Monthly Seasonality in the New Zealand Stock Market

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Abstract

We study monthly seasonality in 4 stock market indices and 16 industry indices in the New Zealand stock market. We find that stock returns of 3 market indices and a half of the 16 industry indices are significantly negative in August, and only 4 indices have significantly positive returns in June. The negative returns in August are probably due to the fact that August is the bitterest and rainiest month of the year in New Zealand. For other months there are no typical anomalies. We do not find any January effect in all the 4 market indices. For industry indices, only 2 industry indices exhibit the January effect while another 2 indices have significantly lower returns in August than in other months. The finding that there are no typical seasonal anomalies in both January and April is inconsistent with the tax-loss selling hypothesis as New Zealand has an April-March tax cycle.

***JEL Classification**: G14*

***Keywords**: New Zealand stock market, market efficiency, market anomaly, monthly effect, January effect, seasonality*

1. INTRODUCTION

Seasonal anomalies in stock markets (over specific days, weeks, months, and even years) have attracted a widespread attention and considerable interests among both practitioners and academics. Over the past hundred years, the economics and finance literature from both the practitioner and academic fields well document monthly seasonality of returns on various assets (e.g., stocks, debt securities, futures, foreign currencies and commodities). Tooke (1824) and Kemmerer (1911) are the two earliest studies on this topic (see Bentzen, 2009). By 2010 more than 150 articles have been published worldwide on this topic, using different data, methods and sample periods in different countries, suggesting the existence of monthly anomalies in stock returns.

Anomalous seasonality relies on the assumption that a certain pattern of stock markets, formed on the basis of the past stock price, can be used to predict the future stock price. If the anomalous pattern is fixed for a specific month, informed investors can utilize the pattern to earn a risk-free profit by trading these stocks. Therefore, the study of seasonality implies that investors could employ the anomaly findings to predict the future behavior of prices (Fama, 1965). Seasonal anomalies, therefore, are in contradiction to any of the three forms of efficient market hypothesis (EMH), particularly the weak-form efficiency (see Worthington and Higgs, 2006; Narayan, 2005).

The literature well documented that there is monthly seasonality in many stock markets around the world. Studies on the US stock markets find that stock return in January is significantly larger than in other months of the year, which is referred as "the January effect", "the turn-of-the-year effect" or "the monthly seasonality/anomaly" (see e.g., Wachtel, 1942; Bonin and Moses, 1976; Ariel, 1987; Heston and Sadka, 2008; Bentzen, 2009; Dzhabarov and Ziemba, 2010). The monthly anomalies are also found in other markets (e.g., Officer, 1975; Brown *et al.*, 1983; Gultekin and Gultekin, 1983; Yakob *et al.*, 2005; Liu and Li, 2010).

Although New Zealand is a small open economy as a member of OECD and has a well established stock market, research on seasonality is very limited (to our best knowledge, we only find two papers on this topic: Keef and McGuinness (2001) and Hasan and Raj (2001)). New Zealand, different from Australia and some other developed countries, has a financial year ending in March and has no capital gains tax. Hasan and Raj (2001) study whether monthly seasonality of New Zealand stock market is driven by tax-loss selling in the end of financial year (i.e., March) or portfolio rebalancing in the end of calendar year (i.e., December). Using a 40 largest stock index and a 40 smallest stock index from 1983 to 1993, they find no existence of either the April or January effects, which is inconsistent with the findings in other markets. Their study, however, is limited to the use of just two indices.

To further examine this issue, unlike the existing studies on the New Zealand stock market, we investigate monthly seasonality in 4 market indices and 16 industry indices of the New Zealand Exchange (NZX) over the period from October 1997 to March 2009.

The rest of the paper is structured as follows: Section 2 offers a description of the data and summary statistics. Section 3 describes empirical approaches and discusses empirical findings. Section 4 concludes this paper.

2. Data
The data employed in this study are monthly closing prices for market indices and industry indices of the NZX over the period from October 1997 to March 2009. The prices are adjusted by dividend distribution, new equity issuance and share buyback. The data are sourced from DataStream. We study both market indices and industry indices. We consider four kinds of market indices: NZX All Companies Index, NZX Top 10 Index, NZX Mid Cap Index, and NZX Small Cap Index. There are 16 industry sectors in our study: Agriculture & Fishing, Building, Consumer, Energy, Financial and Other Services, Food, Forestry, Goods, Intermediary & Durable, Mining, Primary, Property, Ports, Services, Transport, and Textiles and Apparel.[1] The detailed description of DataStream codes and their corresponding names can be found in Table 1.

The monthly market return at month *t* is calculated as:
$$R_{i,t} = \ln(P_{i,t} / P_{i,t-1}),\qquad(1)$$
where $P_{i,t}$ is the price of stock *i* on the last trading day of month *t*, and $P_{i,t+1}$ is the price of stock *i* on the last trading day of month *t*-1.

Table 1 presents summary statistics of the monthly returns. The sample means, standard deviations, medians, minimums, maximums, skewness, kurtosis, Jacaque-Bera statistics, and the first-order autocorrelation coefficients are reported. The mean returns vary across sectors with the largest of 8.60% per month and the lowest of -8.30% per month. The mining sector has the highest standard deviation, suggesting that this sector is mostly volatile for the research period. By contrast, the property sector has the lowest standard deviation indicates that it is mostly stable.

TABLE 1: SUMMARY STATISTICS

DataStream Code	Name	Mean (×100)	Std. Dev. (×100)	Median (×100)	Min (×100)	Max (×100)	Skewness	Kurtosis	Jarque-Bera	ρ(1)
market index										
NZSEALL	NZX All Companies Index	-0.01	3.92	0.52	-13.70	10.06	-0.55	1.34	17	-0.03
NZ10CAP	NZX Top 10 Index	-0.40	5.07	-0.17	-19.67	8.82	-0.74	0.99	18	-0.12
NZMCAPC	NZX Mid Cap Index	-0.05	3.99	0.57	-10.68	10.63	-0.34	0.66	5[#]	0.13
NZSMCIC	NZX Small Cap Index	0.08	4.07	0.89	-10.40	9.27	-0.46	-0.22	5[#]	0.27
industry index										
NZSEAGR	Agriculture & Fishing	-0.31	5.53	0.21	-18.93	14.86	-0.29	0.81	6[#]	0.17
NZSEBLD	Building	0.80	7.14	1.64	-21.69	17.03	-0.72	1.42	24	-0.01
NZSECON	Consumer	0.25	5.20	0.18	-19.94	15.54	-0.48	2.88	53	0.10
NZSEENG	Energy	0.66	4.48	0.86	-15.52	10.95	-0.51	1.53	20	-0.04
NZSEFIN	Financial and Other Services	0.43	5.32	0.78	-19.96	17.60	-0.70	2.26	41	0.05
NZSEFOO	Food	0.86	6.64	0.45	-25.44	20.70	-0.22	1.81	20	-0.01
NZSEFOR	Forestry	-0.72	9.22	-0.68	-39.21	35.88	0.49	4.54	124	-0.02
NZSEGOO	Goods	0.27	5.28	0.40	-19.92	11.73	-0.47	0.91	10	0.09
NZSEINT	Intermediary & Durable	0.23	6.17	0.36	-25.24	16.19	-0.41	1.48	16	0.07
NZSEMIN	Mining	0.61	10.71	0.73	-36.30	39.59	0.09	1.67	16	0.02
NZSEPRM	Primary	-0.26	7.23	0.02	-28.61	26.84	-0.25	2.25	30	-0.06
NZSEPRP	Property	-0.24	3.38	0.03	-13.20	10.47	-0.28	2.69	44	0.13
NZSEPRT	Ports	0.20	5.56	0.06	-14.43	20.34	0.24	1.02	7	0.03
NZSESRV	Services	-0.34	4.75	0.32	-13.13	9.64	-0.49	-0.18	6[#]	-0.09
NZSETRN	Transport	-0.83	8.75	0.05	-42.80	34.49	-0.19	5.12	152	0.08
NZSETXT	Textiles and Apparel	-0.63	8.50	0.00	-40.43	26.29	-0.98	5.29	183	-0.19

Notes: NZSEINV (Investment), NZSELEI (Leisure & Tourism), and NZSEMED (Media & Communication) are not included as their stock price data discontinue in July 2001 in the database. Jarque-Bera statistic for normality that is not significant at the 5% level is denoted with [#]. The samples are monthly and start from October 1997 and end in March 2009.

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[1] There are another three industry sectors in DataStream: Investment, Leisure & Tourism, and Media & Communication. However, they are not included in the study as their stock price data discontinue in July 2001.

Table: 2

DataStream Code	January Mean Return	January Standard Error of Mean	February Mean Return	February Standard Error of Mean	March Mean Return	March Standard Error of Mean	April Mean Return	April Standard Error of Mean	May Mean Return	May Standard Error of Mean	June Mean Return	June Standard Error of Mean	July Mean Return	July Standard Error of Mean	August Mean Return	August Standard Error of Mean	September Mean Return	September Standard Error of Mean	October Mean Return	October Standard Error of Mean	November Mean Return	November Standard Error of Mean	December Mean Return	December Standard Error of Mean
market index																								
NZSEALL	2.017*	-1.153	-0.328	-0.557	-0.755	-1.243	-0.88	-1.52	-0.407	-0.961	1.769**	-0.707	-0.18	-1.4	-2.143**	-1	1.447	-1.262	0.85	-1.172	-0.765	-0.992	-0.771	-1.426
NZ10CAP	0.415	-1.591	-1.701*	-1.015	0.575	-1.196	1.972*	-1.034	-2.548	-1.758	-0.896	-2.045	1.701	-1.273	-3.054*	-1.847	-2.981*	-1.731	-0.678	-1.729	1.236	-1.06	0.905	-0.912
NZMGAPC	-0.77	-1.081	-1.865*	-1.115	-0.489	-1.313	0.752	-1.129	1.066	-0.889	-0.295	-1.657	0.839	-0.832	0.009	-0.668	-1.883	-1.358	0.393	-1.552	0.048	-1.146	1.643	-1.024
NZSMCIC	-0.08	-1.091	-1.714*	-1.03	-1.188	-1.359	0.886	-1.287	0.502	-0.869	0.387	-1.041	1.664*	-0.888	0.056	-1.087	-1.221	-1.101	0.068	-1.783	0.637	-1.412	1.177	-1.175
industry index																								
NZSEAGR	1.547	-1.007	0.066	-1.414	-3.135*	-1.68	1.577	-1.181	-1.659	-1.584	-0.091	-1.622	-0.561	-1.242	-3.663**	-1.758	0.647	-2.242	2.097	-1.856	-0.036	-1.292	-0.685	-2.067
NZSEBLD	2.495	-1.53	1.983	-1.286	3.022*	-1.656	-3.177	-2.868	-0.119	-1.864	5.145**	-1.276	-2.627	-2.459	0.519	-1.495	1.454	-2.739	0.383	-2.628	1.595	-2.096	-1.411	-2.304
NZSECON	1.188	-1.085	2.356**	-0.611	0.672	-1.536	1.327	-1.195	-2.425**	-1.199	2.372**	-1.144	-0.789	-0.931	-3.452**	-2.047	1.569	-1.657	-0.89	-1.579	-0.813	-0.785	1.663	-2.78
NZSEENG	1.305	-1.306	0.31	-0.988	0.324	-1.042	1.072	-1.698	-1.009	-1.217	1.134**	-0.516	-0.603	-1.585	-0.306	-1.488	1.786	-1.387	2.077	-1.309	0.649	-1.226	0.978	-1.893
NZSEFIN	1.254	-1.288	0.282	-0.717	-0.239	-1.516	0.216	-1.403	-2.21	-2.14	1.559	-1.554	0.537	-1.512	-3.066*	-1.705	3.860**	-1.764	1.97	-1.707	1.845	-1.444	-1.03	-1.452
NZSEFOO	4.808**	-1.517	2.429*	-1.419	2.909	-1.963	2.342	-2.29	0.854	-2.33	0.097	-1.493	1.313	-1.838	-4.498*	-2.622	-1.843	-1.86	3.881*	-2.005	-1.096	-1.601	-1.293	-1.455
NZSEFOR	-0.102	-2.32	-3.703**	-1.352	-4.055*	-2.178	-2.853	-2.272	-1.171	-1.913	-0.957	-1.547	-1.317	-2.093	1.606	-2.284	1.845	-3.858	-1.278	-4.95	2.206	-3.517	1.289	-2.28
NZSEGOO	3.337**	-1.257	1.523	-1.387	0.157	-1.279	0.729	-1.721	0.482	-1.208	1.394	-1.11	-2.258	-1.428	-4.760**	-1.981	-0.358	-1.533	2.560*	-1.424	0.038	-1.662	-0.162	-1.759
NZSEINT	2.961**	-1.305	2.084	-1.557	-0.389	-1.452	0.289	-1.657	-0.108	-1.198	3.090*	-1.618	-3.047*	-1.645	-4.289*	-2.583	-0.637	-1.697	1.694	-1.928	0.513	-1.957	0.139	-2.284
NZSEMIN	3.517	-2.195	-5.849	-3.655	0.236	-3.328	5.174**	-2.612	-0.938	-2.288	2.468	-2.864	3.344	-2.491	5.225	-3.477	-0.052	-3.307	4.054	-3.947	2.565	-3.871	-1.831	-2.41
NZSEPRM	-0.52	-1.694	-1.263	-1.485	-0.62	-2.066	3.346	-2.819	-1.181	-2.063	-0.203	-2.896	2.670*	-1.618	-3.107	-2.886	-3.242	-2.082	-0.756	-2.644	0.286	-2.137	1.493*	-0.85
NZSEPRP	-0.746	-0.575	-0.936	-0.745	-1.241	-1.016	0.399	-0.537	0.142	-0.551	-1.56	-1.407	-0.141	-0.909	-0.289	-0.748	-1.121	-0.855	-0.642	-1.55	1.798	-1.19	1.393	-1.035
NZSEPRT	-1.01	-1.641	-0.444	-1.238	-0.486	-1.56	-0.238	-1.24	1.386	-1.561	2.84	-2.313	0.485	-1.196	-1.374	-1.643	-0.754	-1.687	-2.283	-1.922	0.835	-1.417	3.570**	-1.807
NZSESRV	0.715	-1.74	-1.536	-1.246	0.67	-1.175	0.816	-1.004	-1.947	-1.772	-0.963	-1.655	1.202	-1.202	-2.427**	-1.156	-2.804	-1.892	-0.665	-1.439	1.144	-0.973	1.39	-1.094
NZSETRN	-2.166	-2.154	-1.865	-1.709	-2.252	-2.139	1.473	-2.564	3.316	-2.958	-1.405	-2.405	1.382	-1.387	-4.279**	-2.154	-6.836	-4.256	-1.119	-3.638	-0.301	-1.929	4.009**	-1.796
NZSETXT	-1.976	-1.919	-2.934	-3.412	-1.2	-2.081	-1.643	-4.409	3.447**	-1.139	-2.225	-1.884	0.232	-1.281	2.688	-2.378	-1.948	-2.059	0.034	-2.03	0.578	-3.164	-2.236	-2.148

Notes: Mean returns and their associated standard errors of mean are expressed in percentages. Mean returns which are statistically significant different from zero at the 5% and 10% levels are denoted with ** and *, respectively. The samples are monthly and start from October 1997 and end in March 2009.

TABLE 3: TEST OF MEAN DIFFERENCE

DataStream Code	Jan-Non Jan		Feb-Non Feb		Mar-Non Mar		Apr-Non Apr		May-Non May		June-Non June		Jul-Non Jul		Aug-Non Aug		Sep-Non Sep		Oct-Non Oct		Nov-Non Nov		Dec-Non Dec	
	Mean Differenc	Standard Error	Mean Differenc	Standard Error	Mean Differenc	Standard Error	Mean Differenc	Standard Error	Mean Differenc	Standard Error	Mean Differenc	Standard Error	Mean Differenc	Standard Error	Mean Differenc	Standard Error	Mean Differenc	Standard Error	Mean Differenc	Standard Error	Mean Differenc	Standard Error	Mean Differenc	Standard Error
market index																								
NZSEALL	2.22	-1.607	-0.349	-1.299	-0.816	-1.677	-0.946	-1.909	-0.431	-1.54	1.933	-1.398	-0.185	-1.824	-2.318	-1.55	1.583	-1.723	0.942	-1.629	-0.828	-1.516	-0.833	-1.805
NZ10CAP	0.89	-2.157	-1.428	-1.809	1.065	-1.909	2.574	-1.884	-2.337	-2.312	-0.542	-2.327	2.281	-1.998	-2.886	-2.371	-2.807	-2.289	-0.307	-2.252	1.789	-1.83	1.426	-1.758
NZMCAPC	-0.791	-1.887	-1.99	-1.6	-0.495	-1.74	0.869	-1.656	1.21	-1.514	-0.269	-2.025	0.964	-1.486	0.126	-1.41	-1.994	-1.802	0.482	-1.911	0.105	-1.629	1.852	-1.545
NZSMCIC	-0.18	-1.613	-1.969	-1.567	-1.393	-1.785	0.85	-1.778	0.454	-1.528	0.329	-1.624	1.717	-1.531	-0.031	-1.652	-1.418	-1.656	-0.017	-2.101	0.606	-1.825	1.197	-1.662
industry index																								
NZSEAGR	2.034	-1.922	0.412	-2.149	-3.094	-2.303	2.05	-2.069	-1.466	-2.307	0.237	-2.334	-0.273	-2.109	-3.644	-2.404	1.04	-2.766	2.636	-2.427	0.3	-2.078	-0.389	-2.587
NZSEBLD	1.86	-2.602	1.299	-2.481	2.437	-2.668	-4.318	-3.532	-0.995	-2.87	4.725*	-2.526	-3.72	-3.241	-0.302	-2.664	0.714	-3.456	-0.453	-3.31	0.874	-2.943	-2.416	-3.076
NZSECON	1.026	-1.881	2.304	-1.665	0.46	-2.149	1.169	-1.994	-2.909	-1.984	2.304	-1.96	-1.131	-1.861	-4.025	-2.533	1.432	-2.277	-1.25	-2.176	-1.166	-1.738	1.546	-3.082
NZSEENG	0.711	-1.839	-0.379	-1.649	-0.363	-1.679	0.452	-2.153	-1.809	-1.822	0.519	-1.491	-1.368	-2.069	-1.045	-2.003	1.228	-1.934	1.557	-1.837	-0.008	-1.789	0.352	-2.258
NZSEFIN	0.906	-2.023	-0.158	-1.747	-0.729	-2.162	-0.228	-2.147	-2.865	-2.636	1.231	-2.238	0.12	-2.214	-3.795	-2.317	3.731	-2.358	1.691	-2.285	1.554	-2.113	-1.595	-2.118
NZSEFOO	4.328*	-2.448	1.722	-2.418	2.248	-2.74	1.614	-3.029	-0.003	-3.059	-0.825	-2.532	0.497	-2.733	-5.818*	-3.232	-2.934	-2.736	3.094	-2.762	-2.138	-2.517	-2.354	-2.433
NZSEFOR	0.674	-3.559	-3.269	-3.059	-3.656	-3.463	-2.32	-3.622	-0.493	-3.431	-0.26	-3.257	-0.651	-3.526	2.525	-3.628	2.784	-4.696	-0.614	-5.488	3.202	-4.356	2.197	-3.532
NZSEGOO	3.361*	-1.977	1.374	-2.071	-0.121	-2.01	0.502	-2.342	0.233	-2.025	1.224	-1.97	-2.745	-2.14	-5.464**	-2.48	-0.68	-2.218	2.51	-2.086	-0.252	-2.251	-0.47	-2.317
NZSEINT	2.989	-2.227	2.028	-2.377	-0.681	-2.322	0.04	-2.507	-0.37	-2.254	3.105	-2.47	-3.564	-2.481	-4.913	-3.118	-0.945	-2.53	1.601	-2.616	0.307	-2.639	-0.102	-2.869
NZSEMIN	3.179	-3.847	-7.079	-4.722	-0.414	-4.537	4.955	-4.177	-1.687	-4.018	2.014	-4.344	2.966	-4.122	-6.345	-4.709	-0.724	-4.627	3.768	-4.959	2.136	-4.911	-2.679	-3.966
NZSEPRM	-0.288	-2.719	-1.102	-2.604	-0.397	-2.945	3.915	-3.518	-1.005	-3.014	0.059	-3.445	3.181	-2.74	-3.097	-3.574	-3.244	-3.014	-0.546	-3.339	0.594	-2.99	1.916	-2.326
NZSEPRP	-0.557	-1.159	-0.765	-1.244	-1.099	-1.406	0.692	-1.18	0.412	-1.233	-1.438	-1.714	0.105	-1.375	-0.056	-1.282	-0.961	-1.34	-0.443	-1.798	2.229	-1.517	1.786	-1.413
NZSEPRT	-1.328	-2.295	-0.709	-2.053	-0.755	-2.244	-0.479	-2.113	1.286	-2.299	2.866	-2.814	0.307	-2.09	-1.713	-2.349	-1.04	-2.38	-2.722	-2.477	0.693	-2.156	3.688	-2.388
NZSESRV	1.154	-2.194	-1.311	-1.862	1.105	-1.82	1.255	-1.775	-1.748	-2.259	-0.679	-2.179	1.674	-1.882	-2.269	-1.851	-2.679	-2.34	-0.358	-1.988	1.624	-1.705	1.894	-1.769
NZSETRN	-1.466	-3.347	-1.137	-3.105	-1.561	-3.338	2.5	-3.683	4.503	-3.933	-0.628	-3.689	2.401	-3.048	3.75	-3.425	-6.529	-4.891	-0.32	-4.365	0.576	-3.221	5.297*	-3.118
NZSETXT	-1.475	-3.153	-2.525	-4.144	-0.626	-3.627	-1.103	-5.003	4.428	-2.862	-1.734	-3.223	0.935	-2.94	3.604	-3.501	-1.434	-3.321	0.725	-3.218	1.322	-3.964	-1.761	-3.284

Notes: Mean differences and their associated standard errors are expressed in percentages. Mean differences which are statistically significant different from zero at the 5% and 10% levels are denoted with ** and *, respectively. The samples are monthly and start from October 1997 and end in March 2009.

3. EMPIRICAL APPROACHES AND RESULTS

We use usual *t*-tests to test the monthly effect hypothesis. We investigate the monthly effect by calculating returns during that month. To be specific, we calculate mean return on each month and mean return on other 11 months of the year. Then we calculate the difference of mean returns and use *t*-tests to test the statistical significance of mean return difference. For example, to test the January effect, the *t*-statistic is calculated as follows:

$$t = \frac{\overline{R}_{Jan} - \overline{R}_{NonJan}}{\sqrt{\dfrac{S^2_{Jan}}{n_{Jan}} + \dfrac{S^2_{NonJan}}{n_{NonJan}}}} \,, \tag{2}$$

where $\overline{R}_{Jan}$ is the mean return in January, $\overline{R}_{NonJan}$ is the mean return in the months other than January, S^2_{Jan} is the variance of January returns, S^2_{NonJan} is the variance of Non-January returns, and n_{Jan} and n_{NonJan} are the observation numbers of January returns and Non-January returns, respectively.

Before the *t*-tests, we present the mean returns of the 4 market and 16 industry indices on each month (from January to December) and their associated standard errors of mean in Table 2. The US studies document that returns appear to be abnormally high in January. The early Australian studies find that stock returns in Australia are highest in both January and July (Brown *et al.*, 1983; Brailsford and Easton, 1991).

However, as shown in Table 2, we find that returns on only 3 industry sectors (food, goods, and intermediary and durable) are positively significant at the 5% level in January and returns on the all companies index (NZSEALL) are positively significant at the 10% level. August is the worst month as 8 industry sectors and 2 market indices (NZSALL and NZ10CAP) have significantly negative returns. This result may be because New Zealand has the bitterest and rainiest season in August that may affect investor's behavior. By contrast, June is the best month as 5 indices have significantly positive returns in this month.

Table 3 reports the *t*-testing results of equation (2) for all the indices. It shows that there is no typical "January effect" in stock returns in New Zealand as only two sectors (food and good) have significantly larger returns in January than in other months. There is also no strong evidence of a monthly effect other than the January effect in the sample. For all the 4 market and 10 industry indices, stock returns in one month are not significantly different from those in other months. This result suggests that the stock market in New Zealand might generally be weak-form efficient (see Narayan, 2005). Similarly, for the all the indices, there are no anomalies in April. Therefore, the findings that there are no typical anomalies in both January and April are inconsistent with the tax-loss selling hypothesis as New Zealand has the April-March tax cycle. Our result is consistent with Hasan and Raj (2001) on the New Zealand stock market. In addition, we find that there are no difference in the monthly patterns of large stocks and small stocks.

4. CONCLUSION

Seasonal or calendar anomalies in equity markets have brought a widespread attention and considerable interests. During the past four decades, many researchers have documented evidence on monthly seasonality in stock markets around the world.

Although New Zealand is a small open economy as a member of OECD and has a well established stock market, research on seasonality is very limited. To the best knowledge of authors, only two articles (Keef and McGuinness, 2001; Hasan and Raj, 2001) examine stock returns seasonal anomalies. New Zealand, different from Australia and some other developed countries, has a financial year ending in March and has no capital gains tax.

To fill the gap, we study monthly patterns in stock returns in 4 market indices and 16 industry sector indices in the New Zealand stock market. We find that August is the worst month as 8 out of 16 industry sectors and 2 of the 4 market indices (NZSALL and NZ10CAP) have significantly negative returns. This result may be due to the fact that New Zealand has the bitterest and rainiest season in August which might adversely affect investor's mood. By contrast, June is the best month as 5 indices have significantly positive returns.

However, the *t*-test results shows that there is no typical "January effect" in stock returns in New Zealand as only two sectors (food and good) have significantly larger returns in January than in other months.

There is also no evidence of other-than-January monthly effect in the sample. For all the 4 market indices and 10 industry indices, stock returns in one month are not significantly different from those in other months. This result suggests that the stock market in New Zealand might generally be weak-form efficient. Similarly, for all the indices, there are no anomalies in April (the beginning of financial year). Therefore, the findings are inconsistent with the tax-loss selling hypothesis as New Zealand has an April-March tax cycle.

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