Are Actively Managed Funds Really That Bad?

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Research Objective

- Estimate time changing conditional performance measures for actively managed Australian equity funds.
- When, and how often, do active funds exhibit large performance changes, on a month by month basis?
- Can performance be related to variables that are identified with the changing state of the economy?

Performance Measurement

- Traditional performance evaluation uses unconditional expected returns as the performance yardstick
- This means that information about the changing state of the economy is ignored when forming expectations

Unconditional Model

Jensen's (1968) measure

$$r_{p,t} = \alpha_p + \beta_p r_{m,t} + \varepsilon_{p,t} \qquad (1)$$

Where r_{pt} and r_{mt} are returns in excess of the risk-free rate

Treynor and Mazuy (1966)

$$r_{p,t} = \alpha_p + \beta_p r_{m,t} + \gamma_p r_{m,t}^2 + \varepsilon_{p,t} \qquad (2)$$

Shortcomings

- If expected returns and risks vary over time the unconditional approach will be unreliable
- Common time variation in risks and risk premiums will be confused with average performance
- Some performance will be due to publicly available information

Conditional Models

- Conditional Performance Evaluation (CPE) incorporates public information available to investors at the time the returns were generated
- Research has shown that a number of public information variables are relevant for predicting stock and bond returns

Information Variables

- Long history of research on relationship between economic variables and stock and bond returns
  - Dividend Yields – Dow (1920), Ball (1978), Fama and French (1989)
  - Term Spread– Fama (1976)
  - Default Spreads – Keim and Stambaugh (1986)
  - Bill Rate - Fama (1976)

Conditional Models

- Assume:
- expected market returns and managers' betas change over time and are correlated
- Market prices fully reflect readily available public information
- Public information can be measured by a vector of predetermined variables

Conditional Models

- Ferson and Schadt (1996) developed conditional version of Jensen's measure, where beta is a linear function of a vector of predetermined information variables:
  - Lagged 1 month Treasury bill yield
  - Lagged dividend yield of NYSE
  - Lagged slope of term structure
  - Lagged corporate bond quality spread
  - January dummy variable

Conditional Models

- Time-varying Conditional Beta

$$\beta_p\,(Z_{t-1}) = \beta_{0p} + \beta_p'\; z_{t-1} \qquad (3)$$

Where z_{t-1} is a vector of lagged conditioning variables, in demeaned form

Conditional Models

Ferson and Schadt (1996)

$$r_{p,t} = \alpha_p + \beta_{0p}\, r_{m,t} + \beta'_p \left(z_{t-1}\, r_{m,t} \right) + \varepsilon_{p,t} \qquad (4)$$

Conditional Models

- Time varying conditional alpha

$$\alpha_p(Z_{t-1}) = \alpha_{0p} + A_p' z_{t-1} \qquad (5)$$

Conditional Models

Christopherson, Ferson and Glassman (1998) Time-varying conditional alpha and beta

$$r_{p,t} = \alpha_{0p} + A'_p z_{t-1} + \beta_{0p} r_{m,t} + \beta'_p \left(z_{t-1} r_{m,t} \right) + \varepsilon_{p,t} \quad (6)$$

Kalman Filter Approach

- Time series estimation algorithm
- Attempt to understand unobserved relationships through interpretation of observable data
- Produces estimates of a time series of unobserved variables using a related but observable time series of variables

Kalman Filter Approach

Predict future unobserved variable (x) based on the current estimate of the unobserved variable:	$x^{*}_{t+1} = E\left[a * x_{(t)E} + w_t\right]$
Use predicted unobserved variable to predict future observable variable (y):	$y^{*}_{t+1} = E\left[m * x^{*}_{t+1} + v_t\right]$
When the future observable variable actually occurs, calculate the error in the prediction:	$y^{e}_{t+1} = E\left[y_{t+1} - y^{*}_{t+1}\right]$
Generate a better estimate of the unobserved variable at time (t + 1) and start the process over for time (t + 2):	$x_{(t+1)E} = E\left[x^{*}_{t+1} + k_{t+1} * y^{e}_{t+1}\right]$
Note: k_{t+1} is the "Kalman gain" and is based on the variance of the predicted variables in the first and second step of the process:	$k_{t+1} = \dfrac{m * Var\left(x^{*}_{t=1}\right)}{Var\left(y^{*}_{t+1}\right)}$

Source: Arnold, Bertus and Godbey (2006)

Kalman Filter

The signal or observation equation is given by:

$$RP_t = \alpha_t + \beta_t RM_t + \gamma RM_t^2 + e_t \qquad (7)$$

And the state equations by:

$$\alpha_t = a_0 + a_1\alpha_{t-1} + \varepsilon_t$$

$$\beta_t = b_0 + b_1\beta_{t-1} + \upsilon_t$$

Conditional Kalman Filter

The signal or observation equation is given by:

$$RP_t = \alpha_t + \beta_t RM_t + \gamma RM_t^2 + e_t \qquad (8)$$

And the state equations by:

$$\alpha_t = a_0 + a_1\alpha_{t-1} + a_2 JAN_t + a_3 JUL_t + a_4 \, {}^{D}\!/\!{}_{P_{t-1}} + a_5 STI_{t-1} + a_6 YC_{t-1} + \varepsilon_t$$

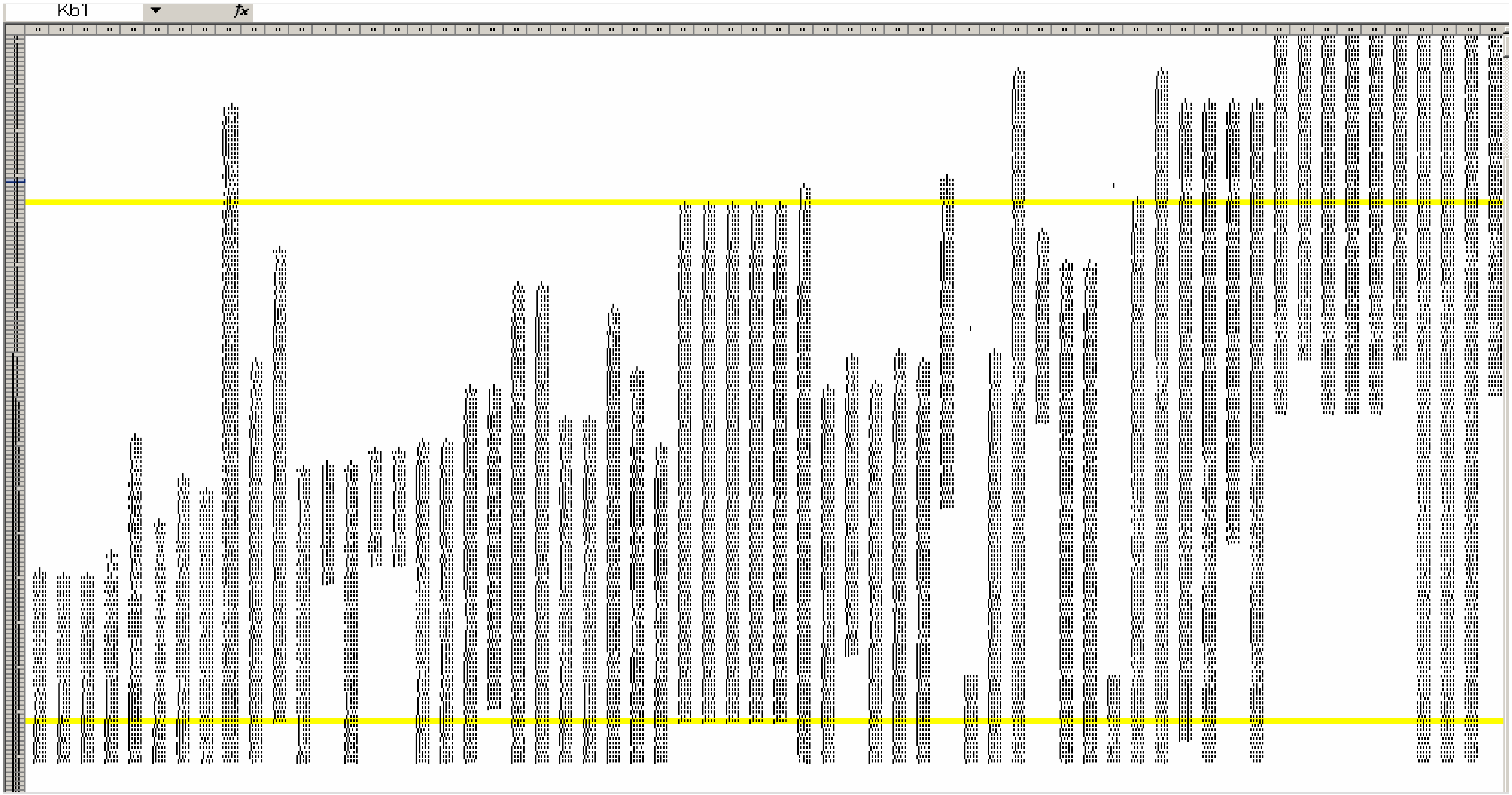
$$\beta_t = b_0 + b_1\beta_{t-1} + b_2 JAN_t + b_3 JUL_t + b_4 \, {}^{D}\!/\!{}_{P_{t-1}} + b_5 STI_{t-1} + b_6 YC_{t-1} + \upsilon_t$$

Data

- Morningstar Data
- Multisector superannuation funds – “Aggressive”
- Monthly returns from May 1995 to December 2004
- 102 funds in total, but only 17 with data over the full 1995-2004 period
- Further 6 deleted because of same returns

Monthly Returns Series

May 1995 – December 2004

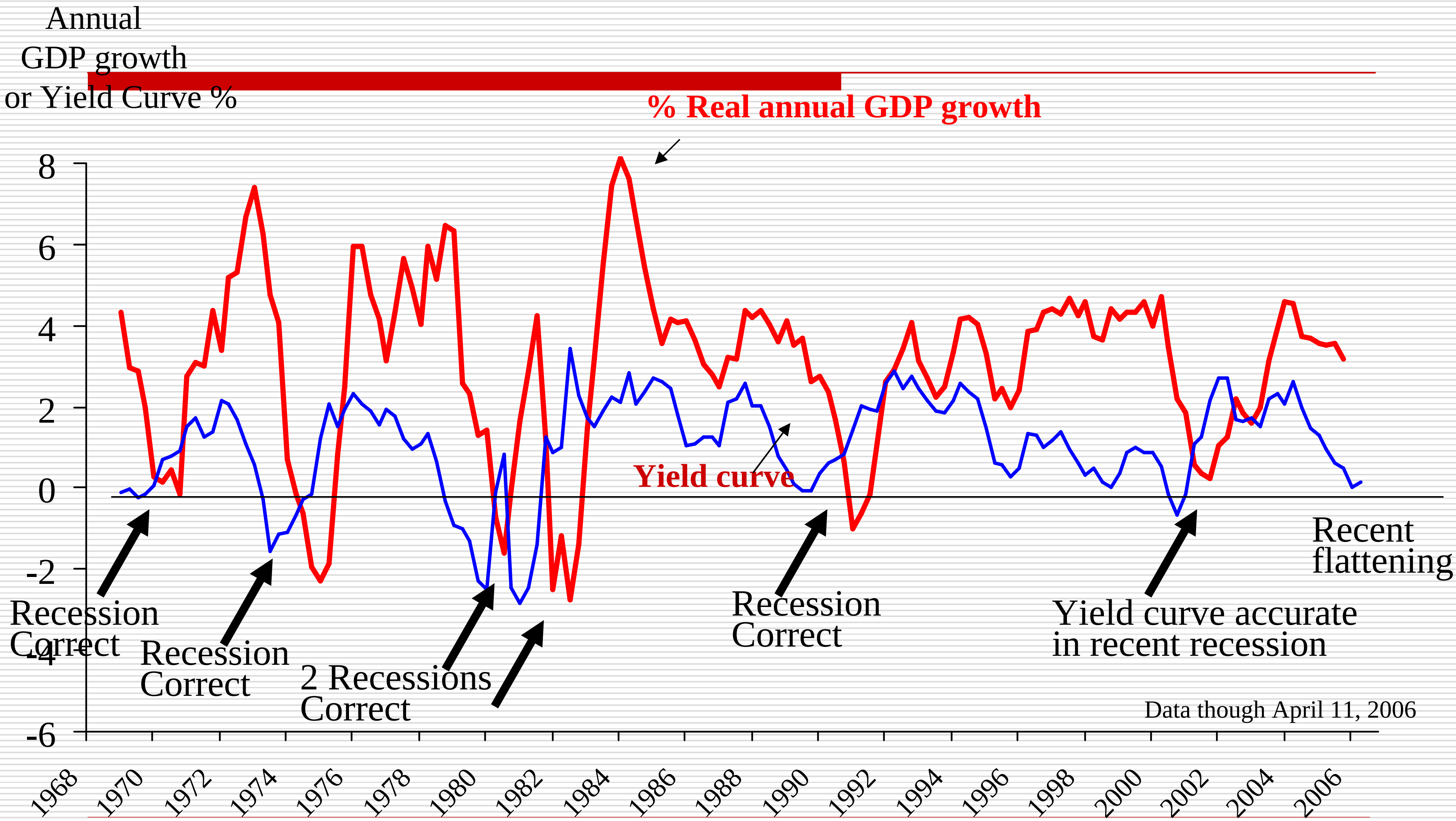


Predetermined Information Variables

- Lagged yield on 90 day BAB (expressed as a monthly rate)
- Lagged yield curve
- Lagged dividend yield on ASX 200
- January dummy variable
- July dummy variable

Yield Curve Inverts Before Last Six Recessions

(5-year Treasury note minus 3-month Treasury bill yield – constant maturity)



Source: Campbell R. Harvey. Update of Harvey (1986, 1988, 1989).

Table 1: Summary Statistics

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Probability	n
RMKT	0.009649	0.012196	0.077028	-0.11144	0.032819	-0.71587	4.094478	15.83289	0.000365	116
DIV_YLD	0.038803	0.037035	0.113871	8.2E-06	0.026825	0.24341	2.029666	5.696284	0.057952	116
STI	5.563237	5.25	7.7	4.25	0.95271	0.98122	2.83671	18.74285	0.000085	116
YC	0.765427	0.765	1.95	-0.74	0.613799	-0.17279	2.328781	2.754836	0.252229	116
Firm Identifier										
A01617	0.000811	0.005122	0.054084	-0.08571	0.026173	-0.6995	3.763842	12.2798	0.002155	116
A01970	0.001037	0.004879	0.068219	-0.07805	0.022946	-0.46533	4.158791	10.6764	0.004805	116
A02705	0.00094	0.004431	0.068477	-0.07813	0.023023	-0.44765	4.141099	10.16772	0.006196	116
A02714	-0.00082	-0.00167	0.13399	-0.12468	0.029443	-0.22463	9.211195	187.4404	0	116
A03492	0.00257	0.007054	0.054261	-0.08051	0.022633	-0.55355	3.975014	10.51888	0.005198	116
A03721	0.002149	0.00413	0.056091	-0.06572	0.021387	-0.43141	3.695149	5.933788	0.051463	116
A05077	0.000437	0.005008	0.053384	-0.08302	0.024714	-0.69615	3.461181	10.39751	0.005523	116
A05091	0.000618	0.003146	0.052759	-0.07386	0.020493	-0.70308	4.19453	16.45347	0.000267	116
A06448	0.002149	0.005584	0.067985	-0.06517	0.021075	-0.33831	4.073119	7.778763	0.020458	116

Conditional Kalman Filter

Table 2: Results for Observation Equation with α and β Final States

Firm	α (Final)	β (Final)	γ	z-stat	σ
A02714	0.000296	0.299981	0.818077	0.311227	5.25E-06
A03492	-0.000708	0.519407	0.304021	0.272217	0.000588
A03721	-0.00159	0.516458	0.212647	0.23991	0.003654
A05077	-0.003905	0.483329	0.40922	0.446288	5.73E-06
A05091	-0.002717	0.496683	0.048852	0.066551	0.006944

Table 3: Results of State Equations for Conditional α and β

Firm	Conditional α State Space Equation							
	a_0	a_1	a_2	a_3	a_4	a_5	a_6	σ
A02714	-0.00378	-0.28152	-0.0098	0.001091	-0.00431	-0.00049	-0.00159	0.021115
	-0.570043	*-1.18357*	*-0.98537*	*0.08107*	*-0.02741*	*-0.06485*	*-0.21086*	
A03492	-0.00085	0.000286	0.002069	0.005134	0.015257	0.000437	0.00025	0.010074
	-0.611155	*0.020337*	*0.348942*	*1.385886*	*0.381238*	*0.325511*	*0.136406*	
A03721	-0.001132	0.000725	0.002742	0.003785	0.055853	-0.00018	0.002189	0.00869
	-0.760165	*0.021259*	*0.74884*	*1.082445*	*1.319299*	*-0.14934*	*1.12697*	
A05077	-0.003035	-0.15375	0.001636	0.003523	0.034531	0.000199	-0.00049	0.011228
	-1.86046	*-0.95771*	*0.339204*	*0.844091*	*0.764342*	*0.106923*	*-0.21798*	
A05091	-0.001709	-0.0013	-0.00157	0.000579	-0.00119	0.000864	0.000861	0.00022
	-1.530232	*-0.04611*	*-0.46959*	*0.232479*	*-0.03704*	*0.942976*	*0.547258*	
	Conditional β State Space Equation							
	b_0	b_1	b_2	b_3	b_4	b_5	b_6	σ
A02714	0.336426	0.303149	**0.94012**	0.023022	4.926264	0.022535	0.22868	2.97E-06
	1.153291	*0.739045*	***2.332442***	*0.058338*	*1.172942*	*0.099238*	*1.298247*	
A03492	**0.594772**	0.009738	0.218942	0.01876	**3.049967**	-0.02299	0.177086	2.97E-06
	4.085648	*0.042339*	*0.507296*	*0.103638*	***2.071433***	*-0.45223*	*1.966408*	
A03721	**0.578057**	0.011832	0.168042	-0.01297	1.788942	0.001579	0.122357	2.97E-06
	2.159118	*0.026802*	*0.731476*	*-0.06305*	*1.24744*	*0.029474*	*1.239701*	
A05077	**0.309823**	**0.511654**	0.315028	-0.06756	1.107996	-0.06127	0.115892	2.97E-06
	2.170941	***2.289684***	*1.086261*	*-0.32464*	*0.580933*	*-1.38677*	*1.522099*	
A05091	**0.578865**	-0.01708	0.159792	0.119179	-0.75125	-0.0071	0.053041	2.97E-06
	2.687434	*-0.04798*	*0.826597*	*1.130076*	*-0.66939*	*-0.18574*	*0.787713*	

Conditional Kalman Filter

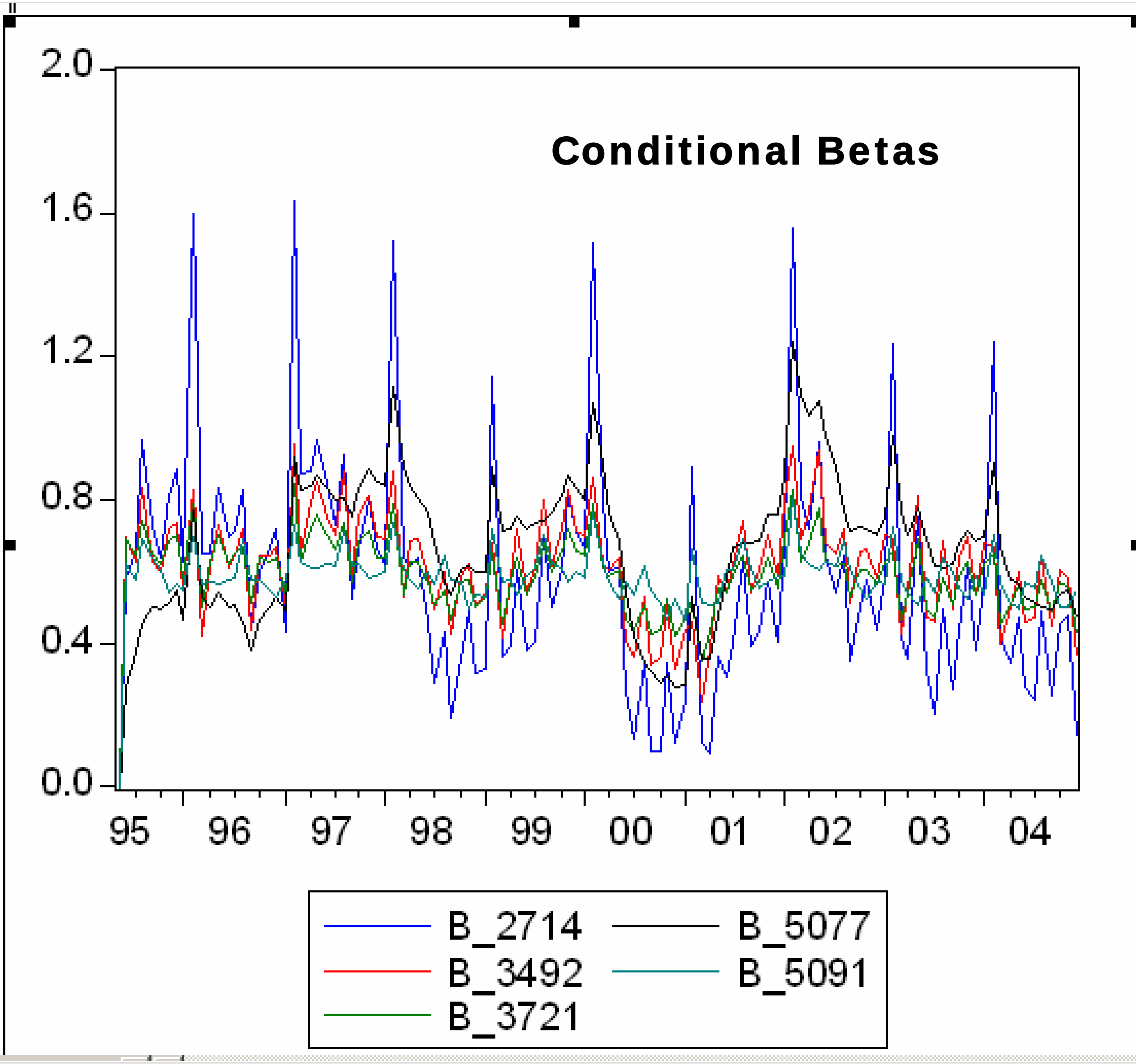
Table 4: Likelihood ratio tests for Sub-Models

	fixed alpha		fixed beta		Both fixed	
	LR test	p-value	LR test	p-value	LR test	p-value
A02714	2.074	0.9127	12.697	0.0481	31.700	0.0015
A03492	3.071	0.7999	10.774	0.0999	16.367	0.1750
A03721	5.535	0.5366	6.223	0.3987	18.776	0.0941
A05077	2.544	0.8634	42.206	0.0000	62.390	0.0000
A05091	1.857	0.9323	3.452	0.7503	7.850	0.7867

Treynor and Mazuy

Table·5:·Results·for·fixed·alpha·and·beta¶

Fund	alpha	t-stat	beta	t-stat	beta=1?	gamma	t-stat	adj·R-sq	DW·stat
A01617	0.000326	0.194698	**0.62639**	**14.04918**	-8.37972	**-2.17576**	**-2.613**	0.678983	1.870755
A01970	-0.00107	-0.89712	**0.621296**	**19.66128**	-11.9843	-0.62491	-1.0589	0.790204	2.003482
A02705	-0.0012	-1.00278	**0.623131**	**19.55878**	-11.8293	-0.59667	-1.00282	0.788173	2.025073
A06448	-0.00013	-0.11362	**0.566363**	**18.32181**	-14.0281	-0.2266	-0.39251	0.762007	1.989229


Conditional Betas
2.0
1.6
1.2
0.8
0.4
0.0
95
96
97
98
99
00
01
02
03
04
B_2714
B_3492
B_3721
B_5077
B_5091

Where to now?

- Larger data set
- Autocorrelation in predictor variables
- Estimate full range of models:
  - Traditional Jensen Alpha
  - Time-varying Beta – OLS
  - Time-varying Alpha & Beta – OLS
  - Kalman Filter – unconditional
  - Kalman Filter – conditional
- Control for impact of fund flows

Spurious Regression Bias

- Arises when high autocorrelation in a predictor variable causes the standard test statistics to find a significant relation where none exists
- Ferson, Sarkissian and Simin (2003) suggest information variables be stochastically detrended by subtracting a 12 month moving average
- Ferson, Sarkissian and Simin (2006) now suggest may not be a problem when used in interactive regressions