Homework 4
Evaluation of Portfolio Performance

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第一題

- 使用 Morningstar Fund Screener 進行條件篩選之後，挑選出其中兩個具特殊的 US equity fund：JPMorgan Large Cap Growth R5 (JLGRX)、AB Growth Fund Advisor Class (AGRYX)。

- 上述基金名稱的後綴字：「R5」代表 Retirement shares，也就是只能透過 401k 等退休基金來購買；「Advisor Class」則代表該基金通常只能透過理財顧問等管道來購買。

- 關於 JLGRX 和 AGRYX 的一些特點，請詳閱表格一、表格二或上述網址。

JPMorgan Large Cap Growth R5 (JLGRX)					
Overview					
Fund Family	JPMorgan		Inception Date	2009-04-14	
Category	Large Growth		Manager	Giri Devulapally	
Objectives	Targeting companies with large markets, sustainable competitive advantages and strong price momentum, JLGRX seeks to harness the return potential of America's fastest growing companies.				
NAV	$40.87 (@2019-05-24)		Total Assets	$14.9 Billion (@2019-05-24)	
Turnover	24%		Total Cost Projections		Per $10K
Net Expense	0.59%			3 Yr	208
Other Fees	N/A			5 Yr	374
Top 5 Holdings	Amazon (5.91%), Microsoft (4.73%), Mastercard (4.59%), Alphabet (4.50%), Apple (4.10%)				
Performance					
	YTD	1 Mo	1 Yr	3 Yr	5 Yr
JLGRX (A)	20.85%	-1.40%	8.61%	20.32%	14.63%
S&P500 TR(B)	13.67%	-3.25%	5.71%	13.09%	10.51%
VFINX (C)	13.62%	-3.26%	5.57%	12.95%	10.36%
(A) - (B)	+7.17%	+1.85%	+2.90%	+7.23%	+4.12%
(A) – (C)	+7.23%	+1.86%	+3.04%	+7.37%	+4.27%

Table 1 Summary of Some Key Information of JLGRX

AB Growth Fund Advisor Class (AGRYX)					
Overview					
Fund Family	AllianceBernstein		Inception Date	1996-10-01	
Category	Large Growth		Manager	Frank Caruso	
Objectives	Seeks stocks with the potential to deliver better-than-expected long-term growth potential and target firms with strong, experienced management teams and strong market positions.				
NAV	$84.83 (@2019-05-24)		Total Assets	$1.1 Billion (@2019-05-24)	
Turnover	46%		Total Cost Projections		Per $10K
Net Expense	0.93%			3 Yr	302
Other Fees	N/A			5 Yr	525
Top 5 Holdings	Alphabet (7.76%), Visa (3.91%), Costco (3.31%), Home Depot (3.24%), Monster Beverage (3.13%)				
Performance					
	YTD	1 Mo	1 Yr	3 Yr	5 Yr
AGRYX (A)	16.60%	-3.70%	11.66%	18.87%	15.18%
S&P500 TR(B)	13.67%	-3.25%	5.71%	13.09%	10.51%
VFINX (C)	13.62%	-3.26%	5.57%	12.95%	10.36%
(A) - (B)	+2.93%	-0.45%	+5.94%	+5.77%	+4.67%
(A) – (C)	+2.98%	-0.44%	+6.09%	+5.92%	+4.82%

Table 2 Summary of Some Key Information of AGRYX

第二題

(1) 表格三提供了有關於 JLGRX、AGRYX 以及 VFINX，從 2014 年 1 月到 2018 年 12 月的每月報酬率，表格四則提供了利用每月報酬率再去計算所得到的其他統計數據。

Date	VFINX	JLGRX	AGRYX	Date	VFINX	JLGRX	AGRYX
Feb-2014	4.56%	5.73%	5.50%	Jul-2016	4.17%	5.20%	5.47%
Mar-2014	0.40%	-5.06%	-3.24%	Aug-2016	0.13%	-0.40%	-0.14%
Apr-2014	1.15%	-1.62%	-0.65%	Sep-2016	-0.42%	1.57%	-0.12%
May-2014	2.33%	4.03%	3.20%	Oct-2016	-1.41%	-1.57%	-2.39%
Jun-2014	1.62%	1.42%	2.07%	Nov-2016	3.70%	0.46%	1.01%
Jul-2014	-0.97%	0.03%	-1.17%	Dec-2016	1.35%	1.11%	1.33%
Aug-2014	3.99%	5.10%	4.08%	Jan-2017	2.49%	4.59%	2.97%
Sep-2014	-1.86%	-1.57%	-0.30%	Feb-2017	3.96%	3.39%	4.36%
Oct-2014	2.88%	3.33%	3.61%	Mar-2017	-0.34%	2.39%	1.21%
Nov-2014	2.68%	1.77%	3.06%	Apr-2017	1.46%	2.95%	4.13%
Dec-2014	-0.79%	-2.13%	-5.15%	May-2017	1.39%	6.05%	3.05%
Jan-2015	-2.49%	1.18%	3.14%	Jun-2017	0.18%	-0.59%	-0.31%
Feb-2015	5.73%	6.55%	7.44%	Jul-2017	2.48%	2.87%	1.61%
Mar-2015	-2.06%	-1.38%	-0.44%	Aug-2017	0.29%	1.57%	2.14%
Apr-2015	1.44%	0.58%	-0.89%	Sep-2017	1.56%	1.03%	1.37%
May-2015	1.27%	2.76%	1.93%	Oct-2017	2.82%	-8.83%	3.43%
Jun-2015	-2.36%	-1.06%	0.16%	Nov-2017	3.06%	18.51%	4.58%
Jul-2015	2.53%	4.48%	3.45%	Dec-2017	0.64%	0.05%	-8.15%
Aug-2015	-6.04%	-6.32%	-5.58%	Jan-2018	6.19%	9.89%	16.20%
Sep-2015	-2.98%	-4.06%	-2.12%	Feb-2018	-3.70%	-1.37%	-1.56%
Oct-2015	8.96%	7.18%	7.50%	Mar-2018	-2.97%	-2.94%	-1.31%
Nov-2015	0.29%	1.17%	0.79%	Apr-2018	0.80%	1.11%	0.62%
Dec-2015	-2.14%	-5.14%	-9.29%	May-2018	2.39%	4.89%	3.99%
Jan-2016	-4.45%	-5.18%	2.73%	Jun-2018	0.16%	1.32%	1.89%
Feb-2016	-0.15%	-2.36%	-0.41%	Jul-2018	4.16%	1.21%	2.50%
Mar-2016	6.23%	5.61%	5.55%	Aug-2018	3.25%	6.97%	4.48%
Apr-2016	0.89%	-1.16%	-1.12%	Sep-2018	0.13%	0.93%	0.21%
May-2016	1.78%	2.91%	1.98%	Oct-2018	-6.45%	-10.46%	-7.88%
Jun-2016	-0.22%	-2.36%	-1.47%	Nov-2018	2.03%	-0.52%	3.81%
				Dec-2018	-9.50%	-20.40%	-19.68%

Table 3 Monthly Returns of VFINX, JLGRX, and AGRYX during Feb-2014 to Dec-2018

	VFINX	JLGRX	AGRYX
Mean	0.78%	0.77%	0.90%
Standard Deviation	3.22%	5.32%	4.84%

Table 4 Means and Standard Deviations of Table 2

(2) 根據 Kenneth R. French - Data Library 所提供的資料，將市場指數的每月報酬率與 JLGRX、AGRYX 以及 VFINX 分別進行 CAPM 分析，再經過若干計算之後，即可得到 Sharpe Ratio、Treynor measure、Jensen's measure、M^2、T^2 以及 information ratio 等指標，詳細數據請見表格五。

根據表格五所顯示的數據，我們可以發現到 VFINX 在各項指標上均勝過 JLGRX 和 AGRYX。事實上，JLGRX 和 AGRYX 都是 Morningstar 五星基金裡頭的常客，而且也被 Morningstar 認為是五星等級裡頭前 10%優良的開放型基金，反倒是 VFINX 僅獲四星評價。雖然從今年初(2019)到 5/24 為止，JLGRX 和 AGRYX 的累積報酬率都超越了 VFINX(請見表格一和表格二)，但是若我們以長期表現來看，VFINX 並不會表現得比較差。

(in decimals)	VFINX	JLGRX	AGRYX
Sharpe Ratio	0.2287	0.1356	0.1763
Treynor Measure	0.7574	0.5765	0.7566
Jensen's Measure	0.0354	-0.1810	0.0402
M Square	0.0232	-0.2796	-0.1473
T Square	0.0364	-0.1445	0.0356
Information Ratio	0.0588	-0.0528	0.0127

Table 5 Several Performance Evaluation Ratios of VFINX, JLGRX, and AGRYX (CAPM)

(3) 根據課本裡 Treynor & Mazuy (TM model)和 Henriksson & Merton (HM model)對於市場擇時所定義的公式，將其套用到 JLGRX、AGRYX 以及 VFINX 每月報酬率資料，我們可以得到表格六。

(in decimals)	VFINX		JLGRX		AGRYX	
Model	TM	HM	TM	HM	TM	HM
Alpha (a)	-0.0173	-0.0727	0.3735	0.3784	0.2456	-0.0929
Beta (b)	0.9760	0.9303	1.2132	1.4697	1.1138	1.0767
Timing (c)	0.0045	0.0860	-0.0479	-0.4447	-0.0177	0.1058
Adj. R Square	0.9647	0.9649	0.5985	0.5814	0.5655	0.5618

Table 6 Tests of Market Timing Ability for VFINX, JLGRX, and AGRYX

根據表格六所顯示的數據，我們可以觀察到以下點：首先，即使 VFINX 的投資策略相當簡單，但它仍然具有市場擇時的跡象；接著，JLGRX 完全不具有市場擇時的跡象，縱使該基金的投資理念表明管理者想要「駕馭」美國高成長公司所帶來的獲利性；最後，雖然 AGRYX 以 HM model 來看似乎具有市場擇時能力，但是基金管理者顯然沒辦法運用這樣的能力去獲取 positive abnormal returns。

(4) 根據 Kenneth R. French - Data Library 所提供的資料，將市場指數的每月報酬率與 JLGRX、AGRYX 以及 VFINX 分別進行**三因子模型**分析，再經過若干計算，我們可以得到一些指標，詳細請見表格七之「3 FA」橫列。

觀察表格七，我們可以明顯地發現到三因子模型比 CAPM，對於 JLGRX、AGRYX 以及 VFINX 的每月報酬率資料，有更佳的解釋能力(adj. R^2 上升)，而且原本在 CAPM 認為的 positive abnormal returns，都被三因子模型認為是負的異常報酬。另外，雖然三者在 CAPM 和三因子模型之下都沒辦法得到 Jensen's measure 不顯著異於零的結果，不過三者從 CAPM 到三因子模型的過程中，Jensen's measure 的 p-value 均下降，也顯示三因子模型具有較強的報酬率解釋力。

	(in decimals)	VFINX	JLGRX	AGRYX
CAPM	Jensen's Measure	0.0354	-0.1810	0.0402
	Adj. R Square	0.9647	0.5802	0.5689
3 FA	Jensen's Measure	-0.0298	-0.2690	-0.0568
	Adj. R Square	0.9841	0.6185	0.5886
4 FA	Jensen's Measure	-0.0261	-0.2767	-0.1194
	Adj. R Square	0.9840	0.6116	0.5954
5 FA	Jensen's Measure	-0.0375	-0.3386	-0.1644
	Adj. R Square	0.9847	0.6134	0.5997

Table 7 Comparison of Some Ratios between CAPM and 3-, 4-, &5-Factor Models

(5) 根據 Kenneth R. French - Data Library 所提供的資料，搭配上第四小題的部分資料，重複如同第四小題的分析方法，我們可以得到**四因子模型**分析的結果，詳細請見表格七之「4 FA」橫列。

和三因子模型相比，Carhart 四因子模型多了衡量股價動能的 momentum factor，將持續上漲或持續下跌這樣子常見的因素納入解釋股價月報酬率的模型之中。然而，在 JLGRX、AGRYX 以及 VFINX 於 2014 年 1 月到 2018 年 12 月的每月報酬率資料當中，似乎並沒有因為多了這個因子而讓模型的解釋能力有顯著提升，甚至對於 JLGRX 來說，adj. R^2 是不升反降的。

(6) 根據 Kenneth R. French - Data Library 所提供的資料，重複如同第四小題的分析方法，我們可以得到**五因子模型**分析的結果，詳細請見表格七之「5 FA」橫列。

和三因子模型相比，五因子模型是在大約 20 年之後由原作者們所推出的修正版本，加入有關於公司獲利能力與公司投資金額大小的兩個因子，希望能夠提升模型解釋股價月報酬率的能力。表格七清楚地展現了由 CAPM(a.k.a. 單因子模型)、三因子模型、到五因子模型 adj. R^2 的改變趨勢。毫無疑問地，五因子模型均比 CAPM 來的更有解釋能力，但五因子模型是否勝過三因子模型則沒有明顯的趨勢。對於 VFINX 和 AGRYX 來說，五因子模型稍微地比三因子模型更具解釋力，但是我們卻看不到這樣子的現象於 JLGRX 之上。

Appendix

- 以下附上有關於 CAPM、3-factor model、4-factor model、5-factor model、TM model 以及 HM model 的回歸詳細結果。

(1) Vanguard 500 Index Fund Investor Shares (VFINX)

Regression Results of VFINX						
CAPM						
Regression Statistics	Multiple R	0.982489				
	R Square	0.965284				
	Adj. R Square	0.964675				
	Standard Error	0.607041				
	Observations	59				
ANOVA		df	SS	MS	F	Sign. F
	Regression	1	584.030889	584.030889	1584.893351	≈ 0
	Residual	57	21.004417	0.368499		
	Total	58	605.035305			
Results		Coef.	Std. Error	t Stat.	p-value	
	Alpha	0.035410	0.080968	0.437332	0.663523	
	Beta$_{Market}$	0.972264	0.024422	39.810719	≈ 0	
3-Factor Model						
Regression Statistics	Multiple R	0.992456				
	R Square	0.984969				
	Adj. R Square	0.984149				
	Standard Error	0.406639				
	Observations	59				
ANOVA		df	SS	MS	F	Sign. F
	Regression	3	595.940781	198.646927	1201.336108	≈ 0
	Residual	55	9.094525	0.165355		
	Total	58	605.035305			
Results		Coef.	Std. Error	t Stat.	p-value	
	Alpha	-0.029847	0.054833	-0.544316	0.588424	
	Beta$_{Market}$	1.010440	0.017109	59.060491	≈ 0	
	Beta$_{SMB}$	-0.180017	0.021481	-8.380311	≈ 0	
	Beta$_{HML}$	-0.011459	0.022299	-0.513876	0.609397	

Regression Results of VFINX (cont.)					
4-Factor Model					

4-Factor Model

Regression Statistics	Multiple R	0.992510				
	R Square	0.985076				
	Adj. R Square	0.983971				
	Standard Error	0.408915				
	Observations	59				

ANOVA		df	SS	MS	F	Sign. F
	Regression	4	596.005875	149.001469	891.094912	≈ 0
	Residual	54	9.029430	0.167212		
	Total	58	605.035305			

Result		Coef.	Std. Error	t Stat.	p-value
	Alpha	-0.026112	0.055464	-0.470786	0.639690
	$Beta_{Market}$	1.007607	0.017794	56.627487	≈ 0
	$Beta_{SMB}$	-0.179740	0.021606	-8.319094	≈ 0
	$Beta_{HML}$	-0.020705	0.026878	-0.770330	0.444461
	$Beta_{MOM}$	-0.012548	0.020111	-0.623935	0.535298

5-Factor Model

Regression Statistics	Multiple R	0.992979				
	R Square	0.986007				
	Adj. R Square	0.984687				
	Standard Error	0.399680				
	Observations	59				

ANOVA		df	SS	MS	F	Sign. F
	Regression	5	596.568873	119.313775	746.906126	≈ 0
	Residual	53	8.466432	0.159744		
	Total	58	605.035305			

Result		Coef.	Std. Error	t Stat.	p-value
	Alpha	-0.037513	0.054532	-0.687916	0.494506
	$Beta_{Market}$	1.017443	0.017405	58.457413	≈ 0
	$Beta_{SMB}$	-0.177613	0.023789	-7.466186	≈ 0
	$Beta_{HML}$	-0.004357	0.029388	-0.148252	0.882707
	$Beta_{RMW}$	0.022288	0.042223	0.527859	0.599800
	$Beta_{CMA}$	0.035428	0.047875	0.740013	0.462558

Regression Results of VFINX (cont.)						
TM Model						
Regression Statistics	Multiple R	0.982801				
	R Square	0.965897				
	Adj. R Square	0.964679				
	Standard Error	0.607005				
	Observations	59				
ANOVA		df	SS	MS	F	Sign. F
	Regression	2	584.401837	292.200918	793.044141	≈ 0
	Residual	56	20.633469	0.368455		
	Total	58	605.035305			
Result		Coef.		Std. Error	t Stat.	p-value
	Alpha (a)	-0.017299		0.096512	-0.179242	0.858395
	Beta (b)	0.976008		0.024704	39.507823	≈ 0
	Timing (c)	0.004550		0.004534	1.003378	0.319995
HM Model						
Regression Statistics	Multiple R	0.982923				
	R Square	0.966138				
	Adj. R Square	0.964928				
	Standard Error	0.604858				
	Observations	59				
ANOVA		df	SS	MS	F	Sign. F
	Regression	2	584.547505	292.273753	798.881778	≈ 0
	Residual	56	20.487800	0.365854		
	Total	58	605.035305			
Result		Coef.		Std. Error	t Stat.	p-value
	Alpha (a)	-0.072726		0.121613	-0.598011	0.552244
	Beta (b)	0.930308		0.042881	21.695270	≈ 0
	Timing (c)	0.085954		0.072333	1.188312	0.239726

(2) JPMorgan Large Cap Growth R5 (JLGRX)

Regression Results of JLGRX						
CAPM						
Regression Statistics	Multiple R	0.766457				
	R Square	0.587456				
	Adj. R Square	0.580219				
	Standard Error	3.455879				
	Observations	59				
ANOVA		df	SS	MS	F	Sign. F
	Regression	1	969.387914	969.387914	81.167186	≈ 0
	Residual	57	680.756769	11.943101		
	Total	58	1650.144683			
Results		Coef.	Std. Error	t Stat.	p-value	
	Alpha	-0.180996	0.460950	-0.392659	0.696036	
	$Beta_{Market}$	1.252608	0.139035	9.009283	≈ 0	
3-Factor Model						
Regression Statistics	Multiple R	0.992456				
	R Square	0.984969				
	Adj. R Square	0.984149				
	Standard Error	0.406639				
	Observations	59				
ANOVA		df	SS	MS	F	Sign. F
	Regression	3	595.940781	198.646927	1201.336108	≈ 0
	Residual	55	9.094525	0.165355		
	Total	58	605.035305			
Results		Coef.	Std. Error	t Stat.	p-value	
	Alpha	-0.029847	0.054833	-0.544316	0.588424	
	$Beta_{Market}$	1.010440	0.017109	59.060491	≈ 0	
	$Beta_{SMB}$	-0.180017	0.021481	-8.380311	≈ 0	
	$Beta_{HML}$	-0.011459	0.022299	-0.513876	0.609397	

Regression Results of JLGRX (cont.)					
4-Factor Model					

Regression Statistics	Multiple R	0.798996			
	R Square	0.638394			
	Adj. R Square	0.611608			
	Standard Error	3.324161			
	Observations	59			
ANOVA		df	SS	MS	F	Sign. F
	Regression	4	1053.442214	263.360554	23.833436	≈ 0
	Residual	54	596.702468	11.050046		
	Total	58	1650.144683			
Result		Coef.	Std. Error	t Stat.	p-value
	Alpha	-0.276698	0.450881	-0.613683	0.542001
	$Beta_{Market}$	1.230416	0.144648	8.506275	≈ 0
	$Beta_{SMB}$	-0.022050	0.175638	-0.125542	0.900561
	$Beta_{HML}$	-0.477792	0.218498	-2.186713	0.033115
	$Beta_{MOM}$	0.025856	0.163488	0.158153	0.874926

5-Factor Model					
Regression Statistics	Multiple R	0.804197			
	R Square	0.646733			
	Adj. R Square	0.613405			
	Standard Error	3.316461			
	Observations	59			
ANOVA		df	SS	MS	F	Sign. F
	Regression	5	1067.202289	213.440458	19.405595	≈ 0
	Residual	53	582.942394	10.998913		
	Total	58	1650.144683			
Result		Coef.	Std. Error	t Stat.	p-value
	Alpha	-0.338553	0.452494	-0.748194	0.457650
	$Beta_{Market}$	1.225960	0.144422	8.488740	≈ 0
	$Beta_{SMB}$	0.083071	0.197396	0.420832	0.675579
	$Beta_{HML}$	-0.503627	0.243858	-2.065251	0.043805
	$Beta_{RMW}$	0.394491	0.350358	1.125965	0.265253
	$Beta_{CMA}$	-0.039931	0.397256	-0.100516	0.920314

Regression Results of JLGRX (cont.)					
TM Model					
Regression Statistics	Multiple R	0.782515			
	R Square	0.612330			
	Adj. R Square	0.598485			
	Standard Error	3.379854			
	Observations	59			
ANOVA		df	SS	MS	F	Sign. F
	Regression	2	1010.433740	505.216870	44.226451	≈ 0
	Residual	56	639.710942	11.423410		
	Total	58	1650.144683			
Result		Coef.	Std. Error	t Stat.	p-value
	Alpha (a)	0.373453	0.537387	0.694942	0.489965
	Beta (b)	1.213222	0.137555	8.819910	≈ 0
	Timing (c)	-0.047860	0.025248	-1.895556	0.063184
HM Model					
Regression Statistics	Multiple R	0.771904			
	R Square	0.595836			
	Adj. R Square	0.581401			
	Standard Error	3.451009			
	Observations	59			
ANOVA		df	SS	MS	F	Sign. F
	Regression	2	983.214804	491.607402	41.278724	≈ 0
	Residual	56	666.929878	11.909462		
	Total	58	1650.144683			
Result		Coef.	Std. Error	t Stat.	p-value
	Alpha (a)	0.378434	0.693858	0.545406	0.587640
	Beta (b)	1.469663	0.244655	6.007084	≈ 0
	Timing (c)	-0.444678	0.412695	-1.077497	0.285878

(3) AB Growth Fund Advisor Class (AGRYX)

Regression Results of AGRYX						
CAPM						
Regression Statistics	Multiple R	0.759163				
	R Square	0.576329				
	Adj. R Square	0.568896				
	Standard Error	3.185170				
	Observations	59				
ANOVA		df	SS	MS	F	Sign. F
	Regression	1	786.650293	786.650293	77.538320	≈ 0
	Residual	57	578.282673	10.145310		
	Total	58	1364.932966			
Results		Coef.	Std. Error	t Stat.	p-value	
	Alpha	0.040200	0.424842	0.094624	0.924946	
	$Beta_{Market}$	1.128385	0.128144	8.805585	≈ 0	
3-Factor Model						
Regression Statistics	Multiple R	0.798891				
	R Square	0.638226				
	Adj. R Square	0.618493				
	Standard Error	3.294565				
	Observations	59				
ANOVA		df	SS	MS	F	Sign. F
	Regression	3	1053.165825	351.055275	32.342921	≈ 0
	Residual	55	596.978858	10.854161		
	Total	58	1650.144683			
Results		Coef.	Std. Error	t Stat.	p-value	
	Alpha	-0.269002	0.444256	-0.605511	0.547330	
	$Beta_{Market}$	1.224578	0.138613	8.834525	≈ 0	
	$Beta_{SMB}$	-0.021480	0.174037	-0.123420	0.902224	
	$Beta_{HML}$	-0.496844	0.180665	-2.750079	0.008048	

Regression Results of AGRYX (cont.)					
4-Factor Model					
Regression Statistics	Multiple R	0.789483			
	R Square	0.623283			
	Adj. R Square	0.595378			
	Standard Error	3.085790			
	Observations	59			
ANOVA		df	SS	MS	F	Sign. F
	Regression	4	850.739655	212.684914	22.335929	≈ 0
	Residual	54	514.193311	9.522098		
	Total	58	1364.932966			
Result		Coef.	Std. Error	t Stat.	p-value
	Alpha	-0.119427	0.418549	-0.285335	0.776479
	$Beta_{Market}$	1.180139	0.134276	8.788935	≈ 0
	$Beta_{SMB}$	-0.125978	0.163043	-0.772669	0.443087
	$Beta_{HML}$	-0.179791	0.202830	-0.886415	0.379324
	$Beta_{MOM}$	0.210542	0.151765	1.387289	0.171053
5-Factor Model					
Regression Statistics	Multiple R	0.796378			
	R Square	0.634218			
	Adj. R Square	0.599710			
	Standard Error	3.069226			
	Observations	59			
ANOVA		df	SS	MS	F	Sign. F
	Regression	5	865.664978	173.132996	18.379005	≈ 0
	Residual	53	499.267988	9.420151		
	Total	58	1364.932966			
Result		Coef.	Std. Error	t Stat.	p-value
	Alpha	-0.164372	0.418762	-0.392518	0.696250
	$Beta_{Market}$	1.097740	0.133656	8.213202	≈ 0
	$Beta_{SMB}$	-0.023257	0.182681	-0.127308	0.899179
	$Beta_{HML}$	-0.132040	0.225679	-0.585080	0.560977
	$Beta_{RMW}$	0.452890	0.324240	1.396777	0.168302
	$Beta_{CMA}$	-0.526374	0.367642	-1.431757	0.158085

Regression Results of AGRYX (cont.)					
TM Model					
Regression Statistics	Multiple R	0.761877			
	R Square	0.580457			
	Adj. R Square	0.565473			
	Standard Error	3.197791			
	Observations	59			
ANOVA		df	SS	MS	F	Sign. F
	Regression	2	792.284556	396.142278	38.739246	≈ 0
	Residual	56	572.648410	10.225864		
	Total	58	1364.932966			
Result		Coef.	Std. Error	t Stat.	p-value
	Alpha (a)	0.245622	0.508440	0.483089	0.630916
	Beta (b)	1.113792	0.130145	8.558072	≈ 0
	Timing (c)	-0.017732	0.023888	-0.742281	0.461019
HM Model					
Regression Statistics	Multiple R	0.759541			
	R Square	0.576903			
	Adj. R Square	0.561792			
	Standard Error	3.211307			
	Observations	59			
ANOVA		df	SS	MS	F	Sign. F
	Regression	2	787.433373	393.716686	38.178615	≈ 0
	Residual	56	577.499593	10.312493		
	Total	58	1364.932966			
Result		Coef.	Std. Error	t Stat.	p-value
	Alpha (a)	-0.092933	0.645664	-0.143934	0.886069
	Beta (b)	1.076730	0.227662	4.729517	≈ 0
	Timing (c)	0.105824	0.384030	0.275563	0.783898