2 LIQ_{it} + \alpha_3 SIZE_{it} + \alpha_4 AGE_{it} + \varepsilon_{it} \quad (1)$$

$$INVTANG_{it} = \alpha_0 + \alpha_1 PROF_{it} + \alpha_2 LIQ_{it} + \alpha_3 SIZE_{it} + \alpha_4 AGE_{it} + \varepsilon_{it} \quad (2)$$

$$INVINTANG_{it} = \alpha_0 + \alpha_1 PROF_{it} + \alpha_2 LIQ_{it} + \alpha_3 SIZE_{it} + \alpha_4 AGE_{it} + \varepsilon_{it} \quad (3)$$

4. The Empirical Results

4.1Descriptive Statistics

The distribution of our sample into five sectors: Service sector, real estate activities, professional, scientific and technical activities, mining and agriculture activities and manufacturing activities are presented in Table 2.

Table 2. Distribution of our sample into activity sectors

	Service	Real estates activities	Professionals activities	Mining and agriculture	Manufacturing	Total
Moldova	45	51	8	8	58	170 firms
Romania	32	21	6	33	78	170 firms
Russia	18	10	31	5	106	170 firms
Serbia	45	38	7	9	71	170 firms

The sample of Moldova is described ass follow: 45 firms in service sector, 51 companies in real estate sector, 8 firms in professionals activities, 8 firms in mining and agriculture sector and 58 industrial companies. A significant part of firms belongs to industrial sector. For the country of Romania : 32 firms in services sector, 21 companies in the real estate sector, 6 firms in professional activities, 33 firms in mining and agriculture and 78 industrial companies. These results show that for the country of Romania, most firms belongs to the mining, agriculture and industrial sectors. A significant part of firms belongs also to the service business. For the country of Russia, firms are introduced as follows: 18 firms in the service sector, 10 firms in the real estate sector, 31 firms in professional activities, 5 mining and agriculture companies and 106 industrial firms. These results show that the majority of firms belong to the manufacturing and Professionals activities sectors. However, the lowest part of firms is concentrated in the mining and agriculture sector. Regarding the country Serbia, firms are introduced as follows: 45 companies belong to the service sector, 38 firms to the real estate sector, 7 firms in professionals activities, 9 firms to the mining and agriculture sector and 71 industrial companies.

The results of descriptive statistics (Table 3) indicate that the country Romania has a positive average profitability equal to 0.0220, with a minimum of -0.980 and a maximum of 0.988. Furthermore, Russia has a positive average return of 0.100 with a minimum of -0.946 and a maximum of 0.992. The other countries have an average deficit profitability. The high profitability ratio for the Russian firms explains the high liquidity ratio that is equal 0.0379. However, firms in Moldova have of the lowest liquidity ratio. Regarding firm size, we found that firms in Russia

have the highest medium sized equal to 16,835. This value is lower than that found by David and Julie (2002). However, the Moldovan firms have the smallest size. Finally, firms in Russia are the Mature companies with an average age of 35,687 years with a minimum of one year and a maximum of 293 years. This average age is higher than that found by Massimo, Annalisa, Massimiliano (2013) for Italian firms (they an average age equal to 10.38 years for a sample of 288 firms observed from 1994 to 2008). For investment variables, we found a higher growth of total assets for firms from Romania with an average value of 0.245.

Table 3. Descriptive statistics

			Moldova		
	OBS	MEAN	STD DEV	MIN	MAX
PROF	911	-0,00270	0,167	-0,919	0,945
LIQ	914	0,0215	0,0624	0,000000366	0,917
SIZE	926	12,257	1,918	6,563	18,0558
AGE	1354	12,444	2,722	1	19
INVTA	704	0,0423	0,348	-0,967	3,455
INVTANG	312	3,767	20,630	-1	167,264
INVINTANG	666	0,208	6,711	-1	11,862
			Romania		
	OBS	MEAN	STD DEV	MIN	MAX
PROF	1167	0,0220	0,230	-0,980	0,988
LIQ	1243	0,0681	0,115	0,000000658	0,888
SIZE	1253	14,706	2,680	7,0211	19,534
AGE	1319	15,161	3,959	1	21
INVTA	1037	0,245	1,261	-0,907	32,0241
INVTANG	1033	0,668	7,997	-1	232,0591
INVINTANG	559	4,436	41,447	-1	686,531
			Russia		
	OBS	MEAN	STD DEV	MIN	MAX
PROF	1193	0,100	0,185	-0,946	0,992
LIQ	1229	0 ,0379	0,0661	0,0000013	0,903
SIZE	1235	16,835	0,922	13,797	24,0831
AGE	1351	35,687	42,858	1	293
INVTA	1058	0,161	0,464	-1	9,382
INVTANG	1054	0,113	0,413	-1	5,851
INVINTANG	564	1,388	11,001	-1	175,225
			Serbia		
	OBS	MEAN	STD DEV	MIN	MAX
PROF	1103	-0,00460	0,213	-0,959	1
LIQ	1226	0,0248	0,0513	0,00000417	0,417
SIZE	1299	15,145	2,253	9,0607	18,965
AGE	1358	30,450	24,525	1	172
INVTA	1101	0,100	0,964	-0,824	29,510
INVTANG	1098	0,135	2,781	-1	90,116
INVINTANG	468	4,75	44,869	-1	731,236

4.2 Determinants of Firm Investment

The empirical results of the factors explaining the investment decision of firms are presented in Table 4 using data panels and ordinary least square methods. We found a highest correlation coefficient equal to 16.89% for the specification 1 for Moldova. However, specification 2 of country Romania has the lowest correlation coefficient of -0.18%.

Profitability: According to work of Lai Yung and Feng Yi (2015), we found a positive and a statistically significant effect of profitability on firm investment for specification 1 and 3 for country Romania and specification 1 for countries of Serbia and Moldova. This result is obtained, also, under specification 3 for country Russia. This result confirms the theory of free cash flow of Jensen (1986) which assumes that controlling shareholders try to reduce

liquidity in the hands of managers by increasing investment. This result do not rejects our first hypothesis. However, profitability has a negative and statistically significant effect on firm investment for Moldova under specification 2. Therefore, we can conclude that with the increase in profitability, we notice an opportunistic behaviours of managers who try to take in private profits.

Liquidity: Like in Pawlina and Renneboog (2005) and Kazuo Ogawa (2015), liquidity positively and significantly affects firm investment under specification 1 and 2 for countries of Moldova and Serbia. This result has been theoretically supported by Jensen (1986). However, Dayong and Fang (2009), find a negative effect of cash holdings ratio. This result do not rejects our second hypothesis. However, we found a negative and not statistically significant effect of liquidity on firm investment for country Romania and Russia under specifications 2 and 3 respectively.

Size: Similarly to the results of Michelle, Rebecca and Rodrigo (2015), size variable positively and significantly affects the investment for countries of Russia and Serbia under specifications 1 and 2. However, this positive association is obtained under all specifications for Moldova country and first specification for country Romania. This result do not rejects our third hypothesis. However, we found a negative and not statistically significant effect of size on investment for country Romania under specifications 2 and 3. This inverse relationship means that for large firms, managers are not interested in allocating their surplus funds for investment.

Firm age: Similarly to the results of Massimo, Annalisa, Massimiliano (2013), the coefficient is negative and statistically significant under specifications 1 and 2 for two countries: Russia and Serbia. However, this effect is observed under the first specification for the other two countries. This result contradicts that presented by Kazuo Ogawa (2015). In fact, he found that factors explaining firm investment are not different between young and older firms. For country Moldova, we highlight a positive and statistically significant effect of firm age on investment decision.

Table 4. Firm investment determinants

	Moldova			Romania		
	Specification 1 INVTA	Specification 2 INVTANG	Specification 3 INVINTANG	Specification 1 INVTA	Specification 2 INVTANG	Specification 3 INVINTANG
C	-4,698***	-28,525***	-4,998**	5,769***	2,992	-1,250
PROF	0,415***	-20,110***	-0,788	0,373*	0,253	24,335***
LEL	0,824***	60,792*	0,149	0,235	-0,665	-25,394
SIZE	0,399***	1,478**	0,281*	0,525***	-0,158	-0,151
AGE	-0,0173**	0,958**	0,141	-0,115***	0,0080	0,556
OBS	683	300	646	942	940	530
R squared (%)	16,89	4,13%	0,37	6,01	-0,18	0,89
Prob> F	0,0000	0,0025	0,1747	0,0000	0,6827	0,0697
	Russia			**Serbia**		
	Specification 1 INVTA	Specification 2 INVTANG	Specification 3 INVINTANG	Specification 1 INVTA	Specification 2 INVTANG	Specification 3 INVINTANG
C	-4,638***	-1,959***	-0,408	-4,404***	-5,280***	-9,967
PROF	0,0364	0,0930	4,846*	0,261***	0,188	1,104
LEL	0,0122	0,156	-8,937	1,483***	1,043*	-17,108
SIZE	0,437***	0,233***	0,0769	0,370***	0,449***	0,591
AGE	-0,0708***	-0,0517***	0,0110	-0,0392***	-0,0494***	0,165
OBS	1015	1011	550	893	893	411
R squared(%)	10,46	5,71	0,24	16,25	7,36	0,04
Prob> F	0,0000	0,0000	0,2571	0,0000	0,0000	0,3831

Note. *,**, ***: significance at 10%, 5% and 1% levels respectively.

5. Firm Investment and the Effect of Activity Sectors

Similarly to the work of Varian (2001), Feenstra, Huang, and Hamilton (2003), Liu and Hsu (2006), Ronald, Sunglyong, and Youn (2008) and Subash, Lukose, and Surenderrao (2015), we examine the importance of the sectors in identifying factors explaining firm investment. The empirical results are presented in Table 5. We

consider five business activities: The service sector, the real estate sector, the professionals activities, manufacturing and mining and agriculture activities. The empirical results are reported for our first measure of the dependent variable. For the country Russia, we found the highest correlation coefficient for the mining and agriculture sector at 87.46%. In this case, variables size is positive and statistically significant. However, the coefficient of profitability variable is negative and statistically significant. The variable age influence negatively firm investment. This result means that young firms have higher investment ratio than mature firms. Furthermore, increased size leads to an increase in investment for the service sector firms. This result is similar to the professional activities. In addition, for this sector variable age have a negative effect on firm investment. Furthermore, we obtained a positive and a statistically significant effect of profitability on firm investment for all countries for two sectors. It appears that an increase in liquidity stimulates managers to invest more in the mining and agriculture sector in Russia. This same result is found for country Serbia for service, real estates and manufacturing sectors. However, the hypothesis of a positive effect between size and investment seems valid for all countries under all specifications, except for real estate sector for country Russia and professional activities for country Serbia. However, the reputation of a firm does not appear to stimulate managers to invest more for all market for every sector, except for the real estate, professionals activities, mining and agriculture sectors for country Moldova, and service and professionals activities for country Serbia.

Table 5. Firm investment determinants and effects of activity sectors

	Moldova					Romania				
	INVTA Service	INTA Real estates	INTA Professionals	INTA Man	INVTA min and agr	INVTA Service	INTA Real estates	INTA Professionals	INTA Man	INVTA min and agr
C	-0,0998	-6,533***	-16,468***	-3,940***	-1,503***	-11,988**	-2,970**	-12,715**	-4,626***	-2,445***
PROF	0,355**	0,588***	0,493	0,184	0,263	0,402	0,744***	0,943	0,415***	0,0291
LEL	-0,326	0,687	-1,732	-1,252	-1,358	1,132	-0,463	-0,280	0,235	0,159
SIZE	0,0394**	0,581***	1,503***	0,320***	0,115***	1,225***	0,298***	1,0706**	0,386***	0,243***
AGE	-0,0273*	-0,0205	0,0279	-0,0219**	0,0123	-0,326***	-0,079***	-0,187*	-0,0831***	-0,0397***
OBS	142	187	32	269	53	180	104	36	444	178
R squared (%)	7,48	32,87	84,71	12,06	31,19	8,04	30,39	25,21	10,80	14,70
Prob > F	0,0054	0,0000	0,0000	0,0000	0,0002	0,0163	0,0000	0,0979	0,0000	0,0002
	Russia					Serbia				
	INVTA service	INTA Real estates	INTA Professionals	INTA Man	INVTA min and agr	INVTA Service	INTA Real estates	INTA Professionals	INTA Man	INVTA min and agr
C	-3,276**	-0,647	-8,794***	-4,139***	-3,909***	-7,722***	-2,532**	0,222	-3,804***	-6,83***
PROF	0,342**	0,238	0,240	0,243**	-1,0213***	0,217	0,203	1,102***	0,359***	-0,0141
LEL	0,516	0,467	0,655	0,710	34,822***	3,131***	1,496***	0,368	0,693*	-1,799
SIZE	0,299***	0,117	0,641***	0,434***	0,235***	0,564***	0,343***	0,00671	0,319***	0,439***
AGE	-0,049***	-0,046***	-0,0837***	-0,071***	-0,00691*	-0,00909	-0,0758**	-0,00472	-0,036***	-0,0200
OBS	111	68	183	627	26	206	193	33	410	51
R squared (%)	17,77	21,64	16,52	11,89	87,46	25,78	21,11	18,84	15,98	20,11
Prob> F	0,0015	0,0095	0,0000	0,0000	0,0000	0,0000	0,0000	0,0420	0,0000	0,0618

Note. *,**, ***: significance at 10%, 5% and 1% levels respectively.

6. Conclusion

This paper interpret the factors explaining the investment decision of a firm (Galende& Suarez, 1999; Galende &

Fuente, 2003). In particular, independent variables are; profitability, liquidity, size and firm age. Investment is measured alternatively by three ratios; change in total assets, changes in tangible fixed assets and changes in intangible fixed assets. The empirical validation was performed for four countries; Moldova, Romania, Russia and Serbia. Using the data panel estimation method, the empirical results pointed to differences between countries for the factors explaining investment decision, particularly profitability. In fact, we obtained positive and statistically significant effects in case of market Moldova, Russia and Serbia under specifications 1, 3 and 1, respectively. This result is found under specifications 1 and 3 for country Romania. A negative relation is obtained under specification 2 for country Moldova. Similarly, liquidity positively and significantly affects firm investment in Moldova and Serbia under specifications 1 and 2. The differences in the factors explaining investment is recorded, also, for size and firm age. Regarding the analysis of the sensitivity of our results by sectors, the empirical results show that the sectors significantly affect factors explaining investment, particularly, liquidity. Indeed, for the case of Russia, liquidity positively and significantly affects firm investment in the mining and agriculture sector. Furthermore, this result is found for service, real estate and manufacturing sectors for country Serbia.

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