

Table 1  
Descriptive statistics

	Complete Sample (N=236)					External Projects (N=167)				
	Mean	Median	Standard deviation	Minimum	Maximum	Mean	Median	Standard deviation	Minimum	Maximum
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<b>PANEL A: PROJECT CHARACTERISTICS</b>										
Project size (man month)	113	26	403	0.38	5400	74.7	27	141	0.38	960
Proposal effort (% of project effort)	2.11	0.63	4.5	0	50	2.55	1.25	4.96	0	50
Specification effort (% of project effort)	13.8	10.0	13.0	0	100	13.5	10.0	14.0	0	100
Project cost >estimate (overrun)	0.74	1	0.44	0	1	0.75	1	0.43	0	1
Project cost =estimated cost	0.22	0	0.41	0	1	0.22	0	0.42	0	1
Project cost <estimate (underrun)	0.046	0	0.21	0	1	0.023	0	0.15	0	1
Total overrun (% of project cost)	24	15	34.4	-25	250	22.7	15	30	0	200
Causes of overrun:										
% due to ambiguity	20.4	0	33.5	0	100	19.5	0	33.6	0	100
% due to changes	48.1	50	41.9	0	100	45.4	50	42.7	0	100
% due to internal difficulties	7.8	0	22.4	0	100	9.06	0	25	0	100
% due to delay by the client	12.7	0	25.8	0	100	12.8	0	26.2	0	100
% due to other reasons	9.92	0	26.3	0	100	11.9	0	29.1	0	100
Project was delivered late	0.19	0	0.4	0	1	0.2	0	0.4	0	1
<b>PANEL B: CLIENT</b>										
Project is for the mother company	0.23	0		0	1	0				
OSDC project	0.063	0				0				
External project	0.71	1		0	1	1				
<b>PANEL C: CONTRACT</b>										
Time and material contract	0.3	0	0.46	0	1	0.15	0	0.36	0	1
Mixed contract	0.21	0	0.41	0	1	0.26	0	0.44	0	1
Fixed cost contract	0.48	0	0.5	0	1	0.58	1	0.49	0	1
Share of overrun paid for by the firm	47.4	38.3	46.3	0	1	57.1	76.5	45.1	0	1

Table 2  
Share of overrun for paid by the firm as a function of initial contract

	Proportion paying 100%	Proportion paying between 0 and 100 %	Proportion paying 0%	Average share of the overrun paid for by the firm
	(1)	(2)	(3)	(4)
<b>PANEL A: ALL CONTRACTS</b>				
All contracts	39.29	17.85	42.86	47.4 (3.58)
Time and material contracts	11.1	11.12	77.78	15.6 (4.92)
Mixed contracts	34.29	25.71	40	51.6 (7.69)
Fixed cost contracts	54.12	18.82	27.06	63.1 (4.83)
<b>PANEL B: EXTERNAL CONTRACTS</b>				
All contracts	47.58	20.97	31.45	57.1 (4.06)
Time and material contracts	17.65	23.53	58.82	28.2 (9.56)
Mixed contracts	40.62	25	34.38	50.9 (8.08)
Fixed cost contracts	56.76	18.92	24.32	65.8 (5.07)

Table 3  
Share of overrun paid by the firm and source of the overrun

	Share of the overrun paid for by the firm			OLS coefficient (share paid by the firm on share due to the firm)
	Client fully responsible	Client and firm partly responsible	Firm fully responsible	
	(1)	(2)	(3)	
<b>PANEL A: ALL CONTRACTS</b>				
All contracts	41.1 (5.41)	49.4 (6.47)	52.6 (5.24)	0.17 (0.095)
Fixed cost contracts	52.2 (7.56)	64.5 (9.15)	70 (7.19)	0.21 (0.13)
T&M and mixed contracts	27.4 (7.60)	36 (8.40)	39.8 (6.81)	0.21 (0.12)
<b>PANEL B: EXTERNAL CONTRACTS</b>				
All contracts	50.9 (6.63)	58.4 (7.42)	62.5 (5.75)	0.18 (0.10)
Fixed cost contracts	53.2 (8.14)	69.1 (9.67)	73.8 (7.30)	0.28 (0.14)
Other contracts	46.5 (11.7)	44.6 (10.8)	50.3 (8.50)	0.19 (0.15)

Table 4  
Firms' and projects'  
characteristics

	External projects (for all firms)									Firms which have internal projects			
	Sample Mean	Firm foundation date			ISO 9001 certification			Relationship with the client			Type of project		
		> 1993	<=1993	Difference	No	Yes	Difference	New client	Repeated	Difference	External	Internal	Difference
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	
Yearly turnover 97/98 (million \$US)	4.71 (0.96)	2.56 (0.87)	6.24 (1.89)	-3.66 (2.35)	2.71 (0.81)	13.9 (4.65)	-11.2* (2.75)	5.21 (1.56)	3.82 (1.72)	1.39 (2.46)	8.11 (2.5)	2.2 (0.87)	5.92* (2.87)
Number of employees	137 (27.2)	84 (17.8)	188 (50.12)	-104* (52.9)	72 (8.73)	453 (137)	-391* (63.8)	160 (46.6)	113 (7.4)	-46.4 (54.6)	273 (92)	73 (12)	200 (86)
Project size (in man-months)	74.7 (10.9)	53.9 (10.8)	90.1 (17.1)	-36.8 (21.9)	48.9 (6.54)	183 (45.5)	-134.8* (25.7)	85.67 (16.2)	58.7 (12.59)	26.9 (22.2)	88.5 (22.5)	206.7 (85.1)	-118.2 (89.1)
Share of yearly turnover coming from this project	18.5 (1.92)	16.2 (2.53)	20.2 (2.77)	-4.0 (3.88)	20.4 (2.32)	10.6 (1.85)	9.81* (4.81)	16.5 (1.84)	21.33 (3.91)	-4.78 (3.91)	19.3 (3.56)	28.6 (3.84)	-9.26 (5.25)
Client is "big"	0.55 (0.039)	0.55 (0.054)	0.55 (0.059)	-0.051 (0.11)	0.54 (0.043)	0.59 (0.088)	-0.05 (0.14)	0.44 (0.050)	0.71 (0.056)	-0.22* (0.11)	0.61 (0.059)	0.28 (0.054)	0.31* (0.11)
Proportion of "simple" projects (y2k, cad, data)	0.14 (0.027)	0.20 (0.048)	0.094 (0.030)	0.10* (0.051)	0.13 (0.029)	0.16 (0.065)	0.023 (0.068)	0.10 (0.030)	0.19 (0.048)	-0.09 (0.054)	0.1 (0.037)	0.072 (0.031)	0.032 (0.049)
Project return (size*markup)	92.6 (14.8)	59.8 (11.7)	120 (24.8)	-59.8* (29.42)	58.2 (8.11)	235.4 (62.3)	-177.2* (34.5)	101.7 (21.0)	78 (18.6)	23.7 (30.5)	123.4 (33.0)	297.1 (139.4)	-173.7 (134.0)
Firm created before 1993	0.57 (0.038)	0	1	-1	0.47 (0.043)	0.22 (0.074)	0.25* (0.096)	0.44 (0.050)	0.4 (0.060)	0.047 (0.078)			
Firm is ISO certified	0.19 (0.43)	0.098 (0.036)	0.26 (0.045)	-0.16* (0.061)	0	1	-1	0.18 (0.038)	0.21 (0.050)	-0.024 (0.062)			
Contract is with a repeated client	0.41 (0.038)	0.38 (0.051)	0.43 (0.051)	-0.047 (0.077)	0.4 (0.042)	0.44 (0.089)	-0.038 (0.097)	0	1	-1			

Table 5  
Contracts

	External projects (for all firms)									Firms which have internal projects			
	Sample Mean	Firm foundation date			ISO 9001 certification			Relationship with the client			Type of project		
			> 1993	<=1993	Difference	No	Yes	Difference	New client	Repeated	Difference	External	Internal
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Proportion of fixed cost contracts	0.58 (0.038)	0.73 (0.053)	0.47 (0.052)	0.26* (0.075)	0.59 (0.042)	0.53 (0.090)	0.061 (0.097)	0.62 (0.049)	0.53 (0.061)	0.087 (0.078)	0.45 (0.061)	0.23 (0.051)	0.22* (0.080)
Share of overrun paid for by the firm	57.1 (4.06)	68.6 (5.16)	49.3 (6.25)	19.4* (8.12)	56.9 (4.59)	57.8 (8.84)	-0.98 (10.01)	64.2 (4.94)	44.2 (6.73)	20* (8.32)	46.7 (6.36)	20.2 (5.82)	26.5* (8.67)
Share of overrun paid for by the firm (fixed cost contracts)	62.1 (5.34)	71.8 (6.83)	59 (7.48)	12.8 (10.1)	69.9 (5.55)	49.5 (11.63)	20.4 (12.46)	73.4 (5.86)	49.9 (9.09)	23.57* (10.54)	58.7 (9.67)	44.8 (14.7)	13.9 (17.2)

Table 6  
Share of overrun paid for by the firm, by project size

	External projects (for all firms)									Firms which have internal projects		
	Firm foundation date			ISO 9001 certification			Relationship with the client			Type of project		
	> 1993	<=1993	Difference	No	Yes	Difference	New client	Repeated	Difference	External	Internal	Difference
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(10)	(11)	(12)
PANEL A: Unconditional												
	68.6	49.3	19.4*	56.9	57.8	-0.98	64.2	44.2	20*	46.7	20.2	26.5*
	(5.16)	(6.25)	(8.12)	(4.59)	(8.84)	(10.01)	(4.94)	(6.73)	(8.32)	(6.36)	(5.82)	(8.67)
PANEL B: By project size												
<16 man months	72.1	48.6	23.4	60.4	0.0	60.4	69.8	46.1	23.7	43.5	8.3	35.1
	(10.9)	(9.8)	(14.7)	(7.47)	(0.00)	(46.6)	(9.64)	(11.07)	(14.6)	(13.1)	(8.33)	(15.5)
16-49 man months	45.2	50.2	-5.0	44.2	66.7	-22.5	62.7	27.8	34.9	46.4	27.5	18.9
	(16.0)	(9.69)	(18.1)	(8.76)	(21.1)	(20.4)	(10.3)	(11.3)	(15.6)	(10.6)	(15.9)	(19.5)
>40 man months	70.6	48.5	22.1	57.2	55.1	2.1	58.4	51.2	7.01	47.9	22.5	25.4
	(10.3)	(8.31)	(13.5)	(8.5)	(10.8)	(13.9)	(7.79)	(13.4)	(15.3)	(11.6)	(8.69)	(14.20)
PANEL C: Controlled contrast												
			15.6			15.3			22.1*			26.3*
			(9.3)			(17.4)			(8.84)			(13.2)
PANEL D: By project complexity												
simple	76.2	56.6	19.6	64.1	77.8	-13.76	71.6	56	15.6	56.7	47.04	9.26
	(9.52)	(8.9)	(13.0)	(7.45)	(10.23)	(19.3)	(8.11)	(11.2)	(13.6)	(12.6)	(15.4)	(19.9)
complicated	63.17	45.9	17.23	52.3	51.9	0.45	60.13	37.4	22.7	43.8	11.2	32.6
	(8.27)	(6.34)	(10.5)	(5.8)	(10.8)	(11.8)	(6.20)	(8.30)	(10.4)	(7.37)	(5.10)	(9.18)

Table 7  
Interaction of different kind of reputation

	External projects (for all firms)				Firms which have internal projects			
	Foundation date		ISO 9001 certification		Relationship with the client		Type of project	
	> 1993	<=1993	No	Yes	New client	Repeated	External	internal
			(1)	(2)	(3)	(4)	(5)	(6)
PANEL A: DIFFERENCE BETWEEN YOUNG AND OLD FIRMS								
Proportion of fixed cost contracts			0.27*	0.23	0.32*	0.17	0.31*	0.12
			(0.082)	(0.22)	(0.094)	(0.12)	(0.12)	(0.10)
Share of overrun paid for by the firm			25.6*	-9.71	17.1*	18.9	7.9	-1.52
			(8.85)	(23.95)	(9.89)	(14.1)	(13.6)	(11.8)
PANEL B: DIFFERENCE BETWEEN CONTRACTS WITH NEW AND REPEATED CLIENT:								
Share of overrun paid for by the firm	17.1	18.9	18.3	26.1			-15.2	NA
	(13.4)	(10.4)	(9.45)	(18.2)			(13.0)	

Table 8  
Overruns and delays

	External projects (for all firms)							Firms which have internal projects					
	Sample Mean	Firm foundation date			ISO 9001 certification			Relationship with the client			Type of project		
		(1)	> 1993 (2)	<=1993 (3)	Difference (4)	No (5)	Yes (6)	Difference (7)	New client (8)	Repeated (9)	Difference (10)	External (11)	Internal (12)
Mean of overrun (% of initial estimate)	22.7 (2.33)	19.9 (2.84)	21.6 (2.65)	-1.77 (3.93)	18.7 (1.89)	30 (6.10)	-11.3 (4.88)	23.3 (2.59)	17.3 (2.86)	6 (3.94)	15.9 (2.55)	23.9 (4.87)	-8.02 (4.87)
Mean of overrun (controlling for size)				-1.83 (4.03)			-5.86 (6.71)			7.1 (4.18)			-9.48 (5.18)
Std. deviation of overrun (% of initial estimate)	30.0	23.7	25.6	F=1.16 p=0.50	21.7	33.9	F=2.45 p=0.00	25.6	23.1	F=1.23 p=0.38	20.8	33.7	F=2.6 p=0.00
Causes of overrun:													
(1) % due to ambiguity	19.5 (3.01)	18.3 (4.87)	20.3 (3.86)	-2.00 (6.17)	19.4 (3.47)	19.9 (6.36)	-0.51 (7.43)	22.9 (3.99)	13.5 (4.34)	9.39 (6.27)	16.9 (4.41)	22.8 (5.11)	-5.93 (6.72)
(2) % due to internal difficulties	9.06 (2.25)	11.0 (3.92)	7.78 (2.68)	3.18 (4.58)	9.73 (2.64)	6.53 (3.99)	3.19 (5.53)	6.79 (2.38)	13.19 (4.6)	-6.41 (4.68)	11.8 (4.18)	4.28 (1.83)	7.56 (4.71)
(3) % due to changes	45.4 (3.83)	46.8 (6.01)	44.4 (5.01)	2.38 (7.84)	46.0 (4.31)	42.9 (8.47)	3.13 (9.45)	44.3 (4.79)	47.0 (6.45)	-2.61 (8.04)	36.2 (5.82)	55.9 (5.93)	-19.7* (8.31)
(4) % due to delay by the client	12.8 (2.35)	11.3 (3.63)	13.8 (3.63)	-2.57 (4.82)	12.3 (2.62)	14.5 (5.43)	-2.17 (5.81)	13.1 (2.90)	12.2 (4.1)	0.88 (4.94)	17.1 (4.80)	12.5 (3.70)	4.59 (6.14)
Overrun caused by the firm ((1) &(2))	7.67 (1.58)	8.00 (2.34)	5.69 (1.28)	2.32 (2.51)	5.74 (1.32)	10.6 (3.24)	-4.82 (3.11)	8.09 (1.81)	4.58 (1.49)	3.51 (2.52)	4.61 (1.64)	7.46 (2.86)	-2.85 (3.28)
Overrun caused by the firm (controlling for size)				2.63 (2.6)			0.23 (4.84)			3.9 (2.2)			-1.64 (3.51)
Standard deviation of overrun caused by firm	16.4	12.4	19.6	F=2.5 p=0.00	15.2	18.3	F=1.5 p=0.18	17.9	12.1	F=2.18 p=0.00	13.4	23.1	F=2.96 p=0.00
Overrun caused by the client ((3) &(4))	12.5 (1.47)	9.44 (1.58)	14.4 (2.26)	-4.41 (2.96)	10.7 (1.33)	19.8 (5.03)	-9.01 (3.66)	12 (1.75)	13.2 (2.56)	1.28 (3.00)	8.80 (1.73)	19 (3.54)	-10.2* (3.91)
Project was delivered late	0.20 (0.031)	0.15 (0.043)	0.23 (0.043)	-0.074 (0.062)	0.18 (0.03)	0.28 (0.081)	0.10 (0.078)	0.22 (0.042)	0.17 (0.045)	0.06 (0.063)	0.18 (0.047)	0.20 (0.049)	-0.02 (0.068)

Table 9  
Share of overrun paid  
by the firm, by project and  
client size

	Young firms			Old firms		
	Size of project			Size of project		
	All	<median	>median	All	<median	>median
	(1)	(2)	(3)	(4)	(5)	(6)
All clients	68.7 (5.15)	72.5 (8.17)	63.3 (9.82)	46.6 (6.25)	54.7 (8.34)	45.7 (6.60)
Small or medium clients	77.5 (7.93)	79.9 (10.0)	73.2 (13.7)	65.4 (7.5)	61.1 (12.7)	68.2 (9.5)
Big clients	59.8 (9.49)	63.5 (13.5)	55.8 (13.9)	37.6 (6.56)	50.2 (11.2)	29.3 (7.72)

Table 10  
Mean and standard deviation of overrun caused by the firm

	External projects (for all firms)						Firms which have internal projects					
	Firm foundation date			ISO 9001 certification			Relationship with the client			Type of project		
	Young	Old	Difference	No	Yes	Difference	New client	Repeated	Difference	External	Internal	Difference
<b>PANEL A: MEAN OVERRUN CAUSED BY THE FIRM</b>												
PANEL A1: Unconditional												
	8.00 (2.34)	5.69 (1.28)	2.32 (2.51)	5.74 (1.32)	10.56 (3.24)	-4.82 (3.11)	8.09 (1.81)	4.58 (1.49)	3.51 (2.52)	4.61 (1.64)	7.46 (2.86)	-2.85 (3.28)
PANEL A2: by project size												
<16 man months	5.53 (3.95)	3.96 (1.23)	1.57 (3.92)	4.86 (2.00)	0 (0.00)	4.86 (10.89)	7.3 (3.54)	2.26 (1.73)	5.04 (1.3)	2.14 (1.53)	2.79 (3.49)	-0.65 (3.88)
16-49 man months	10.1 (6.38)	6.14 (1.82)	4.0 (5.46)	7.64 (3.07)	7.75 (3.8)	-0.11 (7.24)	11.4 (4.41)	2.75 (1.25)	8.64 (5.18)	11.1 (4.73)	5.67 (5.16)	4.43 (7.53)
>40 man months	8.92 (3.13)	7.22 (2.86)	1.58 (3.92)	6.18 (2.46)	10.5 (3.94)	-4.34 (4.40)	7.94 (2.72)	7.58 (3.27)	-0.39 (4.72)	1.83 (1.93)	12.0 (5.71)	-10.2 (6.43)
PANEL A3: Controlled contrast												
			2.63 (2.6)			0.23 (4.84)			3.9 (2.2)			-1.64 (3.51)
<b>PANEL B: STANDARD DEVIATION OF OVERRUN CAUSED BY THE FIRM</b>												
PANEL B1: Unconditionnal												
	12.4	19.6	F=2.5 p=0.00	15.2	18.3	F=1.5 p=0.18	17.9	12.1	F=2.18 p=0.00	13.4	23.1	F=2.96 p=0.00
PANEL B2: by project size												
<16 man months	20.9	6.98	F=8.9 p=0.00	15.3	0		19.1	9.64	F=3.9 p=0.00	6.99	16.4	F=5.5 p=0.00
16-49 man months	23.8	8.74	F=7.4 p=0.00	17.1	9.3	F=3.4 p=0.10	20.2	4.94	F=16.5 p=0.00	20.6	16.3	F=1.6 p=0.43
>40 man months	14.32	17.4	F=1.5 p=0.33	14.8	18.5	F=1.6 p=0.26	17.4	13.5	F=1.67 p=0.23	9.49	30.2	F=10.1 p=0.00

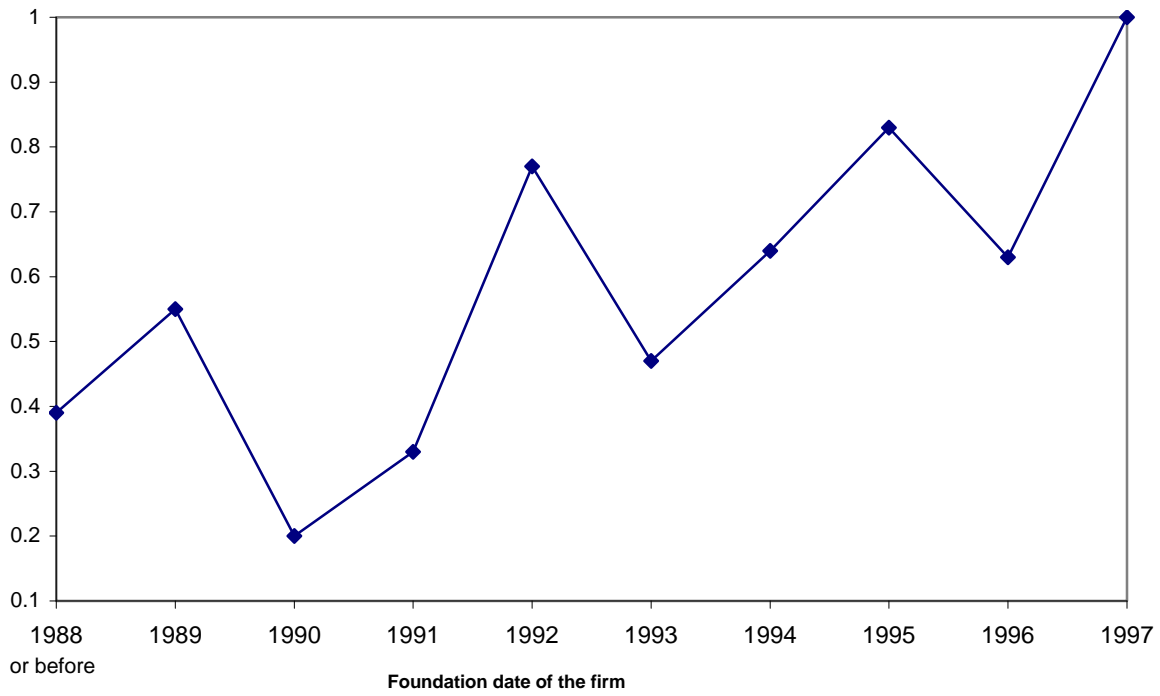
Note: the F stat in panel B is for the hypothesis that the variances are different.

Table 11  
Mean and variance of total overrun

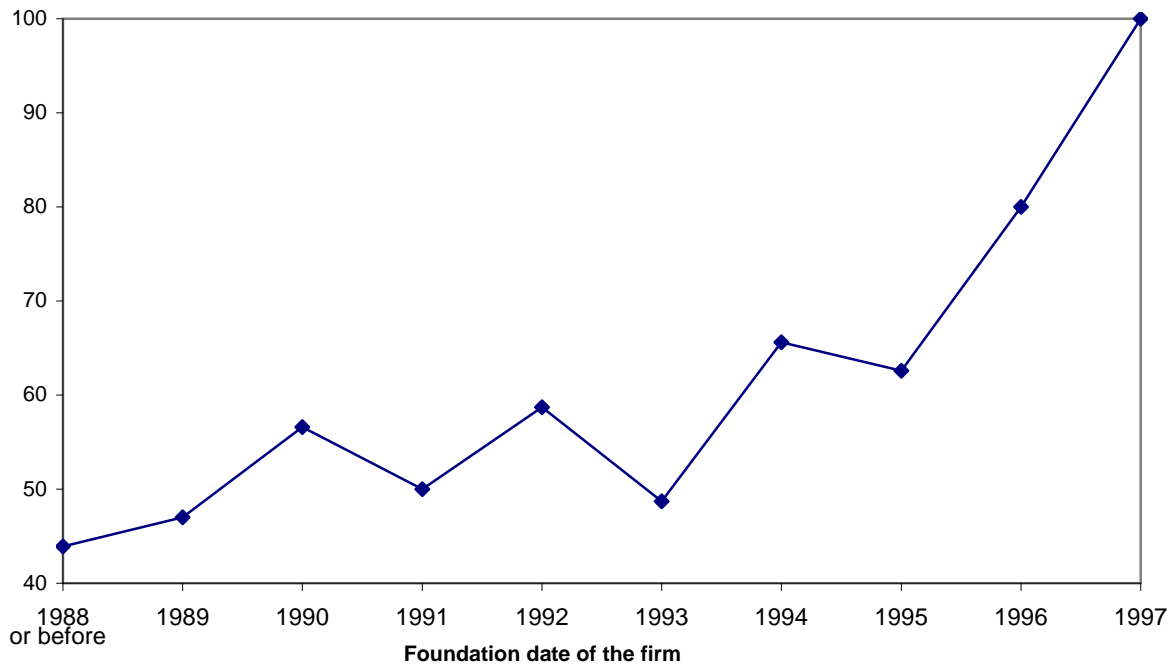
	External projects (for all firms)						Firms which have internal projects					
	Firm foundation date			ISO 9001 certification			Relationship with the client			Type of project		
	Young	Old	Difference	No	Yes	Difference	New client	Repeated	Difference	External	Internal	Difference
<b>PANEL A: MEAN OF TOTAL OVERRUN</b>												
PANEL A1: Unconditional												
	19.9	21.6	-1.77	18.7	30	11.3	23.3	17.3	-6	15.9	23.9	-8.02
	(2.84)	(2.65)	(3.93)	(1.89)	(6.10)	(4.88)	(2.59)	(2.86)	(3.94)	(2.55)	-4.21	(4.87)
PANEL A2: by project size												
<16 man months	15.1	18.4	-3.27	16.6	25	-8.45	19.2	14.6	4.58	14	16.8	-2.8
	(4.12)	(3.19)	(5.15)	(2.56)	(25)	(14.3)	(4.03)	(3.21)	(5.12)	(4.15)	(7.04)	(8.2)
16-49 man months	21.9	16.3	5.58	18.1	21.2	-2.11	21.8	13.9	7.86	20.7	26.5	-5.80
	(6.88)	(2.52)	(6.23)	(3.47)	(5.49)	(8.28)	(4.19)	(4.16)	(6.02)	(5.11)	(11.4)	(10.8)
>40 man months	23.2	28.3	-5.13	24.4	29.9	-5.56	29.0	19.8	9.27	13.7	30.9	-17.2
	(4.74)	(5.90)	(8.54)	(4.57)	(8.00)	(8.54)	(4.92)	(7.33)	(9.12)	(4.60)	(6.80)	(8.44)
PANEL A3: Controlled contrast												
			-1.83			-5.86			7.1			-9.48
			(4.03)			(6.71)			(4.18)			(5.18)
<b>PANEL B: STANDARD DEVIATION OF TOTAL OVERRUN</b>												
PANEL B1: Unconditional												
	23.7	25.6	F=1.16	21.7	33.9	F=2.45	25.6	23.1	F=1.23	20.8	33.7	F=2.6
			p=0.50			p=0.00			p=0.38			p=0.00
PANEL B2: by project size group												
<16 man months	21.8	18.1	F=1.46	19.5	35.4	F=3.28	21.7	17.9	F=1.48	19.0	33.0	F=3.01
			p=0.32			p=0.49			p=0.30			p=0.02
16-40 man months	25.7	12.1	F=4.54	19.3	13.5	F=2.06	19.2	16.7	F=1.33	22.3	36.0	F=2.62
			p=0.00			p=0.31			p=0.56			p=0.02
>40 man months	21.7	35.4	F=2.65	27.4	36.7	F=1.79	31.5	29.3	F=1.15	22.4	35.5	F=2.51
			p=0.02			p=0.15			p=0.74			p=0.03

Note: The F statistic in panel B is for the hypothesis that the variances are different in the two groups.

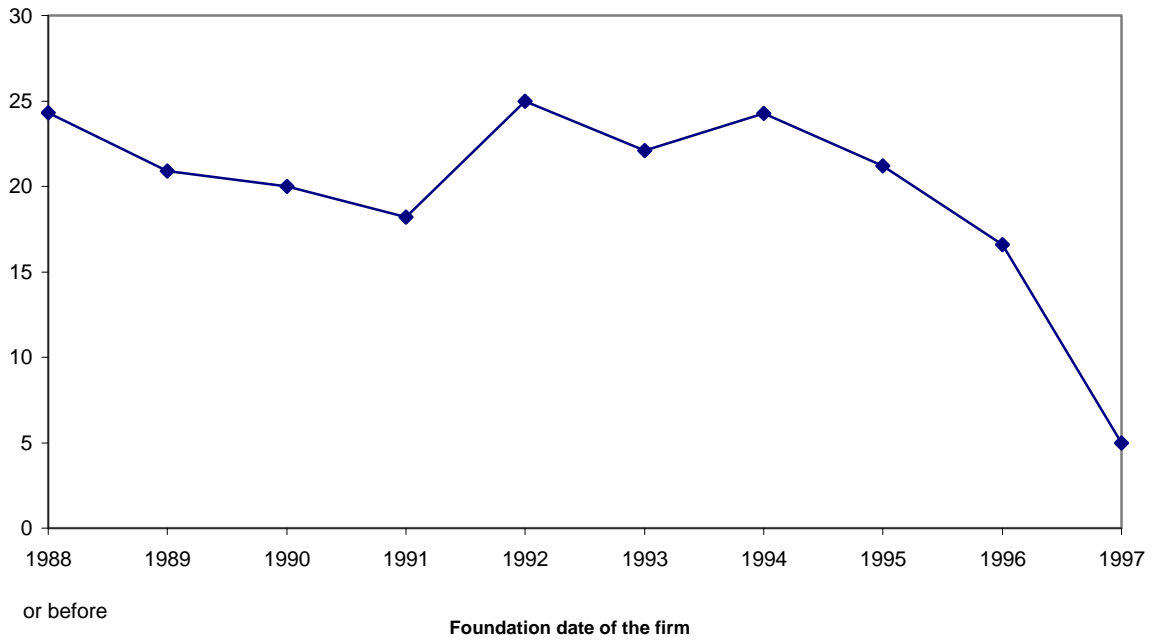
**Figure 1**  
**Proportion of fixed cost contracts**



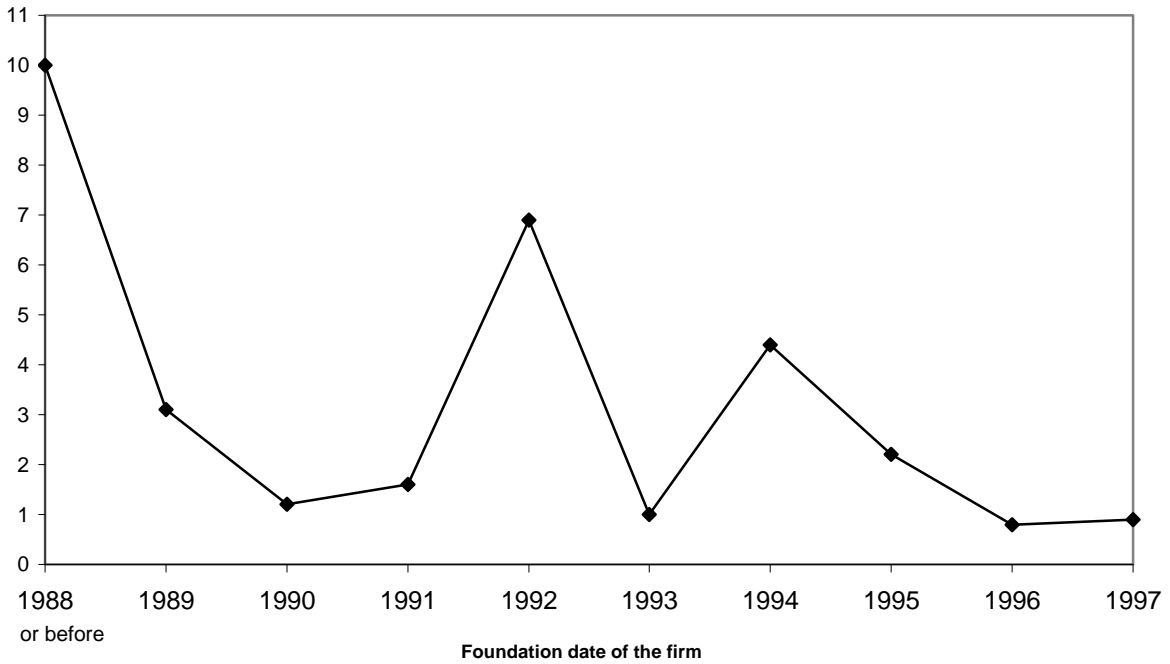
**Figure 2**  
**Share of overrun paid for by the firm**



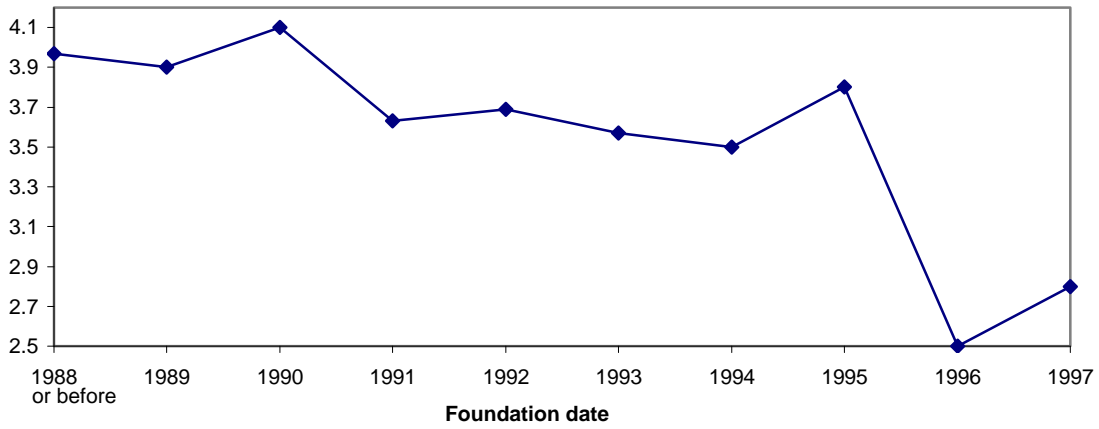
**Figure 3:**  
**Mean of project overrun**  
**(percentage of initial evaluation)**



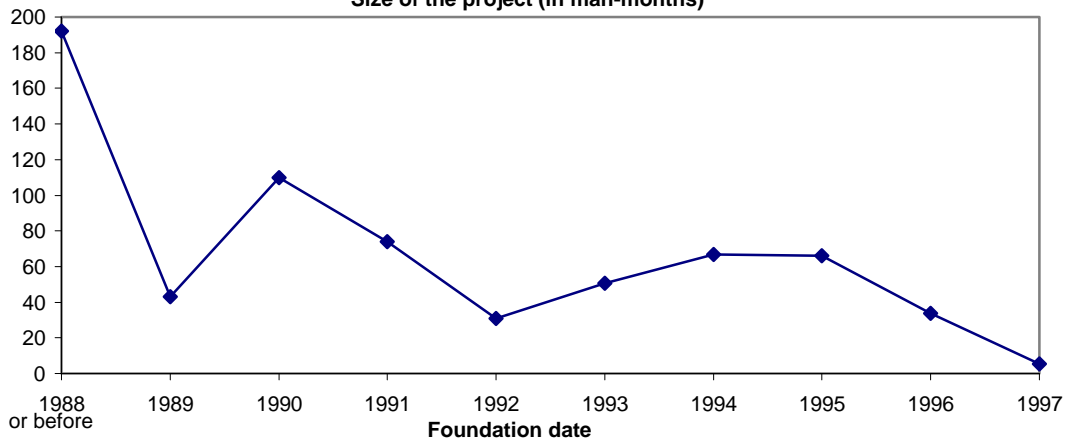
**Figure 4**  
**Average Firm Turnover in 1997/98 (Millions \$US)**



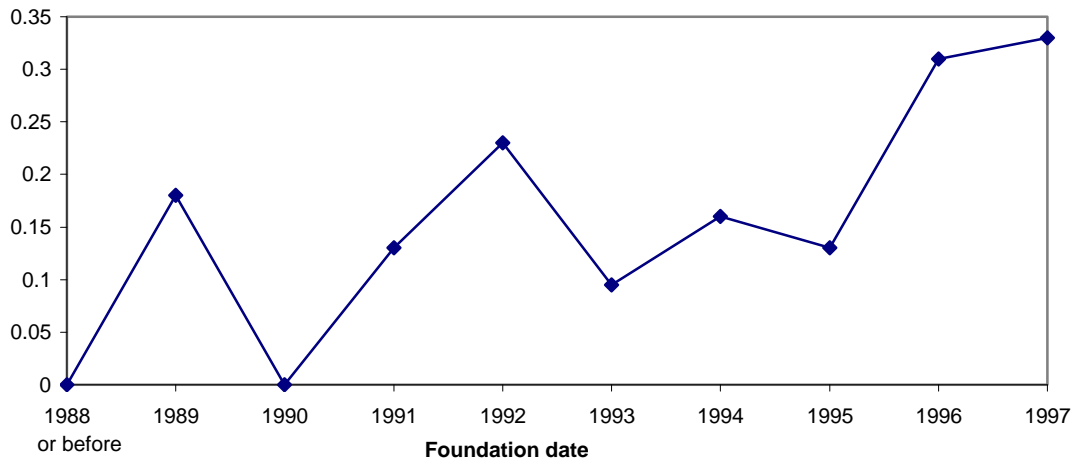
**Figure 5:**  
**Subjective complexity measure**



**Figure 6:**  
**Size of the project (in man-months)**



**Figure 7:**  
**Proportion of "simple" project  
(cad, y2k, web pages, data manipulation)**



**Figure 7:**  
**Proportion of "simple" project**  
**(cad, y2k, web pages, data manipulation)**

