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# The impacts of tax reforms on REITs

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# The Impacts of Tax Reforms on REITs. An International Empirical Study

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**Abstract** Tax exemption is one of the REIT's most unique characteristics. To improve the development of REITs market, the Congress had passed several Tax Reform Acts. Plenty of previous study had already explored the effects of tax legislation changing on REITs market. However the findings had not come to consensus. This might because most of them explored this topic by event study, which cannot control other events happening on the even dates. This paper tries to avoid the complications encountered in previous research by investigating the tax reform effects through the normal panel model with the data in the United States and then retest the hypothesis by a novel empirical model with panel market data in both U.S. and Australia. The results provide evidence that the Tax Reforms would truly affect the REIT's performance with more solid empirical evidences. Furthermore, the results shed light on the tax policy and governance of a REITs market.

**Key words** REITs, tax benefits, international study

**JEL Codes:** C31, G28, R38

## 1. Introduction

Both experts in finance and economics have debates on the impacts of tax reforms on security markets for decades. Large quantities of research were discussing about the effects of the Tax Reform Acts in the US, such as the effects on economic condition, financial market, investors' strategy and the corporate structures of firms etc. We aim to investigate the impact of the taxation legislation changes on REITs markets by a novel method.

With pass-through tax treatment for federal income tax purpose, REIT has its own taxation benefits comparing to other Real Estate Operating Companies (RECOs) in public market or the Direct Real Estate Asset in private market. Back to the originality of REIT in 1960s, the legislation granted REITs the tax benefits that realty rents, unlike dividends received by other regulated investment companies, are not subject to at least one level of corporate taxation. Though the regulations had been amended for many times to conform to the real estate market condition, the tax-exemption nature of REITs remained largely similar as the initial rules. Tax effects on REITs have been studied, for example, Sanger *et al.* (1990)'s study on both the 1976 and 1986 Tax Reform Acts, Sinai and Gyourko (2004)'s work on the Taxpayer Relief Act in 1997, Elayan *et al.* (2006)'s event study on Self-Lease Back transactions of REITs during 1986 to 1999, Amromin *et al.* (2006)'s research on 2003 Dividend Tax Cut and so on. However the findings were mixed. We argue that one of the reasons is the lack of control in the studies. We test the hypothesis that REIT will gain more excess return after each tax reform than before it. The controls of changes besides the changed tax legislations will be made through a novel method, which is named as Global Funds Flow Control Model, in this paper. The global funds flow all around the world's investment markets. Without control, the impact of their flows might be misinterpreted as the effect of tax reform on REITs markets. By employing both the US and Australia REITs in this model, the performance of each REIT before and after the tax reforms will be compared. In this way, the impacts of the flowing global funds into the REITs market will be controlled and wiped from the effect of the tax reform.

This paper is arranged into five sections. The next section will introduce the Tax Reforms in the history and section 3 will provide a critical review on the previous literature on how tax affects the performance of REITs. Then the data, methodology and the empirical results of the test will be discussed in section 4. Lastly, section 5 presents the conclusions of this study.

## 2. Background of tax reform acts<sup>11</sup>

The US Congress had substantially taken actions to upgrade the original operating systems for REITs since the 1960s. There had been several Tax Reforms in the US, i.e. the Tax Reform Acts of 1976 and 1986, the REIT Simplification Act of 1997 and the REIT Modernization Act of 1999, the REIT Improvement Act of 2003, and the REIT Investment Diversification and Empowerment Act of 2007 etc., emphasizing provisions affecting REITs and direct real estate markets in U.S.

Among all of them, the first two reforms in 1976 and 1986 respectively did not focus on REITs only but affected the REITs market a lot. The previous researchers such as Sanger *et al.* (1990) had evidences to confirm this in their work. The REIT Modernization Act (RMA) of 1999 was hailed as the most significant legislation influencing REITs since it was established in 1960. Large quantities of research on REITs in 21st century had mentioned this structural break point and regarded it as

one of the most important ever happened to U.S. REITs market. Moreover both industry and media reports paid a lot of attention on this RMA. However the research, that is focus on the effects from this RMA, is not many, Howe and Jain (2004)'s work is the one of the few.

In this section, we review the basic changes of taxation legislations of those reforms mentioned above. The TRA 1976 was the first tax reform since REIT was born. It showed the culmination of efforts to taxation evolvments of REITs since 1973. Without changing the basic principles of REITs taxations, TRA 1976 just made the existing REITs taxation provisions more workable. Later the Tax Reform Act of 1986 was proved to have the great impacts on the REITs market before 1990s. The Act alters almost all provisions of U.S. tax law. Real estate is one of principal targets of TRA 1986. As the direct real estate assets lost their tax shelter value because of the last item listed above when comparing to others, therefore their values decreased as well (Sanger *et al.*, 1990). Besides as real estate asset is a type of realty with little depreciation, the decelerating depreciation write-offs item was useless for increasing the value of real estate asset. In this way, the TRA 1986 actually reduced the value of real estate firms comparing to others while to some certain push the investors from direct real estate market to REITs market. Meanwhile, REITs market might be boomed under several provisions concerning about the loosened restrictions on REIT's operation and being revenue neutral from a Treasury standpoint. The REIT Simplification Act (REITSA) of 1997 was the first specific tax reform for REITs market, which was contained in the Taxpayer Relief Act (TRA) of 1997. REITSA extended most changes of TRA1986 on REIT. Besides, it reduced the retention capital tax of REIT shareholders and loosened several other restrictions on REITs. As the most influencing tax reform of REITs, REIT Modernization Act (RMA) of 1999 was deemed to produce a positive wealth effect of its provisions for all REITs in the US. Later in 2004, REIT Improvement Act (RIA) of 2003 was signed by President Bush. The most affecting provision in RIA was the permit for REIT to operate its real estate business more efficiently for the benefit of its shareholders. After the burst of the global financial crisis in 2008, the Housing and Economic Recovery Act of 2008 was signed by President Bush. Ann the REITs Investment Diversification and Empowerment Act (RIDEA) of 2007 was contained in the Act. RIDEA changed the REITs tax rules slightly while the changes were deemed to be important for REITs to compete with other real estate companies in both international and domestic markets.

According to both government officials' words and comments from medias, the provision of all tax reform acts were expected to make positive effect for the development of REITs and the wealth growth of the REITs' investors. Table 1 summarizes the key provisions and their impacts of the tax reforms.

Table 1. The key provisions and the expected impacts of the tax reform acts

Name	Key dates	Major changes	Expected impacts
TRA 1976	Was signed on October 8, 1976	Loosening the organizational structure restriction on REIT	Would make the existing regulations on REITs more workable
TRA 1986	Was signed on October 24, 1986	1) allowing a REIT to provide customary services to its tenants; 2) reducing the depreciation deduction through an extension of the useful life and non-allowance of accelerated depreciation deductions;	1) would attract more customers for the underlying property of REIT by serving them; 2) would provide relative advantage for REITs as the direct real estate investment lost part of their tax strength
REITSA 1997	Was signed on August 5, 1997	1) allowing a REIT to provide small amount (less than 1% of the gross income) of otherwise impermissible services to the tenants; 2) allowing a REIT to retain the after tax proceeds of a taxable capital gain while maintain a single tax regime; 3) repealing the 30% gross income test for REITs while keeping the 100% excise tax on sales of dealer property largely intact	1) would help to attract caliber customers who appreciate the ancillary services; 2) would provide REIT an attractive source to fund capital; 3) would remove the barrier to a REIT for capitalizing on an opportunity of buying or selling a package of properties within four years
RMA 1999	Was signed on December 17, 1999; was enacted on January 1, 2001	1) allowing a REIT to own a taxable subsidiary and to provide ancillary services to the customers; 2) reducing the mandatory payout requirement from 95% of the earnings to 90%; 3) allowing hotel REIT to lease its hotels to a taxable REIT subsidiary and retain the operating profits associate with the lease; 4) allowing a healthcare REIT to hire a contractor	1) may enable REIT to generate higher revenues; 2) would increase the shareholders' wealth of mortgage REIT significantly while increase the equity REIT's shareholder's wealth slightly; 3) would be positive for hotel REITs;

		to operate its facilities within 6 years without pay corporate tax on such a facility;	4) would meet the longstanding demands of healthcare REIT
		5) other relaxation of regulatory guidelines.	
RIA 2003	Was signed on October 22, 2004	1) allowing a REIT to make certain loans and to make timber sales to qualify for a new safe harbor from the 100% prohibited transactions tax;	1) loosen the debt restriction of REITs and change the capital structure of REITs
		2) conforming the treatment of foreign shareholders trading REITs to that of foreign shareholders in other listed US companies	2) would put REIT at a competitive disadvantage in the market place
		1) allowing REITs to engage in a higher level of entrepreneurial activities through their taxable REIT subsidiaries;	1) would increase the gross income of the REITs;
RIDEA 2008	Was signed on July 30, 2008	2) enabling healthcare REITs to structure their investments similar to hotel REITs following RMA 1999;	2) would make positive impact on healthcare REITs for the usage of the facilities

Source: NAREIT Reports, including Edwards (1997), Edwards (1999), Edwards and Bernstein (2005) and Edwards and Bernstein (2008) etc.

### 3. Literature review

The impact of tax policy on real investment has been a question for a long time. The theoretical discussions are far more than the empirical work that directly examined the market's response to the treatments. The theoretical studies of tax incidence proposed that the tax legislations of the return on an asset would affect its price through the elasticity of both demand and supply for the asset. There are several arguments underpinning the theoretical models. Brennan (1970) proposed the first argument that the high-dividend firm would pay the penalty on its share price because the investors prefer low tax on their capital gains to the high dividend. However Miller and Scholes (1978) challenged that the marginal investors could be the tax-exempt institution so that the share price may not be able to reflect the shareholder taxes. Contemporarily, King (1977), Auerbach (1979) and Bradford (1981) also made their position that the investors would capitalize the dividend tax into the share price for all firms no matter it was the one that pay current dividends or not. Meanwhile Summers (1981) and Poterba (1984) developed models to support the argument of the capitalization of investor-level taxes into share prices. Furthermore the theoretical models of the impacts of taxes on the firm's cost of capital, capital structure and expected cash flow were also developed well in some studies, see Dhaliwal *et al.* (2005) for instance of cost of capital and Modigliani and Miller (1958), Modigliani and Miller (1963), Graham (1966) for example of capital structure and Ling and Whinihan (1984) for case of expected cash flow respectively. All the arguments above have strengths and weaknesses, thus the empirical examinations are needed.

Though not so much as the theoretical literature, the empirical investigations of tax impacts on real investment had been carried out recently followed three primary lines of inquiry. First most empirical work in the 1980s were undertaken to examine the influences of tax changes by simulation modeling to estimate the impacts on the firms' values, i.e. Fisher and Lentz (1986), Hendershott *et al.* (1986). Despite the extensive studies in this area (see the review of the simulation literature in Follain and Brueckner (1986)'s work), the estimations may not reflect the real impacts from tax changes because of including some potential simultaneous-equation bias Sanger *et al.* (1990).

Second, several investigations tested whether taxes caused the declines in share prices on ex-dividend day by examining the ex-dividend day share price behavior. Numerous studies supported the hypothesis and the methodology, for example, the work of Elton and Gruber (1970), Lakonishok and Vermaelen (1983), Poterba and Summers (1984), Barclay (1987) Lamdin and Hiemstra (1993), and Green and Rydqvist (1999), among others. There are mainly two major contradictory hypothesis in this area, one is the tax-clientele hypothesis proposed by Elton and Gruber (1970) while the other is the short-term trading hypothesis posited by Kalay (1982) and Miller and Scholes (1982). The puzzle of which hypothesis has better predicting ability still exists because of the persistence of several questions. For example, the price reactions might be offset by arbitrage trading (Kalay (1982)), some bias may also lie in the series of discrete prices (Bali and Hite (1998)), and also the uncontrolled test would mix the impacts from other nontax factors into the influence of tax on ex-dividend day share price movements (Frank and Jagannathan (1998)). Though Fama and French (1998) tried to make up the short-comings mentioned above by adopting a cross-sectional approach, focusing on prices rather than on returns. They proxied the market value of firm by its book value while controlling other expected future profitability. However the problem of lack of control of other factors on the ex-dividend day and bias from the information content of dividends still exist.

To overcome the obstacles mentioned above, some researchers tried to examine the share price effects of dividend taxes by focusing on REITs (see i.e. Sanger *et al.* (1990), Gentry *et al.* (2003), Howe and Jain (2004), Sinai and Gyourko (2004), Amromin *et al.* (2006), Li and Weber (2008), Edgerton (2009), among others). They employed long event windows to test

whether the tax legislation changes affect the REIT's return. The institutional features of REITs help to researchers to conquer the problem of asset's market value control by the straightforward nature of REITs and alleviate the management impacts by the restriction of the REIT's undertaken activities. Among all these studies, Sanger *et al.* (1990) examined the effects of TRA 1976 and 1986 on REIT's firm value and systematic risk. They found no significant influence from TRA 1976 while systematic risk decreased significantly over the time period surrounding TRA 1986. Hardin *et al.* (2002), Gentry *et al.* (2003), Whitworth and Carter (2005) and Li and Weber (2008) focused on examining REITs in the context of measuring their dividends. Their findings were mixed. Sinai and Gyourko (2004) investigate the REIT's performance under the influence of TRA 1997 by comparing REITs with different organizational structures. They concluded that the tax change would be capitalized into share prices substantially. Howe and Jain (2004) explored the impacts from RMA 1999 on both REIT's systematic risk and its shareholder wealth, and connected the RMA 1999 with both increase of shareholder's wealth and the decline of the systematic risk of REITs. All the studies faced another big challenge that the empirical results might be sensitive to the particular event windows employed and the other events happened on that day. Li and Weber (2008) suggest that to avoid this bias, the research should be designed not to depend on the changes in tax regimes over time. Thus, the effects of tax reforms may not be able to be examined through traditional methods. In most of these studies, the most severe shortcoming of event study method was admitted to be the difficulty to control for all nontax determinants of REIT's return.

In this study, we examine the effects of tax reforms on REITs through a novel method that controls the nontax factors of REIT's return, especially the global fund flow. By employing the Australia REIT as the control market, we are able to largely avoid the obstacles that complicate the interpretation of results from prior studies. Besides, different with the previous research, this study examines the effects of four tax reforms for REITs since the 1990s. Furthermore, because the data sample contains 34 REITs from both US and Australia, we are able to test the tax hypothesis without relying on domestic political regime changes. In effect, the REIT setting allows us to utilize panel tests that hold other firm-, economic- and time-period-specific factors constant.

#### 4. Methodology of research

##### 4.1. Data Description

This study explores the effects of tax reforms on REIT's return through a novel model, called Global Fund Flow Control Model. To illustrate the advantages and examine the hypothesis testing ability of the new method, we compare the traditional event study method with Global Fund Flow Control Model. Both of the two empirical methods are employed and the results are interpreted in the study. As demonstrated in section 2, there are four tax reforms for REITs in the United States up to now. In the event study of a regulatory change, the most challenging task is to identify the relevant event dates. Information about the legislative process usually flows continuously. Thus it is hard to detect on which exact day the event made the all its effects. We examine the legislative process in detail and check the dates on which the acts were signed. To reduce the uncertainty as much as possible in the test, we use event months instead of event dates in this study. According to the detailed information of each tax reforms, we collapse these months into five "events"<sup>1</sup>. A summary of these months and the related tax reforms is presented in Table 2.

Table 2. Event months relating to each tax reform acts

Event	Date	Event month	Related tax reform
1	August 5, 1997	August 1997	REITSA 1997 was signed
2	December 17, 1999	December 1999	RMA 1999 was signed
3	January 1, 2001	January 2001	RMA 1999 was signed
4	October 22, 2004	October 2004	RIA 2003 was signed
5	July 30, 2008	July 2008	RIDEA 2008 was signed

We collect our sample of REITs, stock return and bond yield, inflation rate data from DATASTREAM. We use the MIT center for real estate transaction based index data for the property market data in US and adopt the Property Council/IPD Australia Property Index for the property market data in Australia. Our sample consists of 20 US REITs and 14 Australia REITs that have the longest trading data series on DATASTREAM in each country. The time periods of both tests are from January 1971 through September 2009. Table 3 and Table 4 show the summary statistics of REITs' portfolio returns and excess returns respectively in each country on the five event months.

<sup>1</sup> As RMA 1999 is different with other tax reforms on that it was signed and enacted on two time point with long distance; we identify the signing and enactment of RMA 1999 as two events in this study.

Table 3. The portfolio returns of US and Australia REITs on each event month

		August 1997	December 1999	January 2001	October 2004	July 2008
US REITs	mean	0.0745%	0.0359%	-0.0067%	0.1581%	0.1396%
	Median	0.0171%	0.0181%	0.0111%	0.1747%	0.1699%
	Max.	1.3101%	0.5964%	0.6703%	0.3671%	1.2123%
	Min.	-0.3026%	-0.5377%	-0.8030%	-0.4010%	-0.9279%
	Std.dev	0.3474%	0.2902%	0.3328%	0.1738%	0.5597%
	Obs	20	20	20	20	20
Australia REITs	mean	0.9490%	0.0192%	0.2273%	0.1736%	-0.1967%
	Median	-0.2213%	-0.0323%	0.0539%	0.1567%	0.1224%
	Max.	10.0439%	0.8729%	1.4863%	0.9557%	0.4490%
	Min.	-0.5243%	-0.4583%	-0.1638%	-0.3844%	-2.4980%
	Std.dev	3.4176%	0.2962%	0.4871%	0.2848%	0.8425%
	Obs	9	14	14	14	14

Table 4. The excess returns of US and Australia REITs on each event month

		August 1997	December 1999	January 2001	October 2004	July 2008
US REITs	mean	0.3205%	-0.1394%	-0.1784%	0.1623%	0.2237%
	Median	0.2630%	-0.1572%	-0.1606%	0.1789%	0.2540%
	Max.	1.5560%	0.4211%	0.4986%	0.3712%	1.2963%
	Min.	-0.0567%	-0.7130%	-0.9748%	-0.3968%	-0.8438%
	Std.dev	0.3474%	0.2902%	0.3328%	0.1738%	0.5597%
	Obs	20	20	20	20	20
Australia REITs	mean	1.1989%	-0.1102%	-0.0253%	0.0201%	0.0267%
	Median	0.0286%	-0.1618%	-0.1986%	0.0032%	0.3458%
	Max.	10.2938%	0.7434%	1.2338%	0.8022%	0.6724%
	Min.	-0.2744%	-0.5877%	-0.4164%	-0.5379%	-2.2745%
	Std.dev	3.4176%	0.2962%	0.4872%	0.2848%	0.8425%
	Obs	9	14	14	14	14

Australia has the second matured REITs market, which was established in 1973, other than the United States. Besides the REITs market in Australia was developed on a stable basis without significant changes of the legislations. From this angle of view, both U.S. and Australia REITs markets should share the global economic, financial and political events during the investigation period. The employment of the excess return in this study helps to throw off the uncontrollable effects (i.e. global fund flow) from difference of the stock exchange markets. Figures 1 to 4 demonstrate the movements of REITs' excess returns<sup>2</sup> in each country during the four tax reforms<sup>3</sup>.

Besides the excess return, there are some other variables would be employed in this study, such as the return of underlying real estate asset, the government bond yield rate and the inflation rate of each country, the year when the legislation changed and the country where the REIT is listed. As the fixed cross sectional effect will be applied in the panel regression model to control the effects from firm-specific factors in the empirical test, the individual factor variables (i.e. the size, age, book-to-market value ratio etc.) of each REIT will not be employed in the model. Table 5 shows the legends of the variables. The government bond yield rate is proxied by 10-year US Treasury Bond Yield Rate for that in US and Australia Government Bond Yield Rate for that in Australia respectively; both series of data can be accessed from DATASTREAM; The inflation rate of each country is calculated by the annually changing percentage of CPI composite in each country. The data of composite CPI for each country can be accessed from DATASTREAM.

<sup>2</sup>the excess return of each REIT is calculated by the market return minus portfolio return of the REIT. By employing the excess return as the dependent variable in the Global Fund Flow Control Model, the impacts of the systematic risk from market on REIT can be wiped off.

<sup>3</sup>to make the figure clear enough to demonstrate the movements of REITs' excess returns, we divide the whole time period into four according to the four tax reforms. In this part, the signing and enactment of RMA 1999 were included into one tax reform. -1 year and +1 year of each event month were grouped into one single figure.

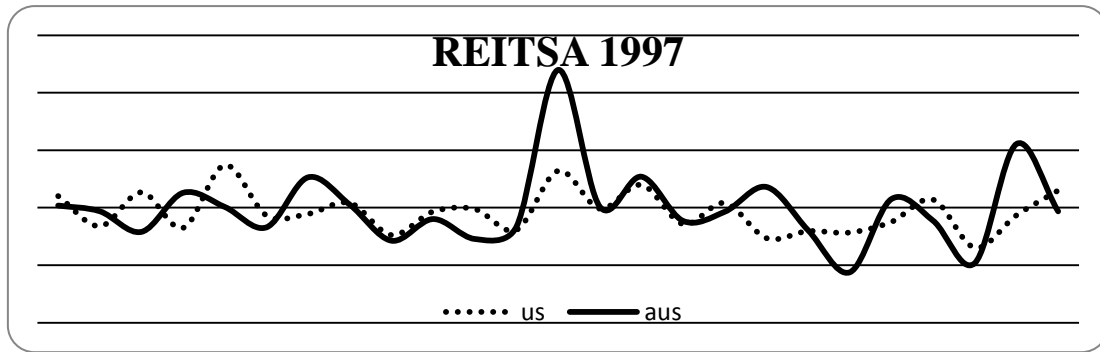


Figure 1. The movements of the selected REITs' excess returns in the U.S. and Australia before and after REITSA 1997

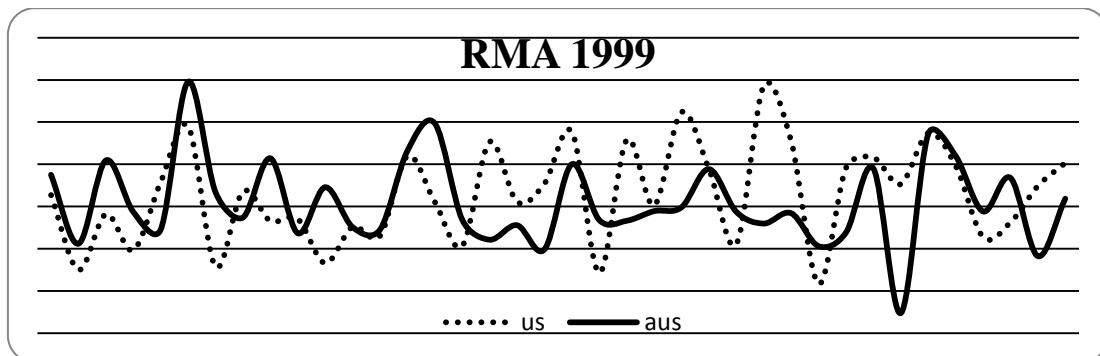


Figure 2. The movements of the selected REITs' excess returns in the U.S. and Australia before and after RMA 1999

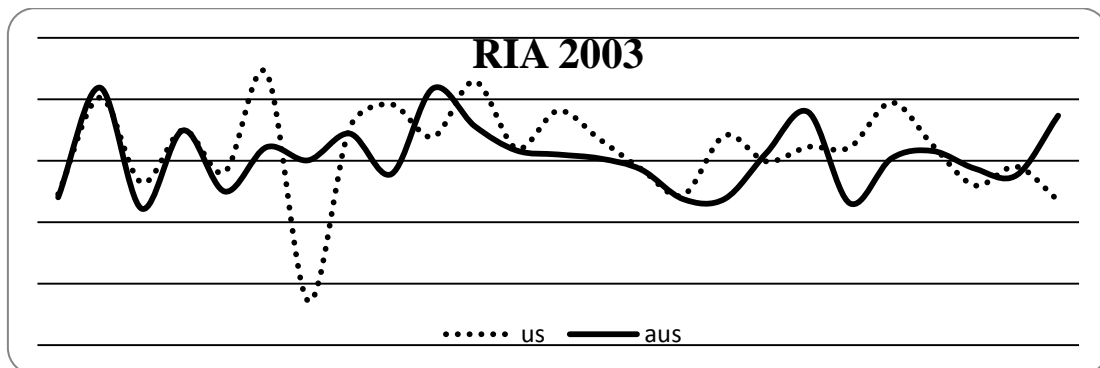


Figure 3. The movements of the selected REITs' excess returns in the U.S. and Australia before and after RIA 2003

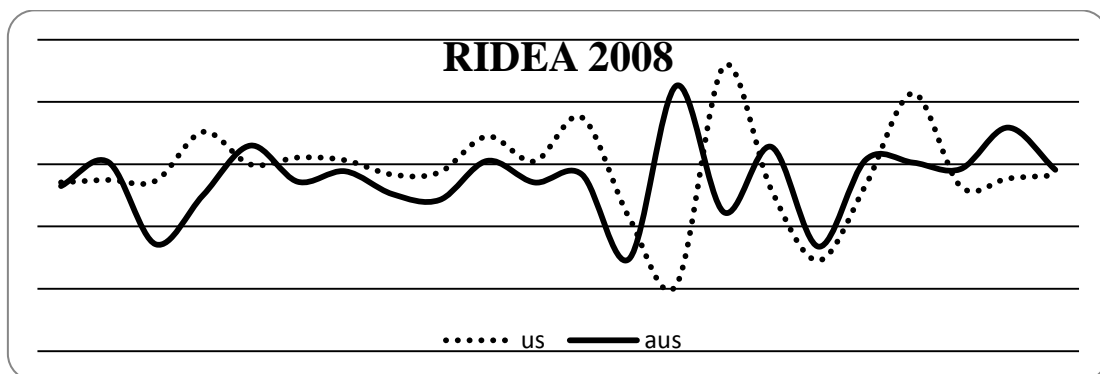


Figure 4. The movements of the selected REITs' excess returns in the U.S. and Australia before and after RIDEA 2008

The property return in US is proxied by the transaction based return index constructed by MIT center for real estate while that in Australia is proxied by the Australia Property Index published by Property Council/IPD in Australia.

Table 5. Descriptions of the Variables in the Empirical Model

Categories	Unit of measure	Descriptions
Dependent Variable:		
Excess return, exc_return	percentages	Excess return of REIT = Total return of the REIT – return of the stock market price index (on monthly basis)
Independent Variables:		
Asset Attributes		
Return of the real estate asset, property_return	percentage	The overall return rate of the property market in each country;
Economics Attributes		
Government bond yield rate, bond	percentages	Yield rate of 10-year US Treasury bond and AUS government bond;
Inflation rate, inf	percentage	The annual change of CPI in each country;
Country Attributes		
Country listed on, country	dummy variable	country=1if the REIT is listed on US market; country=0 otherwise;
Time Attributes		
Year of the legislation changed, year_i	dummy variable	Year_i=1 if the data obtained is in the period between the two legislation changed; year_i=0 otherwise.

\***Remarks:** the excess return of REIT is calculated by the difference of market return and portfolio return of the REIT. The return index of REIT and stock market price index can be access from DATASTREAM.

#### 4.2. Demonstration of the empirical models

Aiming at the reliability of the investigation results, we tests our hypothesis based on the data of four taxation legislation changes with two empirical models. One is named as Global Fund Flow Control Model while the other is the traditional event study model. With same panel of data, the testing results of two models show the evidences not only for the effects from taxation legislation changes on REITs but also the unique advantage of control experiment.

##### 1) Traditional event study method and the empirical results

In prior studies, the event study method is widely applied for the investigation of the impact of legislation changes or other incidents. It is believed to be an effective method although some shortcoming lying in it. Besides the lack of control for non-tax factor's effect, the inapplicability of the standard market model is another obstacle for the researchers to do the event study. Thus since Schipper and Thompson (1983), the multivariate regression model has been commonly employed to calculate the abnormal returns around the event dates.

We follow the extant literature and use a multivariate regression method based on the portfolio returns of REIT and stock market returns to calculate abnormal returns. The regression equation is:

$$portfolio\_return_{it} = \alpha + \beta \times market\_return_t + \sum_{n=1}^5 \gamma_{in} \times M_{nt} + \varepsilon \tag{1}$$

Where  $portfolio\_return_{it}$  refers to the portfolio return of the  $i$ th REITs at time  $t$ ,  $market\_return_t$  represents the monthly return of SandP 500 index at time  $t$  and  $M_{nt}$  is equal to 1 for each month in the event month and 0 otherwise. The subscript  $n$  runs from 1 to 5 to account for each of the five event months. The coefficients for the dummy variables represent the CAR (cumulative abnormal return) for the event window. Table 6 reports the CAR with respect to the event months in the tax legislation changes process.

As all the tax reforms aimed at conforming the development of REITs market to the real economic and financial conditions, we expect to find a positive market reaction for every event. As seen in Table 6, the results show only REITSA 1997 and RIDEA 2008 received significant positive market reactions (0.26% and 0.20% respectively as reported). The market reaction to RIA 2003 is positive but not significant while it to RMA 1999 (both sign and enactment) is negative and insignificant. It is believed that the uncontrolled uncertain factors may off-set or even affect the impact from legislation changes.



Table 6. CAR with respect to the event months in the tax legislation changes process

Variable	Event month CAR (%)
EVENT 1	0.26***
REITSA 1997 was signed	(2.6660)
EVENT 2	-0.12
RMA 1999 was signed	(-1.2217)
EVENT 3	-0.16
RMA 1999 was enacted	(-1.6203)
EVENT 4	0.15
RIA 2003 was signed	(1.5033)
EVENT 5	0.20**
RIDEA 2008 was signed	(1.9802)
OBS	20 (cross-sections); 441 (periods)
F-statistic	55.82
Adjusted R <sup>2</sup>	0.13

Notes: \*, \*\* and \*\*\* denote significantly different from zero at 10%, 5% and 1%.

Moreover, we look into the changes in systematic risk of the REIT over the time of tax legislation changes. We calculate the changes in systematic risk by the equation as followed:

$$portfolio\_return_{it} = \alpha + \beta \times market\_return_t + \chi \times YEAR\_DUMMY_{it} + \delta \times RISK\_CHANGE_t + \varepsilon_{it} \quad (2)$$

Where  $portfolio\_return_{it}$  refers to the portfolio return of the  $i$ th REITs at time  $t$ ,  $market\_return_t$  represents the monthly return of SandP 500 index at time  $t$ ;  $RISK\_CHANGE_t$  is the product of  $YEAR\_DUMMY_t$  and  $market\_return_t$ .  $YEAR\_DUMMY_t$  is equal to 1 during each period between the  $n$ th and  $(n+1)$ th events and 0 otherwise. The coefficient of  $RISK\_CHANGE$  captures the average change in the market beta during the period after each event and before the next event. The results are reported in Table 7.

Table 7. Changes in systematic risk of REITs

	MARKET_RETURN	YEAR_DUMMY	RISK_CHANGE
REITSA 1997	0.8519*** (37.2993)	-0.0007*** (-3.3850)	-0.4405*** (-4.7815)
RMA 1999 (signed)	1.1082*** (28.9200)	-0.0001 (-1.5519)	-0.4302*** (-9.1670)
RMA 1999 (enacted)	0.8889*** (38.1328)	0.0007*** (4.6524)	-0.6136*** (-8.4775)
RIA 2003	0.8100*** (36.8700)	-0.0001 (-0.9463)	0.2049* (1.7706)
RIDEA 2008	0.6412*** (26.5927)	-0.0004 (-1.5645)	0.9595 (16.8888)
Obs	8820 (including 441 periods and 20 cross-sections)		

Notes: \*, \*\* and \*\*\* denote significantly different from zero at 10%, 5% and 1%.

The positive market reaction to the tax reforms might be caused by the changes of other market factors, such as the decrease of the systematic risk. Therefore we explore the changes in systematic risk coincident with the event as well. The change in systematic risk associate with changed tax legislation could be either positive or negative. As seen in Table 7, the systematic risk for the sample fell 0.4405 after REITSA 1997, further fell 0.4302 after RMA 1999 was signed and then fell 0.6136 after RMA 1999 was enacted. As RIA 2003 was signed, the systematic risk raised 0.2049. No evidence shows the significant change of systematic risk caused by RIDEA 2008. The negative reaction of systematic risk of REIT represent that the new legislations have low correlations with the market portfolio while the positive reaction of it reflects the high correlation between the new legislation and market portfolio.

2) Global fund flow control model and the empirical results

As discussed, the event study method has limitations on controlling the factors other than tax legislation changes. Even though the analysis could be so detailed tested that every single event date was explored in the study, the method still could not access the reliable results without the controls. Therefore this study adopts a control experiment, which is widely applied in scientific research, to investigate how the changes of taxation legislation affect the REITs market. There is little research in economics or financial area employing the controlled research model. That may because the controlled samples in the two areas are too difficult to find. Thus a novel and more rigorous methodology will be applied in this study, which is probably the first empirical test on the effect of taxation legislation changes on REITs. First the effects from stock market on REIT's return are controlled by using the excess return of REIT as the dependent variable. In addition, same-date-event influences are controlled by an inter-temporal and a cross-sectional interaction variable in two countries in the empirical model. This model was initially established in Yiu (2010)'s work and has been intensively applied in Yiu (2007)'s work for the investigation of the property price gradients in Hong Kong and Macau, and Yiu (2009)'s work for the exploration on the impacts from implementation of pedestrian scheme on retail rents.

The empirical model in this study works in a panel model way. The excess returns of REITs in two countries (U.S. and Australia) and in two periods of time (one is before the taxation legislation reform while the other is after that) are collected and investigated as dependent variable in the regression model. The test will be taken by the steps listed as followed:

- A. The samples, both US and Australia REITs markets were established before 1980s, which means that their maturities are closed to each other. This would help to reduce data heterogeneity due to the maturity factor.
- B. The US and Australia REITs went through most big financial, economic and political events together during the sample period so that the same-year event effects on REITs could be controlled.
- C. The individual characteristics effects on REIT's return are controlled by incorporating REIT characteristic variables in regression model, including its age and size.
- D. The macroeconomic condition is also controlled in this test by the government bond yield rate in each country.
- E. Time factor is controlled by year dummy variables.

The REIT's excess return difference between the US-REIT (country) and AUS-REIT (1-country) during each period of the changing tax legislation are tested by incorporating the interaction terms in the regression models, as shown in the following equation:

$$\begin{aligned}
 exc\_return = & \alpha + \beta \times d(property\_return) + \delta \times d(BOND) + \gamma \times d(INF) \\
 & + \lambda_1 \times YEAR\_pre\_1997 \times COUNTRY + \lambda_2 \times YEAR\_1997\_1999 \times COUNTRY \\
 & + \lambda_3 \times YEAR\_1999\_2001 \times COUNTRY + \lambda_4 \times YEAR\_2001\_2004 \times COUNTRY \\
 & + \lambda_5 \times YEAR\_2004\_2008 \times COUNTRY + \lambda_6 \times YEAR\_1997\_1999 \times (1 - COUNTRY) \\
 & + \lambda_7 \times YEAR\_1999\_2001 \times (1 - COUNTRY) + \lambda_8 \times YEAR\_2001\_2004 \times (1 - COUNTRY) \\
 & + \lambda_9 \times YEAR\_2004\_2008 \times (1 - COUNTRY) + \varepsilon
 \end{aligned}
 \tag{3}$$

Where *exc\_return* refers to the excess return of the REIT, *property\_return*, *BOND* and *INF* represent the return of direct real estate, yield rate of government bond and inflation rate. The dummy variable *COUNTRY* is equal to 1 when the REIT is publicly traded in US and 0 otherwise. Each year dummy variable is equal to 1 when it is between the time period of *n*th and (*n*+1)th events and 0 otherwise. The models are estimated by the panel least squares method in this study.

Each model consists of several key variables which are employed in the model in the form of *YEAR<sub>i</sub> × COUNTRY* and *YEAR<sub>i</sub> × (1-COUNTRY)*, which represent the difference of REITs' excess returns in two countries, during the different period of taxation legislation changed. They measure the how much the REIT's excess return has changed by each period of tax legislation changed with all other factors controlled. As mentioned in the background, the tax legislation changing periods would be divided based on the RMA time table. Therefore we employ both key dates as time variables in this study, and two panel models are constructed for the investigation. By varying the omitted variable, the effect of each tax legislation change would be measured. As there are five independent periods of the changed tax legislations, five regression models will be constructed in this study. Table 8 reports the empirical results of the model for each period of tax legislation changed.

Most of the explanatory variables can explain the dependent variable well as we expected. The dependences of REIT's excess return on the return of its underlying real estate asset and inflation rate are consistent to the previous findings. Concerning the explanatory power of the interaction variables, we'd like to point that the omitted variable in this model is *YEAR\_PRE1997 × (1-COUNTRY)*, which refers to the period before Tax Reform Act of 1997 in Australia. And the results show US REITs were affected by the tax reforms during every other reform period comparing to the Australian REITs' performances during the period before 1997.

Table 8. Changes of excess return of REITs

Independent variables	Coefficient	t-statistic
Constant	-0.0015***	-4.6666
<u>Asset variables</u>		
Return of real estate asset (d(property_return))	0.003702**	1.901436**
<u>Economics variables</u>		
Bond yield rate (d(BOND))	0.004666	0.270642
Inflation rate (d(INF))	0.025223**	1.908358**
<u>Interaction variables of country and temporal effects</u>		
YEAR_PRE1997 × COUNTRY	-0.001331*	-4.041569*
YEAR_1997_1999 × COUNTRY	-0.002253*	-5.797525*
YEAR_1999_2001 × COUNTRY	0.002725*	5.325777*
YEAR_2001_2004 × COUNTRY	0.002354*	5.458326*
YEAR_2004_2008 × COUNTRY	0.001473*	3.397677*
YEAR_1997_1999 × (1-COUNTRY)	5.01E-05	0.148070
YEAR_1999_2001 × (1-COUNTRY)	0.001283*	2.570090*
YEAR_2001_2004 × (1-COUNTRY)	0.001900*	3.763284*
YEAR_2004_2008 × (1-COUNTRY)	0.001115**	2.199595**
Adjusted R-square	0.0092	
F-statistics	2.7889	
No. of Obs.	8498 (including 290 period observations and 34 cross-section observations)	
Dependent variable	Exc_return	
Omitted variable	YEAR_PRE1997 × (1-COUNTRY)	

Notes: \*, \*\* and \*\*\* denote significantly different from zero at 10%, 5% and 1%.

Meanwhile, the Australian REITs' performances altered over the period as well with different extents from US REITs. From the empirical results, the effect of each tax legislation change on REITs' return can be measured based on the logic of the equation as followed:

$$exc\_return = C + \sum_{i=1}^k \beta_i \times X_i + \lambda_1 \times YEAR1 \times US + \lambda_2 \times YEAR2 \times US + \lambda_3 \times YEAR2 \times AUSTRALIA + \varepsilon \tag{4}$$

Where Xi refers to the ith factor which need to be controlled in the empirical test; YEAR1 and YEAR2 refers to the time period before and after the tax reform respectively. In this study, we hope to find out the pure influence from the tax reform on US REIT's return, which can be calculate by the equation as followed:

$$\begin{aligned} influence &= (US_{year2} - US_{year1}) - (AUSTRALIA_{year2} - AUSTRALIA_{year1}) \\ &= (US_{year2} - AUSTRALIA_{year1}) - (US_{year1} - AUSTRALIA_{year1}) - (AUSTRALIA_{year2} - AUSTRALIA_{year1}) \\ &= \lambda_1 - \lambda_2 - \lambda_3 \end{aligned} \tag{5}$$

In this way, comparing any tax reforming key year with the base-line year, the three coefficients of the empirical model can tell the effect it made. Based on this model, we found that the influences from tax reforms on REIT's excess return were -0.09%, 0.28%, 0.18% and 0.17% from the events of REITSA 1997, RMA 1999 being sign and enacted, RIA 2003 respectively. Unfortunately, the effect of RIDEA 2008 cannot be measured by the model because the time period of the enactment of the Act is too short to be regressed in the model.

Although there is no test for the changes in systematic risk of REITs, the influence from the market risk is considered in the model. By employing the excess return of REIT as the dependent variable, the systematic return caused by the market movement is contained in the market return calculated by the stock market price index. Therefore even the systematic risk of REIT had made reaction to the tax legislation changes; the excess return movement would represent the changes. In this way, the effects from tax reform on REITs measured in this study are the sum of REIT's return and systematic risk.

From the empirical results based on two methods above, we can find evidence for the explanatory power of the changed tax legislation on REIT's return. Comparing the two method, we find that the latter one overcome the shortcoming of event

study method in being able to control the non-tax factors, such as the flow of global fund. In this way, the Global Fund Flow Model can capture the more exact effects of each tax reform on REITs than the event study method.

## 5. Conclusions

We present a novel method to test the tax hypothesis on REITs market by controlling the non-tax factors, i.e. global fund flow. Under the help of new method, we document the exact market reaction of REITs to the tax reforms. Major uncertainty caused by the event study method had been controlled and the undetectable effects are revealed in this study. The findings of this study are concluded from two of the most developed REITs markets thus would be helpful for the country which hope to establish REITs market or improve the poor performance of the existed REITs market. However in this study, we have not analyzed the effects from each changing item of the tax legislations. Limited by the data availability, the effects from changes of corporation tax, dividend tax and relaxation of regulatory requirements and investment restrictions have not been separately explored. Further research could examine them in the future.

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