THE IMPACT OF CLIMATE CHANGE AND FIRM CHARACTERISTICS ON THE FINANCIAL PERFORMANCE OF AGRO FIRM: STUDY ON MALAYSIAN PUBLIC LISTED COMPANIES

By

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Abstract

The aim this study is to examine the impacts of climate change and firm characteristics on Malaysian agro firm performance. The sample of this study consists of 33 Malaysian public listed plantation firms with 462 firm year observations for the period of 2003 to 2016. Panel data regressions such as the pooled OLS, fixed effect and random effect model are used to analyse the dataset. Based on the regression results, growth opportunity, rainfall and El Nino positively and significantly impact ROA, whereby leverage, liquidity, temperature and flood negatively and significantly impact ROA. Another measure of firm performance which is ROE are positively and significantly influenced by liquidity, growth opportunity and El Nino. However, temperature and flood negatively and significantly impact ROE. At the same time, leverage, temperature and flood positively and significantly foster Tobin's Q where firm size negatively and significantly impacts Tobin's Q. Overall, all variables are significant with firm performance accept firm age is found to be insignificant in influencing Malaysian agro firm performance.

Keywords: Climate change, Agro firm, Return on assets (ROA), Return on equity (ROE), Tobin's Q,

Abstrak

Tujuan kajian ini adalah untuk mengkaji kesan perubahan iklim dan ciri-ciri firma pada prestasi firma agro Malaysia. Sampel kajian ini terdiri daripada 33 syarikat perladangan tersenarai awam Malaysia dengan 462 firma tahun pemerhatian untuk tempoh 2003 hingga 2016. Regresi data panel seperti pooled OLS, fixed effect dan random effect digunakan untuk menganalisis dataset. Berdasarkan hasil regresi, peluang pertumbuhan, hujan dan El Nino memberi kesan positif dan signifikan terhadap ROA, di mana tanggungan, kecairan, suhu dan banjir memberi impak yang negatif dan signifikan terhadap ROA. Satu lagi ukuran prestasi firma yang ROE adalah positif dan ketara dipengaruhi oleh kecairan, peluang pertumbuhan dan El Nino. Walau bagaimanapun, suhu dan banjir memberi impak yang negatif dan nyata kepada ROE. Pada masa yang sama, tanggungan, suhu dan banjir secara positif dan menimbulkan ketara Tobin's Q di mana saiz firma secara negatif dan memberi impak yang signifikan terhadap Tobin's Q. Secara keseluruhannya, semua pembolehubah adalah penting dengan prestasi firma yang menerima usia firma didapati tidak penting dalam mempengaruhi prestasi firma agro Malaysia.

Kata Kunci: Perubahan iklim, Firma agro, Pulangan atas aset (ROA), Pulangan atas ekuiti (ROE), Tobin’s Q,

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List of Abbreviation

ASEAN	Association of Southeast Asian Nations
BRIC	Brazil, Russia, India and China
CRSP	The Center for Research in Security Prices
ENSO	El Niño Southern Oscillation
GDP	Gross domestic product
LM	Lagrangian Multiplier
OLS	Ordinary Least Squares
Prob	Probability
ROA	Return on assets
ROE	Return on equity
S&P	Standard and Poor
UK	United Kingdom

CHAPTER ONE

INTRODUCTION

1.1 Introduction

This chapter explains the area of the study along with Malaysian economic outlook, problem statement, research questions, significance and scope of the study.

1.2 Background of the Study

Firm performance is a process of measuring firm's overall financial health. Financial performance is firm's operational capability to manage resources in many ways to gain competitive advantage over other firms (Iswatia & Anshoria, 2007). According to Haniffa and Hudaib (2006) firm performance is apparently reflected by conduct and systems through which the organizations are overseen and the effectiveness of the governance body of the organizations. Profitability is defined as proxy of financial performance (Burca & Batrinca, 2014). To make profit is an essential part for the company to compete with other organizations and attract investors in global market. Additionally, the ultimate goal of firm manager is to maximize shareholder wealth. Moreover, Firm Financial analyst analyzes firm's performance which helps in the process of decision making on operating, financing, and investing activities. If firm fails to generate profit, it will face difficulties in operating its business, eventually firm would become insolvent. Therefore, financial performance is important for business in order to become self-sustaining and create value to the shareholders.

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Appendices

Appendix A: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
roa	462	.0487405	.0614871	-.3214462	.2476475
roe	462	.0645543	.1654117	-2.684369	.3448657
tq	462	1.057658	.5208804	.1855316	3.530413
lev	462	.2746814	.2406107	.0029096	1.829493
lnsize	462	20.3623	1.213259	17.26095	23.89482
lnage	462	3.47099	.7268876	.6931472	4.663439
liqd	462	9.140968	19.20598	.0261835	252.7381
grth	462	.2285838	1.583858	-.9316685	30.76483
temp	462	25.83147	.2445321	25.47379	26.55
lnrain	462	5.577328	.0902407	5.399546	5.756627
end	462	1.285714	.4522437	1	2
fldd	462	1.357143	.4796768	1	2

Appendix B: Correlation Matrix

	roa	roe	tq	lev	lnsize	lnage	liqd
roa	1.0000						
roe	0.6985	1.0000					
tq	0.3130	0.1308	1.0000				
lev	-0.1821	-0.0563	0.2944	1.0000			
lnsize	0.3499	0.2970	0.3584	0.0610	1.0000		
lnage	-0.0328	-0.0375	-0.0392	-0.2901	0.1525	1.0000	
liqd	-0.1377	-0.0820	-0.1855	-0.4028	-0.2046	0.1961	1.0000
grth	0.1305	0.0764	0.0191	-0.0004	0.0920	0.0058	-0.0368
temp	-0.2451	-0.1237	-0.0605	0.0175	0.1888	0.1168	0.0518
lnrain	0.2947	0.1392	0.0289	-0.0793	-0.0590	-0.0288	-0.0849
end	-0.0546	-0.0228	-0.0399	-0.0331	0.1548	0.1048	0.0095
fldd	-0.0318	-0.0238	0.0518	-0.0140	0.0590	0.0426	-0.0076

	grth	temp	lnrain	end	fldd
grth	1.0000				
temp	-0.0593	1.0000			
lnrain	0.0170	-0.5535	1.0000		
end	-0.1001	0.6243	-0.2498	1.0000	
fldd	0.0759	-0.0421	-0.3261	0.1886	1.0000

Appendix C: Variance Inflation Factor

Variable	VIF	1/VIF
temp	2.92	0.342877
lnrain	1.98	0.504578
end	1.98	0.505402
fldd	1.45	0.689477
liqd	1.29	0.773886
lev	1.29	0.773991
lnage	1.16	0.862841
lnsize	1.15	0.872192
grth	1.03	0.967551
Mean VIF	1.58	

Appendix D: Pooled OLS Regression Result (ROA)

Source	SS	df	MS
Model	.570107042	9	.063345227
Residual	1.17277631	452	.002594638
Total	1.74288335	461	.003780658

Number of obs	462
F(9, 452)	24.41
Prob > F	0.0000
R-squared	0.3271
Adj R-squared	0.3137
Root MSE	.05094

roa	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lev	-.0684579	.0112074	-6.11	0.000	-.090483	-.0464328
lnsize	.0203873	.0020938	9.74	0.000	.0162725	.024502
lnage	-.0103727	.0035136	-2.95	0.003	-.0172778	-.0034676
liqd	-.0003556	.0001404	-2.53	0.012	-.0006316	-.0000797
grth	.0033789	.0015228	2.22	0.027	.0003863	.0063714
temp	-.0759072	.0165685	-4.58	0.000	-.108468	-.0433464
lnrain	.0881489	.0370102	2.38	0.018	.0154155	.1608823
end	.0174315	.007379	2.36	0.019	.0029301	.0319329
fldd	-.0071974	.0059563	-1.21	0.228	-.018903	.0045081
_cons	1.14741	.5741858	2.00	0.046	.0190049	2.275815

Appendix E: Fixed Effect Regression Result (ROA)

```
Fixed-effects (within) regression               Number of obs      =       462
Group variable: firm                            Number of groups   =        33

R-sq:  within  = 0.2949                         Obs per group: min =        14
       between = 0.0365                                        avg =      14.0
       overall = 0.1601                                        max =        14

                                                F(9,420)           =     19.52
corr(u_i, Xb)  = -0.0599                        Prob > F           =    0.0000
```

roa	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lev	-.0616141	.0125547	-4.91	0.000	-.0862921	-.0369362
lnsize	.0011901	.0051348	0.23	0.817	-.0089031	.0112833
lnage	.0065139	.0112015	0.58	0.561	-.0155041	.0285319
liqd	-.0001676	.0001297	-1.29	0.197	-.0004226	.0000873
grth	.0058616	.001192	4.92	0.000	.0035186	.0082047
temp	-.0606761	.0135499	-4.48	0.000	-.0873102	-.034042
lnrain	.1102649	.0287959	3.83	0.000	.0536629	.1668669
end	.0189025	.005541	3.41	0.001	.0080109	.0297941
fldd	-.0045199	.0046267	-0.98	0.329	-.0136142	.0045744
_cons	.9532148	.4472658	2.13	0.034	.0740565	1.832373
sigma_u	.04364882					
sigma_e	.03821482					
rho	.56608749	(fraction of variance due to u_i)				

F test that all u_i=0: F(32, 420) = 11.97 Prob > F = 0.0000

Appendix F: Random Effect Regression Result (ROA)

```
Random-effects GLS regression                   Number of obs      =       462
Group variable: firm                            Number of groups   =        33

R-sq:  within  = 0.2879                         Obs per group: min =        14
       between = 0.3358                                        avg =      14.0
       overall = 0.2975                                        max =        14

                                                Wald chi2(9)       =    183.21
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000
```

roa	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lev	-.0630253	.0119797	-5.26	0.000	-.0865051	-.0395456
lnsize	.011541	.0036588	3.15	0.002	.0043699	.018712
lnage	-.0074846	.0069512	-1.08	0.282	-.0211086	.0061395
liqd	-.0001918	.0001279	-1.50	0.134	-.0004424	.0000589
grth	.0053694	.0011938	4.50	0.000	.0030297	.0077092
temp	-.0669262	.0132258	-5.06	0.000	-.0928482	-.0410042
lnrain	.1032124	.0286821	3.60	0.000	.0469965	.1594282
end	.0187453	.0055932	3.35	0.001	.0077828	.0297078
fldd	-.0055924	.0046064	-1.21	0.225	-.0146207	.0034359
_cons	.9941979	.4439473	2.24	0.025	.1240773	1.864319
sigma_u	.03313135					
sigma_e	.03821482					
rho	.42910921	(fraction of variance due to u_i)				

Appendix G: LM Test (ROA)

```
Breusch and Pagan Lagrangian multiplier test for random effects

        roa[firm,t] = Xb + u[firm] + e[firm,t]

        Estimated results:
                     |       Var     sd = sqrt(Var)
             ---------+------------------------------
                 roa |    .0037807       .0614871
                   e |    .0014604       .0382148
                   u |    .0010977       .0331314

        Test:   Var(u) = 0
                             chibar2(01) =   505.04
                          Prob > chibar2 =   0.0000
```

Appendix H: Hausman Test (ROA)

	Coefficients (b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
lev	-.0616141	-.0630253	.0014112	.004143
lnsize	.0011901	.011541	-.0103509	.003673
lnage	.0065139	-.0074846	.0139985	.0089212
liqd	-.0001676	-.0001918	.0000241	.0000282
grth	.0058616	.0053694	.0004922	.0001529
temp	-.0606761	-.0669262	.0062501	.0034986
lnrain	.1102649	.1032124	.0070525	.004756
end	.0189025	.0187453	.0001572	.0001194
fldd	-.0045199	-.0055924	.0010725	.0007762

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 13.50
Prob>chi2 = 0.0191
(V_b-V_B is not positive definite)

Appendix I: Fixed Effect with Robust Standard Error (ROA)

```
Fixed-effects (within) regression               Number of obs      =       462
Group variable: firm                            Number of groups   =        33

R-sq:  within  = 0.2949                         Obs per group: min =        14
       between = 0.0365                                        avg =      14.0
       overall = 0.1601                                        max =        14

                                                F(9,32)            =      9.38
corr(u_i, Xb)  = -0.0599                        Prob > F           =    0.0000

                                              (Std. Err. adjusted for 33 clusters in firm)
------------------------------------------------------------------------------
             |               Robust
         roa |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         lev |  -.0616141   .0235918    -2.61   0.014    -.1096691   -.0135591
      lnsize |   .0011901   .0067148     0.18   0.860    -.0124874    .0148677
       lnage |   .0065139   .0205584     0.32   0.753    -.0353622      .04839
        liqd |  -.0001676    .000093    -1.80   0.081    -.0003572    .0000219
        grth |   .0058616   .0023567     2.49   0.018     .0010611    .0106622
        temp |  -.0606761   .0109207    -5.56   0.000    -.0829208   -.0384315
      lnrain |   .1102649     .02326     4.74   0.000     .0628858    .157644
         end |   .0189025   .0049221     3.84   0.001     .0088766    .0289285
        fldd |  -.0045199   .0038001    -1.19   0.243    -.0122605    .0032207
       _cons |   .9532148   .2730495     3.49   0.001     .3970312    1.509398
-------------+----------------------------------------------------------------
     sigma_u |  .04364882
     sigma_e |  .03821482
         rho |  .56608749   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Appendix J: Pooled OLS Regression Result (ROE)

Source	SS	df	MS		
Model	1.84242118	9	.204713465	Number of obs	462
Residual	10.7710123	452	.023829673	F(9, 452)	8.59
				Prob > F	0.0000
Total	12.6134335	461	.027361027	R-squared	0.1461
				Adj R-squared	0.1291
				Root MSE	.15437

roe	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lev	-.0728496	.0339645	-2.14	0.032	-.1395976	-.0061016
lnsize	.0465579	.0063453	7.34	0.000	.034088	.0590277
lnage	-.0221599	.0106482	-2.08	0.038	-.043086	-.0012338
liqd	-.0001873	.0004255	-0.44	0.660	-.0010236	.000649
grth	.0046803	.0046148	1.01	0.311	-.0043888	.0137495
temp	-.1420386	.0502115	-2.83	0.005	-.2407156	-.0433616
lnrain	.0573879	.112161	0.51	0.609	-.1630339	.2778097
end	.0313974	.0223624	1.40	0.161	-.0125497	.0753445
fldd	-.0205782	.0180509	-1.14	0.255	-.0560524	.014896
_cons	2.550653	1.740096	1.47	0.143	-.8690287	5.970334

Appendix K: Fixed Effect Regression Result (ROE)

```
Fixed-effects (within) regression               Number of obs      =       462
Group variable: firm                            Number of groups   =        33

R-sq:  within  = 0.0679                         Obs per group: min =        14
       between = 0.2156                                        avg =      14.0
       overall = 0.0946                                        max =        14

                                                F(9,420)           =      3.40
corr(u_i, Xb)  = -0.1273                        Prob > F           =    0.0005
```

roe	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lev	-.1205925	.0493651	-2.44	0.015	-.2176258	-.0235591
lnsize	.0316048	.0201901	1.57	0.118	-.0080815	.0712911
lnage	.0099289	.0440442	0.23	0.822	-.0766457	.0965035
liqd	.0003678	.00051	0.72	0.471	-.0006347	.0013703
grth	.0097619	.004687	2.08	0.038	.000549	.0189748
temp	-.1423884	.0532781	-2.67	0.008	-.2471134	-.0376634
lnrain	.0493163	.1132251	0.44	0.663	-.1732421	.2718747
end	.0330525	.0217873	1.52	0.130	-.0097732	.0758782
fldd	-.0226571	.0181919	-1.25	0.214	-.0584158	.0131015
_cons	2.805377	1.758643	1.60	0.111	-.651462	6.262215
sigma_u	.06630791					
sigma_e	.15026013					
rho	.16299403	(fraction of variance due to u_i)				

F test that all u_i=0: F(32, 420) = 1.78 Prob > F = 0.0063

Appendix L: Random Effect Regression Result (ROE)

```
Random-effects GLS regression                   Number of obs      =       462
Group variable: firm                            Number of groups   =        33

R-sq:  within  = 0.0607                         Obs per group: min =        14
       between = 0.5005                                        avg =      14.0
       overall = 0.1456                                        max =        14

                                                Wald chi2(9)       =     63.24
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000
```

roe	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lev	-.0786776	.0364717	-2.16	0.031	-.1501608	-.0071945
lnsize	.0465054	.0073029	6.37	0.000	.0321919	.0608189
lnage	-.0226812	.0123789	-1.83	0.067	-.0469434	.0015811
liqd	-.0000775	.0004414	-0.18	0.861	-.0009427	.0007877
grth	.0059206	.0045795	1.29	0.196	-.0030549	.0148962
temp	-.1425393	.0495959	-2.87	0.004	-.2397456	-.0453331
lnrain	.0568942	.110511	0.51	0.607	-.1597033	.2734918
end	.0320251	.0219713	1.46	0.145	-.0110378	.075088
fldd	-.0210077	.0177729	-1.18	0.237	-.0558419	.0138264
_cons	2.569309	1.713002	1.50	0.134	-.7881146	5.926732
sigma_u	.02714813					
sigma_e	.15026013					
rho	.03161127	(fraction of variance due to u_i)				

Appendix M: LM Test (ROE)

```
Breusch and Pagan Lagrangian multiplier test for random effects

        roe[firm,t] = Xb + u[firm] + e[firm,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+------------------------------
                     roe |     .027361       .1654117
                       e |    .0225781       .1502601
                       u |     .000737       .0271481

        Test:   Var(u) = 0
                                  chibar2(01) =     5.24
                               Prob > chibar2 =   0.0110
```

Appendix N: Hausman Test (ROE)

	Coefficients (b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
lev	-.1205925	-.0786776	-.0419148	.0339377
lnsize	.0316048	.0465054	-.0149006	.0190222
lnage	.0099289	-.0226812	.0326101	.0426909
liqd	.0003678	-.0000775	.0004454	.0002647
grth	.0097619	.0059206	.0038413	.0011844
temp	-.1423884	-.1425393	.000151	.020767
lnrain	.0493163	.0568942	-.0075779	.0290548
end	.0330525	.0320251	.0010274	.00085
fldd	-.0226571	-.0210077	-.0016494	.0046032

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 13.11
Prob>chi2 = 0.0224
(V_b-V_B is not positive definite)

Appendix O: Fixed Effect with Robust Standard Error (ROE)

```
Fixed-effects (within) regression               Number of obs      =       462
Group variable: firm                            Number of groups   =        33

R-sq:  within  = 0.0679                         Obs per group: min =        14
       between = 0.2156                                        avg =      14.0
       overall = 0.0946                                        max =        14

                                                F(9,32)            =     11.59
corr(u_i, Xb)  = -0.1273                        Prob > F           =    0.0000

                                          (Std. Err. adjusted for 33 clusters in firm)
```

roe	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
lev	-.1205925	.1712042	-0.70	0.486	-.469324	.228139
lnsize	.0316048	.0223794	1.41	0.168	-.0139805	.0771901
lnage	.0099289	.0598406	0.17	0.869	-.1119625	.1318203
liqd	.0003678	.0001867	1.97	0.058	-.0000125	.0007482
grth	.0097619	.0053606	1.82	0.078	-.0011572	.020681
temp	-.1423884	.0556903	-2.56	0.016	-.2558258	-.028951
lnrain	.0493163	.1141862	0.43	0.669	-.1832733	.2819059
end	.0330525	.0137471	2.40	0.022	.0050506	.0610544
fldd	-.0226571	.0124819	-1.82	0.079	-.0480819	.0027676
_cons	2.805377	1.638164	1.71	0.096	-.5314553	6.142208
sigma_u	.06630791					
sigma_e	.15026013					
rho	.16299403	(fraction of variance due to u_i)				

Appendix P: Pooled OLS Regression Result (Tobin's Q)

Source	SS	df	MS		
Model	27.827355	9	3.09192833	Number of obs	462
Residual	97.2495183	452	.215153802	F(9, 452)	14.37
				Prob > F	0.0000
Total	125.076873	461	.271316428	R-squared	0.2225
				Adj R-squared	0.2070
				Root MSE	.46385

tq	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lev	.6027883	.1020566	5.91	0.000	.402224	.8033526
lnsize	.1584833	.0190662	8.31	0.000	.1210138	.1959527
lnage	-.0018404	.0319957	-0.06	0.954	-.0647191	.0610384
liqd	.0002649	.0012786	0.21	0.836	-.0022479	.0027778
grth	-.0089022	.0138666	-0.64	0.521	-.0361532	.0183488
temp	-.2234428	.1508756	-1.48	0.139	-.5199474	.0730618
lnrain	.1361081	.3370214	0.40	0.687	-.5262151	.7984313
end	-.0315762	.0671944	-0.47	0.639	-.1636284	.100476
fldd	.0484419	.0542395	0.89	0.372	-.058151	.1550347
_cons	2.658591	5.228638	0.51	0.611	-7.616865	12.93405

Appendix Q: Fixed Effect Regression Result (Tobin's Q)

```
Fixed-effects (within) regression               Number of obs      =       462
Group variable: firm                            Number of groups   =        33

R-sq:  within  = 0.2053                         Obs per group: min =        14
       between = 0.1716                                        avg =      14.0
       overall = 0.0235                                        max =        14

                                                F(9,420)           =     12.05
corr(u_i, Xb)  = -0.6937                        Prob > F           =    0.0000
```

tq	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lev	.8116774	.1013326	8.01	0.000	.6124952	1.01086
lnsize	-.2420246	.0414446	-5.84	0.000	-.3234893	-.1605599
lnage	.1773604	.0904104	1.96	0.050	-.0003529	.3550737
liqd	-.0000253	.0010469	-0.02	0.981	-.0020831	.0020326
grth	-.0010324	.0096211	-0.11	0.915	-.0199439	.0178792
temp	.202823	.109365	1.85	0.064	-.0121479	.417794
lnrain	.7031748	.2324192	3.03	0.003	.2463251	1.160025
end	-.0224261	.0447231	-0.50	0.616	-.1103352	.0654829
fldd	.1383088	.0373429	3.70	0.000	.0649064	.2117111
_cons	-4.172191	3.609999	-1.16	0.248	-11.26811	2.923725
sigma_u	.59461493					
sigma_e	.30844174					
rho	.78797498	(fraction of variance due to u_i)				

```
F test that all u_i=0:     F(32, 420) =    18.82                 Prob > F = 0.0000
```

Appendix R: Random Effect Regression Result (Tobin's Q)

```
Random-effects GLS regression                   Number of obs      =       462
Group variable: firm                            Number of groups   =        33

R-sq:  within  = 0.1801                         Obs per group: min =        14
       between = 0.0121                                        avg =      14.0
       overall = 0.0094                                        max =        14

                                                Wald chi2(9)       =     76.30
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000
```

tq	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lev	.7746215	.1016031	7.62	0.000	.575483	.9737599
lnsize	-.0861563	.0332256	-2.59	0.010	-.1512774	-.0210353
lnage	.0280269	.0650141	0.43	0.666	-.0993983	.1554521
liqd	.0000564	.0010735	0.05	0.958	-.0020475	.0021604
grth	-.0051983	.0099624	-0.52	0.602	-.0247241	.0143276
temp	.0769819	.1111068	0.69	0.488	-.1407834	.2947471
lnrain	.5538384	.2396917	2.31	0.021	.0840514	1.023625
end	-.0242704	.0465855	-0.52	0.602	-.1155762	.0670354
fldd	.1139818	.0384968	2.96	0.003	.0385295	.1894341
_cons	-2.698362	3.711611	-0.73	0.467	-9.972985	4.576262
sigma_u	.33485223					
sigma_e	.30844174					
rho	.540986	(fraction of variance due to u_i)				

Appendix S: LM Test (Tobin's Q)

```
Breusch and Pagan Lagrangian multiplier test for random effects

        tq[firm,t] = Xb + u[firm] + e[firm,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+------------------------------
                      tq |    .2713164       .5208804
                       e |    .0951363       .3084417
                       u |     .112126       .3348522

        Test:   Var(u) = 0
                                 chibar2(01) =   581.14
                              Prob > chibar2 =   0.0000
```

Appendix T: Hausman Test (Tobin's Q)

	Coefficients (b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
lev	.8116774	.7746215	.0370559	.0286684
lnsize	-.2420246	-.0861563	-.1558683	.027575
lnage	.1773604	.0280269	.1493335	.0681556
liqd	-.0000253	.0000564	-.0000817	.0001931
grth	-.0010324	-.0051983	.0041659	.0011052
temp	.202823	.0769819	.1258412	.0252447
lnrain	.7031748	.5538384	.1493364	.0343388
end	-.0224261	-.0242704	.0018442	.000862
fldd	.1383088	.1139818	.0243269	.0056185

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 40.17
Prob>chi2 = 0.0000
(V_b-V_B is not positive definite)

Appendix U: Fixed Effect with robust Standard Error (Tobin's Q)

```
Fixed-effects (within) regression               Number of obs      =       462
Group variable: firm                            Number of groups   =        33

R-sq:  within  = 0.2053                         Obs per group: min =        14
       between = 0.1716                                        avg =      14.0
       overall = 0.0235                                        max =        14

                                                F(9,32)            =      4.34
corr(u_i, Xb)  = -0.6937                        Prob > F           =    0.0009

                                        (Std. Err. adjusted for 33 clusters in firm)
```

tq	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
lev	.8116774	.2306753	3.52	0.001	.3418071	1.281548
lnsize	-.2420246	.0971193	-2.49	0.018	-.4398501	-.0441991
lnage	.1773604	.1390575	1.28	0.211	-.1058904	.4606112
liqd	-.0000253	.0010597	-0.02	0.981	-.0021838	.0021333
grth	-.0010324	.0133612	-0.08	0.939	-.0282483	.0261835
temp	.202823	.0800327	2.53	0.016	.0398018	.3658442
lnrain	.7031748	.3036704	2.32	0.027	.0846184	1.321731
end	-.0224261	.0356541	-0.63	0.534	-.0950512	.0501989
fldd	.1383088	.0452804	3.05	0.005	.0460757	.2305419
_cons	-4.172191	3.09203	-1.35	0.187	-10.47045	2.126068
sigma_u	.59461493					
sigma_e	.30844174					
rho	.78797498	(fraction of variance due to u_i)				