AN INVESTIGATION ON THE IMPACT OF MACROECONOMIC VARIABLES ON STOCK MARKET PERFORMANCE OF G7 COUNTRIES

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ABSTRAK

Kajian ini bertujuan untuk mengkaji kesan perubahan dalam kadar tukaran matawang, kadar faedah dan kadar inflasi ke atas prestasi pasaran saham negara-negara G7 yang meliputi Amerika Syarikat, UK, Kanada, Jepun, Itali, Jerman dan Perancis. Indeks yang digunakan meliputi indeks saham industri Dow Jones, indeks kesemua saham FTSE, indeks saham DAX, indeks SBF 250, indeks pasaran saham Tokyo, pasaran saham Toronto dan indeks Comit. Kajian ini menggunakan data tahunan dari tahun 2001 hingga 2005. Data diperolehi daripada pengkalan data Datastream. Bagi mencapai objektif kajian, ujian-ujian seperti model *ordinary least square,* model *fixed effect,* model *random effect* dan model *fixed effect with robust standard error* telah digunakan. Dapatan empirikal model *fixed effect with robust standard error* telah menunjukkan bahawa kadar inflasi mempunyai kesan yang signifikan dan positif ke atas indeks pasaran saham. Dapatan regresi menunjukkan bahawa bagi satu peratus peningkatan dalam kadar inflasi akan menyebabkan indeks pasaran saham meningkat sebanyak 38 peratus. Kadar tukaran matawang dan kadar faedah tidak mempunyai kesan yang signifikan ke atas indeks pasaran saham.

Kata kunci: kadar faedah, kadar inflasi, kadar tukaran, pulangan pasaran saham, negara-negara G7

ABSTRACT

This study intends to investigate the impact of exchange rate, interest rate and inflation rate on stock market performance of G7 countries which are United States, UK, Canada, Japan, Italy, Germany and France. The stock indices used in this study are Dow Jones Industrial stock index, FTSE all stock index, DAX stock index, SBF 250 index, Tokyo stock exchange index, Toronto stock exchange and Comit indices. This study employs annual data for 15 years which is from 2001 to 2015. The data is obtained from the Datastream database. An ordinary least square, fixed effect model, random effect model and fixed effect with robust standard error model are the tests used to achieve the objectives of the study. Empirical results of the fixed effect model with robust standard error show that inflation rate has a significant impact and positive relationship with the stock index movement. In particular, the regression result shows that for 1 percent increase in inflation rates the stock price would increase by 38 percent. The exchange rate and interest rate do not have any significant impact on the stock market index.

Key words: interest rate, inflation rate, exchange rate, stock market return, G7 countries

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CHAPTER ONE

INTRODUCTION

1.0 Introduction

Discussion on stock performance are of interest to firms, investors, regulators, policy makers and researchers due to the importance of the stock market in the financial system (Barakat, Elgazzar & Hanafy, 2016). It is suggested that the stock price movement and economic performance of developed countries are affected by inflation, exchange rate and interest rate (Duca, 2007). This indicates that in countries with steady economic growth, the stock market is expected to have better performance. Talla (2013) indicates that the stock return can significantly being impacted by a change in macroeconomic variables. The significance role of the stock market can be seen in a number of circumstances. For instance, the period of the great depression in the United States of America (U.S.A) witnessed a crash in the stock market (Cecchetti, 1992; Green, 1971; Krugman, 2009.) Similarly, a rapid fall in the prices of stocks along with falls in economic growth was effected by the 2007/2008 global financial crisis (European Commission, 2009; Verick; Islam, 2010; United Nations Conference on Trade and Development(UNCTAD), 2010).

The stock market is part of the financial system which promotes savings, investment and growth (Levine 2004). A study by Flannery and Protopapadakis (2002) highlight that macroeconomic variables are the most influential factors that affect the return on the stock market. When a stock market is functioning well, companies could raise funds through equity while the secondary market would provide liquidity for investors.

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APPENDICES

DATA

YEAR	COUNTRY	INDEX	INTEREST RATE	INFLATION RATE	EXCHANG RATE
2001	USA	10021.5	4.53	2.83	0.5141
2002	USA	8341.63	2.97	1.59	0.5627
2003	USA	10453.92	1.41	2.27	0.7390
2004	USA	10783.01	1.23	2.68	0.7666
2005	USA	10717.5	3.69	3.39	0.7432
2006	USA	12463.15	5.16	3.23	0.7859
2007	USA	13264.82	5.16	2.85	0.8724
2008	USA	8776.39	2.54	3.84	0.6708
2009	USA	10428.05	2.25	-0.36	0.9026
2010	USA	11577.51	0.84	1.64	0.9929
2011	USA	12217.56	0.91	3.16	1.0118
2012	USA	13104.14	1.15	2.07	1.0473
2013	USA	16576.66	0.68	1.46	0.8984
2014	USA	17823.07	0.55	1.62	0.8255
2015	USA	17425.03	1.07	0.12	0.7248
2001	UK	2523.88	5.09	1.24	1.4193
2002	UK	1893.73	4.86	1.26	1.4267
2003	UK	2207.38	3.69	1.36	1.5636
2004	UK	2410.75	4.61	1.34	1.8473
2005	UK	2847.02	5.09	2.05	1.8992
2006	UK	3221.42	4.69	2.33	1.7469
2007	UK	3286.67	5.76	2.32	1.9673
2008	UK	2209.29	5.80	3.61	1.9822
2009	UK	2760.8	2.13	2.17	1.4433
2010	UK	3062.85	1.10	3.29	1.5070
2011	UK	2857.88	1.67	4.48	1.6387
2012	UK	3093.41	1.94	2.82	1.5808

2013	UK	3609.63	0.88	2.55	1.5239
2014	UK	3532.74	0.90	1.46	1.6495
2015	UK	3444.26	1.01	0.05	1.4922
2001	CANADA	7688.41	4.38	2.53	0.6356
2002	CANADA	6614.54	3.48	2.26	0.6342
2003	CANADA	8220.89	3.64	2.76	0.6708
2004	CANADA	9246.65	2.06	1.86	0.7532
2005	CANADA	11272.26	3.03	2.21	0.8320
2006	CANADA	12908.39	4.14	2	0.8581
2007	CANADA	13833.06	4.23	2.14	0.8639
2008	CANADA	8987.7	3.35	2.37	0.9738
2009	CANADA	11746.11	1.85	0.3	0.8083
2010	CANADA	13443.22	1.20	1.78	0.9811
2011	CANADA	11955.09	1.95	2.91	1.0238
2012	CANADA	12433.53	1.85	1.52	0.9997
2013	CANADA	13621.55	1.61	0.94	0.9780
2014	CANADA	14632.44	1.39	1.91	0.8933
2015	CANADA	13009.95	1.15	1.13	0.7940
2001	JAPAN	1032.14	0.17	-0.8	0.0082
2002	JAPAN	843.29	0.11	-1.31	0.0080
2003	JAPAN	1043.69	0.08	0.17	0.0086
2004	JAPAN	1149.63	0.02	-0.01	0.0092
2005	JAPAN	1649.76	0.08	-0.27	0.0091
2006	JAPAN	1681.07	0.33	0.24	0.0086
2007	JAPAN	1475.68	0.77	0.06	0.0085
2008	JAPAN	859.24	1.21	1.37	0.0097
2009	JAPAN	907.59	1.10	-1.35	0.0107
2010	JAPAN	898.8	0.55	-0.72	0.0114
2011	JAPAN	728.61	0.62	-0.28	0.0125
2012	JAPAN	859.8	0.53	-0.03	0.0125
2013	JAPAN	1302.29	0.45	0.36	0.0102

2014	JAPAN	1407.51	0.25	2.75	0.0094
2015	JAPAN	1547.3	0.25	0.79	0.0083
2001	ITALY	1433.36	4.30	2.79	0.8956
2002	ITALY	1091.89	3.94	2.46	0.9449
2003	ITALY	1256.64	2.55	2.68	1.1309
2004	ITALY	1475.05	2.00	2.22	1.2433
2005	ITALY	1679.13	2.34	2	1.2448
2006	ITALY	1997.16	3.11	2.07	1.2557
2007	ITALY	1841.38	4.10	1.82	1.3706
2008	ITALY	942.9	4.65	3.38	1.4706
2009	ITALY	1137.58	1.92	0.75	1.3933
2010	ITALY	1048.42	1.18	1.54	1.3268
2011	ITALY	805.85	1.86	2.74	1.3917
2012	ITALY	873.02	1.41	3.04	1.2856
2013	ITALY	1041.34	0.55	1.22	1.3281
2014	ITALY	1038.26	0.61	0.24	1.3288
2015	ITALY	1217.7	0.25	0.04	1.1096
2001	GERMANY	5160.1	4.30	1.98	0.8956
2002	GERMANY	2892.6	3.94	1.42	0.9449
2003	GERMANY	3965.2	2.55	1.03	1.1309
2004	GERMANY	4256.1	2.00	1.67	1.2433
2005	GERMANY	5408.3	2.34	1.55	1.2448
2006	GERMANY	6596.9	3.11	1.58	1.2557
2007	GERMANY	8067.3	4.10	2.3	1.3706
2008	GERMANY	4810.2	4.65	2.63	1.4706
2009	GERMANY	5957.4	1.92	0.31	1.3933
2010	GERMANY	6914.2	1.18	1.1	1.3268
2011	GERMANY	5898.4	1.86	2.08	1.3917
2012	GERMANY	7612.4	1.41	2.01	1.2856
2013	GERMANY	9552.2	0.55	1.5	1.3281
2014	GERMANY	9805.6	0.61	0.91	1.3288

2015	GERMANY	10743	0.25	0.23	1.1096
2001	FRANCE	118.77	4.30	1.63	0.8956
2002	FRANCE	92.95	3.94	1.92	0.9449
2003	FRANCE	77.73	2.55	2.11	1.1309
2004	FRANCE	92.87	2.00	2.13	1.2433
2005	FRANCE	109.34	2.34	1.74	1.2448
2006	FRANCE	132.85	3.11	1.68	1.2557
2007	FRANCE	150.31	4.10	1.49	1.3706
2008	FRANCE	112.92	4.65	2.81	1.4706
2009	FRANCE	87.36	1.92	0.09	1.3933
2010	FRANCE	100	1.18	1.53	1.3268
2011	FRANCE	98.05	1.86	2.12	1.3917
2012	FRANCE	92.67	1.41	1.96	1.2856
2013	FRANCE	109.98	0.55	0.86	1.3281
2014	FRANCE	122.34	0.61	0.51	1.3288
2015	FRANCE	137.21	0.25	0.04	1.1096

Descriptive Statistics

Date:04/04/17 Time: 16:15

Sample: 2001 2015

	LINDEX	INR	INFR	EXR
Mean	7.736831	2.222668	1.602095	1.007160
Median	7.957835	1.920000	1.680000	1.109625
Maximum	9.788249	5.800000	4.480000	1.982200
Minimum	4.353241	0.015625	-1.350000	0.007987
Std. Dev.	1.562655	1.598341	1.145870	0.508668
Skewness	-0.746335	0.503337	-0.338080	-0.670849
Kurtosis	2.617787	2.026040	2.850785	2.830051
Jarque-Bera	10.38692	8.583704	2.097629	8.002033
Probability	0.005553	0.013680	0.350353	0.018297
Sum	812.3673	233.3801	168.2200	105.7518
Sum Sq. Dev.	253.9567	265.6882	136.5539	26.90924
Observations	105	105	105	105

Correlation Matrix

	LINDEX	INR	INFR	EXR
LINDEX	1.000000	0.074214	0.194893	-0.062288
INR	0.074214	1.000000	0.528234	0.413818
INFR	0.194893	0.528234	1.000000	0.439345
EXR	-0.062288	0.413818	0.439345	1.000000

Pooled OLS Test

Dependent Variable: LINDEX
Method: Panel Least Squares
Date: 04/04/17 Time: 15:33
Sample: 2001 2015
Periods included: 15
Cross-sections included: 7
Total panel (balanced) observations: 105

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INR	0.006580	0.114063	0.057690	0.9541
INFR	0.371660	0.161235	2.305082	0.0232
EXR	-0.567744	0.338771	-1.675891	0.0969
C	7.698579	0.350369	21.97280	0.0000

R-squared	0.065126	Mean dependent var	7.736831
Adjusted R-squared	0.037357	S.D. dependent var	1.562655
S.E. of regression	1.533189	Akaike info criterion	3.729928
Sum squared resid	237.4176	Schwarz criterion	3.831031
Log likelihood	-191.8212	Hannan-Quinn criter.	3.770897
F-statistic	2.345298	Durbin-Watson stat	0.106938
Prob(F-statistic)	0.077347		

Fixed Effect Model Test

Dependent Variable: LINDEX
Method: Panel Least Squares
Date: 04/04/17 Time: 15:36
Sample: 2001 2015
Periods included: 15
Cross-sections included: 7
Total panel (balanced) observations: 105

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INR	0.358694	0.218172	1.644091	0.1038
INFR	0.519201	0.203091	2.556493	0.0123
EXR	-1.250955	0.434047	-2.882072	0.0050
C	7.367674	0.382712	19.25123	0.0000

Effects Specification

Period fixed (dummy variables)

R-squared	0.163082	Mean dependent var	7.736831
Adjusted R-squared	-0.000454	S.D. dependent var	1.562655
S.E. of regression	1.563010	Akaike info criterion	3.885909
Sum squared resid	212.5410	Schwarz criterion	4.340874
Log likelihood	-186.0102	Hannan-Quinn criter.	4.070270
F-statistic	0.997222	Durbin-Watson stat	0.076409
Prob(F-statistic)	0.469263		

Random Effect Model Test

Dependent Variable: LINDEX
Method: Panel EGLS (Cross-section random effects)
Date: 04/04/17 Time: 15:40
Sample: 2001 2015
Periods included: 15
Cross-sections included: 7
Total panel (balanced) observations: 105
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INR	-0.047224	0.019024	-2.482342	0.0147
INFR	-0.002556	0.028370	-0.090079	0.9284
EXR	0.287935	0.165065	1.744373	0.0841
C	7.555892	0.657638	11.48943	0.0000

Effects Specification	S.D.	Rho
Cross-section random	1.676107	0.9785
Idiosyncratic random	0.248177	0.0215

Weighted Statistics

R-squared	0.099986	Mean dependent var	0.295569
Adjusted R-squared	0.073253	S.D. dependent var	0.257854
S.E. of regression	0.248230	Sum squared resid	6.223419
F-statistic	3.740156	Durbin-Watson stat	0.761453
Prob(F-statistic)	0.013515		

Unweighted Statistics

R-squared	-0.026892	Mean dependent var	7.736831
Sum squared resid	260.7860	Durbin-Watson stat	0.018171

Husman Test

Correlated Random Effects - Hausman Test
Equation: Untitled
Test period random effects

Test Summary	Chi-Sq.Statistic	Chi-Sq. D.f.	Prob.
Period random	9.076380	3	0.0283

** WARNING: estimated period random effects variance is zero.
Period random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
INR	0.358694	0.006580	0.034078	0.0565
INFR	0.519201	0.371660	0.014228	0.2161
EXR	-1.250955	-0.57744	0.069123	0.0094

Period random effects test equation:
Dependent Variable: LINDEX
Method: Panel Least Squares
Date: 04/04/17 Time: 15:44
Sample: 2001 2015
Periods included: 15
Cross-sections included: 7
Total panel (balanced) observations: 105

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.367674	0.382712	19.25123	0.0000
INR	0.358694	0.218172	1.644091	0.1038
INFR	0.519201	0.203091	2.556493	0.0123
EXR	-1.250955	0.434047	-2.882072	0.0050

Effects Specification

Period fixed (dummy variables)

R-squared	0.163082	Mean dependent var	7.736831
Adjusted R-squared	-0.000454	S.D. dependent var	1.562655
S.E. of regression	1.563010	Akaike info criterion	3.885909
Sum squared resid	212.5410	Schwarz criterion	4.340874
Log likelihood	-186.0102	Hannan-Quinn criter.	4.070270
F-statistic	0.997222	Durbin-Watson stat	0.076409
Prob(F-statistic)	0.469263		

Redundant Fixed Effect Model Test

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	626.617913	(6,95)	0.0000
Cross-section Chi-square	388.833219	6	0.0000

Cross-section fixed effects test equation:
Dependent Variable: LINDEX
Method: Panel Least Squares
Date: 04/04/17 Time: 15:47
Sample: 2001 2015
Periods included: 15
Cross-sections included: 7
Total panel (balanced) observations: 105

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INR	0.006580	0.114063	0.057690	0.9541
INFR	0.371660	0.161235	2.305082	0.0232
EXR	-0.567744	0.338771	-1.675891	0.0969
C	7.698579	0.350369	21.97280	0.0000

R-squared	0.065126	Mean dependent var	7.736831
Adjusted R-squared	0.037357	S.D. dependent var	1.562655
S.E. of regression	1.533189	Akaike info criterion	3.729928
Sum squared resid	237.4176	Schwarz criterion	3.831031
Log likelihood	-191.8212	Hannan-Quinn criter.	3.770897
F-statistic	2.345298	Durbin-Watson stat	0.106938
Prob(F-statistic)	0.077347		

Multicollinearity Problem Test

```
reg lindex exr infr inr
Source    |    SS          df          MS          Number of obs = 105
----------+------------------------------          F( 3, 101) = 2.35
Model     | 16.5387625      3        5.51292083         Prob > F = 0.0774

Residual  | 237.417903     101       2.35067231        R-squared = 0.0651
----------+------------------------------       Adj R-squared = 0.0374
Total     | 253.956666     104       2.44189102         Root MSE = 1.5332
------------------------------------------------------------------------------
--
lindex    |    Coef.      Std. Err.   t      P>|t|   [95% Conf.   Interval]
----------+-------------------------------------------------------------------
--
exr       | -.5677215   .3387658   -1.68    0.097    -1.239742    .1042987
infr      | .3716581    .1612352    2.31    0.023    .0518109     .6915053
inr       | .0065789    .1140625    0.06    0.954    -.2196904    .2328482
cons      | 7.698562    .3503653    21.97   0.000    7.003531     8.393592
------------------------------------------------------------------------------


. vif
Variable |    VIF          1/VIF
---------+----------------------
infr     | 1.51          0.662168
inr      | 1.47          0.680039
exr      | 1.31          0.761165
-------- +----------------------
Mean VIF | 1.43
```

Heteroskedasticity Problem Test

```
tsset code year, yearly
panel variable: code, 1 to 7
time variable: year, 2001 to 2015
. xtreg lindex exr infr inr,fe
Fixed-effects (within) regression           Number of obs      =       105
Group variable (i): code                    Number of groups   =         7
R-sq:within  = 0.1072                       Obs per group: min =        15
between      = 0.0343                                      avg =      15.0
overall      = 0.0131                                      max =        15
                                                           F(3,9 =      3.80
corr(u_i, Xb) = -0.2016                                 Prob > F =    0.0127

Lindex       Coef.     Std.Err.   t     P>|t|     [95Conf.   Interval]

Exr        .2953234   .1664082   1.77   0.079    -.0350387   .6256854

Infr      -.0031702   .0283743   -0.11  0.911    -.0595002   .0531598

Inr       -.0471684   .0190308   -2.48  0.015    -.0849493   -.0093875

Cons       7.549313   .1779621   42.42  0.000    7.1960137   .902612

sigma_u1  .6837137

sigma_e   .2481766

Rho       .97873572 (fraction of variance due to u_i)

F test that all u_i=0: F(6, 95) = 626.62 Prob > F = 0.0000
```



```
. xttest3
Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model


H0: sigma(i)^2 = sigma^2 for all i


chi2 (7)         =  57.21
Prob>chi2        = 0.0000
```

Serial Correlation

```
tsset code year, yearly
   panel variable:  code, 1 to 7
   time variable :   year, 2001 to 2015


. xtserial lindex exr infr inr


Wooldridge test for autocorrelation in panel data


H0: no first order autocorrelation


         F( 1, 6) = 42.356
         Prob > F = 0.000
```

Fixed Effect with Robust Model Test

Dependent Variable: LINDEX
Method: Robust Least Squares
Date: 04/09/17 Time: 19:13
Sample: 2001 2015
Included observations: 105
Method: M-estimation
M settings: weight=Bisquare, tuning=4.685, scale=MAD (median centered)
Huber Type I Standard Errors & Covariance

Variable	Coefficient	Std. Error	z-Statistic	Prob.
INR	0.025747	0.117114	0.219846	0.8260
INFR	0.377820	0.165548	2.282235	0.0225
EXR	-0.414656	0.347834	-1.192110	0.2332
C	7.657283	0.359741	21.28552	0.0000

Robust Statistics

R-squared	0.060312	Adjusted R-squared	0.032401
Rw-squared	0.089420	Adjust Rw-squared	0.089420
Akaike info criterion	125.8144	Schwarz criterion	136.8400
Deviance	198.4299	Scale	1.295539
Rn-squared statistic	6.925175	Prob(Rn-squared stat.)	0.074321

Non-robust Statistics

Mean dependent var	7.736831	S.D. dependent var	1.562655
S.E. of regression	1.545679	Sum squared resid	241.3014