OULUN YLIOPISTO
UNIVERSITY of OULU

YLIOPISTOTENTTILOMAKEPOHJA / UNIVERSITY EXAM TEMPLATE

Koskee tiedekuntia LuTK, OyKKK, KaTK, TTK, TST ja BMTK (Linnanmaan tentit) /
Concerns Faculties SCI, OBS, OMS, TECH, ITEE and BMM (Linnanmaa campus)

Tentin pvm / Date of exam: 16.2. 2016	**Tentin kesto tunteina / Exam in hours: 4**
Tiedekunta / Faculty: OBS	
Opintojakson koodi, nimi, tentin numero ja opintopistemäärä / The code and the name of the course, number of the exam and credit units: **721961S Entrepreneurial Finance**	
Tentaattori(t) / Examiner(s): **Juha Joenväärä**	**Sisäinen postios. / Internal address:**

Sallitut apuvälineet / The devices allowed in the exam:

☒ Nelilaskin / Standard calculator
☒ Funktiolaskin / Scientific calculator
☐ Ohjelmoitava laskin / Programmable calculator

☐ Muu materiaali, tarkennettu alla / Other material, specified below:

Tenttiin vastaaminen / Please answer the questions:

☒ Suomeksi / in Finnish
☒ Englanniksi / in English

Kysymyspaperi on palautettava / Paper with exam questions must be returned:

☒ Kyllä / Yes
☐ Ei / No

Answer 4 questions.

1. Capital Structure of New Firms
   a. What is meant by financial growth cycle theory? Does the theory hold in data? (2. points)
   b. What are the sources of capital for new firms? Utilize the information in table below (4. points)

Table 4: Sources of Financing for 2004 Startups

Sample includes 3,972 firms that either survived over the 2004-2007 period or were verified as going out of business over the same period. The mean, in dollars, for all firms is reported in the first column. The second column reports the mean, in dollars, for only firms with positive amounts of that source of funding. The sample size for that source of funding is reported in the third column.

Category	Funding Source	Grand Mean	Mean if > 0	Count
Owner Equity		31,734	40,536	3,093
Owner Debt		5,037	15,765	1,241
	Personal CC balance, resp.	2,811	9,375	1,158
	Personal loan, other owners	1,989	124,124	67
	Personal CC balance, others	238	7,415	132
Insider Equity		2,102	44,956	177
	Parent Equity	1,456	42,509	126
	Spouse Equity	646	40,436	62
Insider Debt		6,362	47,873	480
	Personal Loan from family	2,749	29,232	327
	Business loan from family	1,760	57,207	115
	Family loan to other owners	284	34,509	29
	Personal loan to other owners	550	28,988	73
	Other personal loans	924	81,452	45
	Business loan by owner	15	9,411	5
	Business loan by emp.	79	22,198	9
Outsider Equity		15,935	354,540	205
	Angel investors	6,350	244,707	110
	Venture Capital	4,804	1,162,898	26
	Business equity	3,645	321,351	56
	Govt. equity	798	146,624	27
	Other equity	337	187,046	8
Outsider Debt		47,847	128,706	1,439
	Business bank loan	17,075	261,358	243
	Personal bank loan	15,859	92,433	641
	Credit line balance	5,057	95,058	210
	Non-bank bus. Loan	3,627	214,920	72
	Personal bank loan by other owners	1,859	80,650	92
	Govt. bus. Loan	1,331	154,743	34
	Owner bus. CC balance	1,009	7,107	543
	Bus. CC balance	812	6,976	452
	Other Bus. CC balance	135	7,852	62
	Other bus. Loan	231	78,281	19
	Other individual loan	226	43,202	22
	Other debt	626	119,493	22
Total Financial Capital		109,016	121,981	3,972
Trade credit		21,793	93,536	838

2. Dr. Sipola's Lecture
   a. What kind of startup is fundable from investor's perspective? (2. points)
   b. Structure of (a good) pitch. (4. points)

3. Private Equity Fund Performance
   a. What is meant private equity fund return persistence? How it is defined and measured? (points 2)
   b. Explain stylized facts about private equity fund performance persistence. See Table 7 below. (3 points)
   c. How fund size is related to performance? See Table 7 below (1 point)

Table 7: Fund Persistence Regressions

This table shows regressions of current fund performance, as measured by PME, on previous fund performance. Some regressions include the current fund size and the change in the fund size. All variables are expressed in natural logarithms. Log Previous Fund PME if PME <(>) 1 includes the log of the previous fund PME if the prior fund returns were below (exceeded) public market returns (as measured by the S&P 500). Vintage year dummies are included for the current fund and the previous funds that are included in the regressions. Only funds for which a previous fund exists in our sample are included. See Table 1 for further information on the data sample.

Panel A: Whole sample

	Buyout Funds						VC Funds					
(Log) Previous Fund PME	0.273***			0.407***	0.271***	0.269***	0.338***			0.272***	0.339***	0.321***
	[0.053]			[0.087]	[0.053]	[0.053]	[0.044]			[0.062]	[0.044]	[0.044]
(Log) Previous Fund PME if PME<1		0.357***						0.338***				
		[0.104]						[0.080]				
(Log) Previous Fund PME if PME>=1		0.208**						0.338***				
		[0.064]						[0.068]				
2nd Previous Fund PME			0.053	-0.002					0.167***	0.063		
			[0.075]	[0.082]					[0.060]	[0.060]		
(Log) Change Fund Size					0.019						-0.057	
					[0.057]						[0.069]	
(Log) Fund Size						0.027						0.157***
						[0.021]						[0.042]
Vintage Year Dummies	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	285	285	139	139	285	285	436	436	252	252	436	436
Adj. R-squared	0.20	0.20	0.01	0.25	0.19	0.20	0.32	0.32	0.38	0.44	0.32	0.34

Panel B: Pre-2001 funds

	Buyout Funds						VC Funds					
(Log) Previous Fund PME	0.293***			0.570***	0.286***	0.296***	0.365***			0.252**	0.367***	0.340***
	[0.094]			[0.162]	[0.096]	[0.094]	[0.063]			[0.097]	[0.063]	[0.062]
(Log) Previous Fund PME if PME<1		0.244						0.380***				
		[0.179]						[0.126]				
(Log) Previous Fund PME if PME>=1		0.338*						0.355***				
		[0.169]						[0.092]				
2nd Previous Fund PME			0.131	-0.045					0.171	0.064		
			[0.154]	[0.157]					[0.109]	[0.109]		
(Log) Change Fund Size					-0.092						-0.110	
					[0.154]						[0.113]	
(Log) Fund Size						0.051						0.265***
						[0.051]						[0.075]
Vintage Year Dummies	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	106	106	40	40	106	106	243	243	123	123	243	243
Adj. R-squared	0.14	0.13	0.00	0.27	0.14	0.14	0.34	0.34	0.41	0.46	0.34	0.38

Panel C: Post-2000 funds

	Buyout Funds						VC Funds					
(Log) Previous Fund PME	0.280***			0.320***	0.258***	0.271***	0.281***			0.319***	0.282***	0.270***
	[0.062]			[0.107]	[0.074]	[0.062]	[0.053]			[0.073]	[0.053]	[0.053]
(Log) Previous Fund PME if PME<1		0.627***						0.295***				
		[0.130]						[0.077]				
(Log) Previous Fund PME if PME>=1		0.084						0.261***				
		[0.089]						[0.099]				
2nd Previous Fund PME			-0.017	-0.004					0.133**	0.057		
			[0.098]	[0.098]					[0.058]	[0.054]		
(Log) Change Fund Size					0.074						-0.010	
					[0.050]						[0.063]	
(Log) Fund Size						0.025						0.061*
						[0.019]						[0.036]
Vintage Year Dummies	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	179	179	99	99	179	179	193	193	129	129	193	193
Adj. R-squared	0.20	0.24	0.00	0.14	0.21	0.21	0.17	0.16	0.01	0.16	0.16	0.18

4. Risk and returns in venture capital.

   a. Define the development stages of entrepreneurial company. (2 points)

   b. To which extent are venture capital returns are exposed to risk factors across different stages? See Table 5 below. (2 points)

   c. What you can say about risk-adjusted returns? See Table 8 below. (2 points)

Table 5
Estimates by stage of development of entrepreneurial company

	(1)			(2)			(3)			(4)		
	Mean	Std. Dev.		Mean	Std. Dev.		Mean	Std. Dev.		Mean	Std. Dev.	
Valuation Equation												
Intercept												
seed	0.0436	(0.0108)	***	0.0452	(0.0104)	***	0.0434	(0.0106)	***	0.0461	(0.0112)	***
early	–0.0398	(0.0020)	***	–0.0405	(0.0020)	***	–0.0391	(0.0021)	***	–0.0397	(0.0022)	***
late	–0.0920	(0.0031)	***	–0.0922	(0.0033)	***	–0.0894	(0.0036)	***	–0.0892	(0.0036)	***
mezz	–0.0517	(0.0130)	***	–0.0516	(0.0130)	***	–0.0609	(0.0153)	***	–0.0630	(0.0143)	***
RMRF												
seed	0.7414	(0.7914)		0.5827	(0.7556)		0.7270	(0.7254)		0.4688	(0.8176)	
early	2.7425	(0.1267)	***	2.6633	(0.1309)	***	2.1774	(0.1317)	***	2.1693	(0.1424)	***
late	2.6281	(0.2210)	***	2.5053	(0.1877)	***	2.3840	(0.2204)	***	2.3481	(0.2319)	***
mezz	5.8885	(0.9108)	***	5.5939	(0.9100)	***	5.3149	(1.0087)	***	5.0712	(0.9047)	***
SMB												
seed							–0.1013	(0.6441)		–0.1443	(0.6081)	
early							1.4233	(0.2200)	***	1.3245	(0.2202)	***
late							0.5772	(0.3924)		0.4167	(0.3982)	
mezz							1.7806	(1.1654)		1.8336	(1.0111)	*
HML												
seed							0.5291	(0.4820)		0.5165	(0.5019)	
early							–1.8732	(0.1520)	***	–1.7795	(0.1542)	***
late							-1.2142	(0.1632)	***	–1.0380	(0.2679)	***
mezz							-1.2195	(0.9704)		–1.0938	(0.9146)	
Sigma												
seed	0.3434	(0.0155)	***	0.3417	(0.0149)	***	0.3415	(0.0168)	***	0.3404	(0.0151)	***
early	0.3880	(0.0056)	***	0.3886	(0.0051)	***	0.3784	(0.0053)	***	0.3800	(0.0054)	***
late	0.4396	(0.0100)	***	0.4386	(0.0108)	***	0.4397	(0.0093)	***	0.4392	(0.0109)	***
mezz	0.3930	(0.0350)	***	0.3810	(0.0314)	***	0.3761	(0.0332)	***	0.3664	(0.0331)	***

The table presents MCMC estimates of the one-factor market model and three-factor Fama-French model in monthly log returns with selection correction. Factor and risk-free returns are from Kenneth French's website. The estimates are means and standard deviations (in parentheses) of the simulated posterior distributions. The specifications contain separate coefficients for companies at the seed, early, late, and mezzanine stages, as defined in Table 2 in Sahlman (1990). Our late stage corresponds to the second, third, and fourth stages according to Sahlman's definition. In the valuation equation, *Intercept* is the monthly intercept in excess of the risk-free rate and *RMRF* is the slope on the market log return in excess of the risk-free rate. *SMB* is the small-minus-big portfolio, and *HML* the high-minus-low book-to-market portfolio. *Sigma* is the estimated standard deviation of the error term. In the selection equation, *Return* is the log return earned since the previous financing event. *Time* is the time since this event (in years). *Acquisitions*, *IPOs*, and *Rounds* contain the number of VC-backed acquisitions, IPOs, and total VC investment rounds in the month of the observation (in 000s). The simulations use 5,000 iterations preceded by 1,000 discarded iterations for burn-in. ***, **, and * denote whether zero is contained in the 1%, 5%, and 10% credible intervals, respectively.

Table 8
Monthly risk-adjusted excess returns

	Mean	Std. Dev.	1	5	50	95	99
Table 5: By stage							
Model 1							
Seed	0.1031	(0.0117)	0.0781	0.0850	0.1026	0.1235	0.1325
Early	0.0400	(0.0024)	0.0346	0.0362	0.0399	0.0440	0.0462
Late	0.0087	(0.0038)	-0.0002	0.0023	0.0088	0.0148	0.0173
Mezz	0.0528	(0.0196)	0.0129	0.0233	0.0512	0.0881	0.1051
Model 2							
Seed	0.1040	(0.0112)	0.0801	0.0867	0.1034	0.1233	0.1325
Early	0.0392	(0.0023)	0.0340	0.0355	0.0392	0.0430	0.0445
Late	0.0081	(0.0039)	-0.0004	0.0019	0.0079	0.0148	0.0174
Mezz	0.0464	(0.0185)	0.0084	0.0180	0.0453	0.0785	0.0947
Model 3							
Seed	0.1025	(0.0120)	0.0777	0.0845	0.1018	0.1223	0.1385
Early	0.0408	(0.0026)	0.0348	0.0366	0.0408	0.0452	0.0470
Late	0.0137	(0.0048)	0.0027	0.0057	0.0138	0.0217	0.0247
Mezz	0.0399	(0.0212)	-0.0017	0.0085	0.0380	0.0777	0.0973
Model 4							
Seed	0.1049	(0.0126)	0.0779	0.0849	0.1042	0.1266	0.1376
Early	0.0404	(0.0027)	0.0342	0.0360	0.0403	0.0448	0.0469
Late	0.0131	(0.0051)	0.0025	0.0051	0.0128	0.0217	0.0261
Mezz	0.0311	(0.0196)	-0.0070	0.0014	0.0293	0.0667	0.0826

The table presents means, standard deviations, and percentiles of the posterior distributions of the monthly risk-adjusted excess returns (alphas). See text for construction of these estimates.