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A Tourism Financial Conditions Index

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Abstract

The paper uses monthly data on financial stock index returns, tourism stock sub-index returns, effective exchange rate returns and interest rate differences from April 2005 – August 2013 for Taiwan that applies Chang's (2014) novel approach for constructing a tourism financial indicator, namely the Tourism Financial Conditions Index (TFCI). The TFCI is an adaptation and extension of the widely-used Monetary Conditions Index (MCI) and Financial Conditions Index (FCI) to tourism stock data. However, the method of calculation of the TFCI is different from existing methods of constructing the MCI and FCI in that the weights are estimated empirically. The empirical findings show that TFCI is estimated quite accurately using the estimated conditional mean of the tourism stock index returns. The new TFCI is straightforward to use and interpret, and provides interesting insights in predicting the current economic and financial environment for tourism stock index returns that are based on publicly available information. In particular, the use of market returns on the tourism stock index as the sole indicator of the tourism sector, as compared with the general activity of economic variables on tourism stocks, is shown to provide an exaggerated and excessively volatile explanation of tourism financial conditions.

Keywords: Monetary Conditions Index, Financial Conditions Index, Model-based Tourism Financial Conditions Index, Unbiased Estimation.

JEL: B41, E44, E47, G32.

1. Introduction

Despite political upheaval, economic uncertainty and natural disasters around the world in recent years, the global travel, tourism and hospitality industry, which is one of the world's leading economic and financial industries, has experienced continued growth. According to the World Tourism Organization (UNWTO), international tourist arrivals worldwide have more than doubled since 1990, rising from 435 million to 675 million in 2000, to 940 million in 2010, growing by a further 4% in 2012 to reach 1.035 billion, and forecast to increase by 3% to 4% in 2013. These figures are in line with the UNWTO long term forecast for 2030, namely 3.8% increase per year, on average, between 2010 and 2020. Moreover, tourism arrivals are expected to increase by 3.3% each year from 2010 to 2030, representing 43 million additional international tourist arrivals annually, reaching a total of 1.8 billion arrivals by 2030.

The latest annual findings from the World Travel and Tourism Council (WTTC) and Oxford Economics show that Travel & Tourism's contribution to GDP grew for the third consecutive year in 2012. The total contribution comprised 9% of global GDP (US $6.6 trillion) and generated over 260 million jobs, that is, 1 in 11 of global employment. With a stronger performance than the rest of the economy, the importance of the Travel &Tourism sector for economic growth and development is undisputed. In order to provide further support to enable accurate forecasts of the tourism and economic environments, a tourism index that is closely related to economic growth and development would be helpful to public and private decision makers, such as government, business executives and investors.

Recent years have seen increasing attention being paid to building tourism indexes for both the public and private sectors. For example, (i) the tourism industry stock index represents the performance of stocks of tourism-related firms listed on the stock market; (ii) the tourism index published by the World Economic Forum assesses the obstacles and drivers of Travel & Tourism development; (iii) the Travel and Tourism Competiveness Index (TTCI) (Blanke and Chiesa, 2013); and (iv) the statistical information of tourism listed on Tourism Bureau Executive Information System available on the government's website, are just a few of the available tourism-related indexes.

However, from the global economic viewpoint, in general, tourism is sensitive to the impacts from the international economic environment, such as price levels, exchange rates, interest rates, and industry promotion policies. On the other hand, as foreign visitors who travel to a country will purchase that country's tourist experience, the tourism industry is considered to be an export industry. The impacts arising from both exchange rates and interest rates affect the tourism and economic environments, such as the growth in international visitor arrivals, and domestic and international of business investment.

Therefore, a composite tourism indicator, taking account of both the economic and tourism environments as a whole, is desirable to assist in decision making for public and private policy makers. However, such an analysis pertaining to tourism indicators is limited. In order to incorporate greater information for purposes of forecasting future tourism and economic environments in a straightforward manner, this paper proposes a new tourism financial indicator, namely the Financial Tourism Conditions Index (TFCI).

The premise underlying the TFCI index is that it should be linked closely to both the economic and tourism environments. Therefore, three key components comprise the TFCI, namely the tourism industry stock index, exchange rate, and interest rate, which represent tourism performance, tourism demand and tourism capital costs, respectively.

The foundation of the proposed TCI is an application of the Financial Conditions Index (FCI), which is derived from the Monetary Conditions Index (MCI). As stated by the Bank of Canada, the MCI is an index number calculated from a linear combination of two variables, namely the short-run interest rate and an exchange rate, that are deemed relevant for monetary policy. Based on the MCI, the FCI takes account of an extra factor, namely real asset prices, such as house prices and stock prices, to assess the conditions of financial markets (see Beaton, Lalonde, and Luu, 2009; Brave and Butters, 2011; Ericsson, Jansen, Kerbeshian, and Nymoen, 1997; Freedman, 1994, 1996a, b; Hatzius, Hooper, Mishkin, Schoenholtz, and Watson, 2010; Lin, 1999; and Matheson, 2012).

The aim of this paper is to construct a Tourism Financial Conditions Index (TFCI) to summarize current economic conditions into a single statistic. The components of the coincident indicators (CI) are the following: industrial production index (2006=100), electric power consumption (billion kWh), index of producer’s shipment for manufacturing (2006=100), sale index of wholesale retail and food services (2006=100), nonagricultural employment (1,000), real customs-cleared exports (NT$ billion), and real machinery and electrical equipment import (NT$ billions) (Council for Economic Planning and Development, Taiwan).

The remainder of the paper is structured as follows. Section 2 explains the proxies for analyzing the tourism and economic environments. Section 3 presents the model-based approach and estimation method for constructing the TFCI. Section 4 describes the data used in the analysis, and presents the descriptive and summary statistics. Section 5 discusses the empirical results. Section 6 concludes the paper by summarizing the key empirical results and findings.

2. Definitions and Construction of MCI and FCI

In this section we describe the foundations of the Tourism Financial Conditions Index (TFCI), which is an adaptation and extension of the widely-used Financial Conditions Index (FCI). The FCI, in turn, is derived from the well-known Monetary Conditions Index (MCI). For an application of some of these ideas to daily data, including modelling the volatility that is inherent in daily data, see Chang (2014).

2.1 MCI

Freedman (1994, 1996a, 1996b) discussed the units of measurement of the MCI in terms of real interest rate changes. The MCI is defined deterministically as:

$$MCI_t = \theta_1(e_t - e_0) + \theta_2(r_t - r_0). \quad (1)$$

The subscripts *t* and *0* denote the current and base periods, respectively, and θ_1 and θ_2 are the weights attached to real effective exchange rates (e) (in logarithms) and real interest rates (*r*), respectively. The presentation of MCI in equation (1) is linear, though this is not essential. The weights on the components of the MCI (that is, θ_1 and θ_2) are the results of empirical studies that estimate the effect on real aggregate demand over six to eight quarters of changes in real exchange rates and real interest rates. Typically, in analyzing the constructed values of MCI, there is no allowance made for the fact that the weights in equation (1) are estimated from other studies, and hence contain sampling variation. An exception to the general rule is Chang (2014), who analyses the conditional volatility in daily economic and financial data series.

Based on equation (1), the MCI may be interpreted as the percentage point change in monetary conditions arising from the combined change in real exchange rates and real interest rates from the base period. As the MCI is measured relative to a given base period, subtracting the MCI at two points in time gives a measure of the degree of tightening or easing between these two points. Lack (2003) discusses the experience of various countries that have used the MCI as an operating target, such as Canada and New Zealand.

2.2 FCI

Owing to the recent high volatility in stock and property prices, the influence of asset prices on monetary policy has drawn greater attention of policy makers. Significant efforts have been made recently to extend additional asset variables, such as stocks and housing prices into the MCI as a new indicator, namely the Financial Conditions Index (FCI) (see Goodhart and Hofmann (2001) for the G7 countries, Mayes and Virén (2001) for 11 European countries, and Lack (2003) for Canada and New

Zealand).

Just as in the case of MCI, the FCI reveals the offsetting influences among real effective exchange rates, real interest rates, and real asset prices. The FCI is defined deterministically as:

$$FCI_t = \theta_1(e_t - e_0) + \theta_2(r_t - r_0) + \theta_3(a_t - a_0). \qquad (2)$$

As in the case of the MCI, the subscripts *t* and *0* denote the current and base periods, respectively, and θ_1, θ_2, and θ_3 are the weights attached to real effective exchange rates (*e*) (in logarithms), real interest rates (*r*), and real assets (*a*) (in logarithms), respectively. Furthermore, the relative weights on the components of the FCI, namely θ_1, θ_2, and θ_3, are the outcomes of empirical estimation. The presentation of FCI in equation (2) is linear, though this is not essential. As in the case of MCI, when analyzing the alternative constructed values of FCI, there is no allowance made for the fact that the weights in equation (2) are estimated from other studies, and hence contain sampling variation. The exception to the rule would seem to be the analysis in Chang (2014).

3. A Model-based TFCI

The MCI and FCI are constructed in such a way that the respective weights are first obtained from a separate empirical model, and are then used to construct a data series using the definitions given in equations (1) and (2), respectively. This is in marked contrast to the approach taken in this paper, whereby model-based estimates of the

TFCI are calculated directly from empirical data. Such a contrast is explained in greater detail in this section.

The Tourism Financial Conditions Index (TFCI) proposed in this paper focuses on economic activities related to the tourism industry. The three components of the proposed monthly TFCI, each of which can be constructed from publicly available data, are as follows:

(1) monthly returns on nominal effective exchange rates (REE);

(2) monthly differences in the one-year interest rates (DIR);

(3) monthly returns on the Taiwan Composite Coincident Index (RTCC).

Unlike the construction of the MCI and FCI, where the weights are based on a wide range of considerations rather than using direct model-based estimates, the TFCI is based on estimation of a linear regression model. The model-based weights for the returns on nominal exchange rates, the differences in the interest rate, and the returns on the Taiwan composite coincident index, will be estimated by OLS.

As the models to be estimated below are linear in the variables, with the appropriate weights to be estimated empirically, the percentage change in a variable is used to denote simple returns rather than logarithmic differences (or log returns). The latter would be more appropriate for calculating continuously compounded returns.

Accordingly, TFCI is defined as:

$$TFCI_t = c + \theta_1 REE_t + \theta_2 DIR_t + \theta_3\, RTCC_t + u_t\ ,\ \ u_t \sim D(0, \sigma_u^2\ ) \qquad (3)$$

where c denotes the constant term, and u denotes the shocks to TFCI, which need not be independently or identically distributed. The parameters $\theta_1,\ \theta_2$ and θ_3 are the weights attached to effective exchange rates, interest rates and the composite coincident stock index, respectively. Unlike the standard approach to estimating MCI and FCI, in this paper the weights will be estimated empirically and explicit allowance can be made for the sampling variation in the parameter estimates.

As TFCI is unobservable, it is necessary to relate TFCI to observable data. The unobservable variable is defined as being the conditional mean of an observable variable, namely the returns on a Tourism Stock Index, RTS, which reflects the tourism industry stock index that is listed on the Taiwan Stock Exchange (specifically, the Taiwan Stock Exchange Over the Counter Tourism Subindex), as follows:

$$RTS_t = TFCI_t +\ v_t\ \ ,\ v_t \sim D(0, \sigma_v^2\ ) \qquad (4)$$

where RTS is observed, TFCI is not observed, and the measurement error in RTS is denoted by v, which need not be independently or identically distributed.

Given the zero mean assumption for v, the means of RTS and TFCI will identical, as will their estimates. Using equations (3) and (4), the empirical model for estimating the weights for TFCI is given as:

$$RTS_t = c + \theta_1 REE_t + \theta_2 DIR_t + \theta_3 RTCC_t +\ u_t\ +\ v_t\ , \qquad (5)$$

$$\varepsilon_t = u_t + v_t \sim D(0, \sigma_\varepsilon^2)$$

where $\varepsilon_t = u_t + v_t$ need not be independently or identically distributed.

The parameters in equation (5) can be estimated by OLS to yield unbiased and consistent estimates of RTS. In view of the definition in equation (4), the unbiased and consistent estimates of RTS will also be unbiased and consistent estimates of the unobservable TFCI.

This paper proposes unbiased and consistent estimation of TFCI in equations (3) and (5) by Ordinary Least Squares (OLS), with consistent Newey-West HAC standard errors to accommodate the possibility of serial correlation and heteroskedasticity in the errors in equation (5).

4. Data

In this section we present the data used for the empirical analysis. Monthly data are used from April 2005 to August 2013. The sources of data are the Taiwan Stock Exchange (TWSE), Taiwan First Bank and Taipei Foreign Exchange Market Development Foundation for the tourism industry stock index, one-year deposit rate, and the nominal effective exchange rate, respectively.

As discussed in Section 3 above, the observable variables that will be used to estimate the unobservable monthly TFCI are as follows (see Table 1):

(1) monthly returns on the Taiwan Stock Exchange Over the Counter Tourism

Subindex, which reflects the tourism industry stock index (RTS);

(2) monthly returns on nominal effective exchange rates (REE);

(3) monthly differences in the one-year interest rates (DIR);

(4) monthly returns on the Taiwan Composite Coincident Index (RTCC).

These data will be used to estimate equation (5) by OLS. The estimates of monthly RTS in equation (5), which are equivalent to the estimates of monthly TFCI, are defined as TFCI(OLS).

[Table 1 goes here]

[Figure 1 goes here]

The time series plots in Figure 1 are instructive. The returns on the tourism stock index, RTS, exhibit standard stock market returns, with some volatility clustering, namely periods of relatively high volatility interspersed with periods of relatively low volatility. The lowest value of RTS occurs at the end of 2008. The returns on nominal effective exchange rates, REE, exhibit similar patterns of variation to those of RTS, with some periods of relatively high volatility mixed with periods of relatively low volatility. The differences in interest rates, DIR, have relatively small variations, apart from a large negative spike at the end of 2008. The returns on the Taiwan composite coincident index, RTCC, are reasonably smooth throughout the sample period, apart from a sharp fall at the end of 2008, followed by an even larger positive correction during 2009.

The descriptive statistics of the variables that are used to estimate the parameters in equation (5) are given in Table 2. There are 100 monthly observations in total. The means and medians of the four variables are reasonably close to zero. Aprt from REE, three of the four distributions are found to be significantly different from the normal distribution, as shown by the Jarque-Bera Lagrange multiplier test of normality. This is not particularly surprising for daily tourism stock returns, interest rate differences, or composite coincident index returns. The departures from symmetry and (especially) kurtosis suggest significant departures from what would be expected under normality for three of the four variables, with REE being the exception.

[Table 2 goes here]

Estimation of TFCI, as defined in Table 1, will be examined in the next section to determine an unbiased estimate of TFCI for purposes of sensible public and private policy considerations that focus on economic activities that are related to the tourism industry, using information on nominal effective exchange rates, one-year interest rates, and returns on the Taiwan composite coincident index.

5. Empirical Results

This section discusses the estimates of the daily TFCI based on the regression model in equation (5) that relates RTS to REE, DIR, and RTCC. Estimation of the model in equation (5) by OLS is undertaken using the EViews econometric software package.

The descriptive statistics of the estimated daily TFCI from equation (5) are given in the last column of Table 2, where the estimates are given as TFCI(OLS). The OLS estimates of TFCI are given in Figure 2. The mean of TFCI(OLS) is identical to that of RTS, as expected, but the medians are different. The range, or difference between the largest and smallest TFCI estimates, is much smaller for TFCI(OLS) than for RTS. The distribution of TFCI(OLS) is found to be significantly different from the normal distribution, as shown by the Jarque-Bera Lagrange multiplier test of normality. The departure from symmetry is relatively small, but the kurtosis suggests a significant departure from what would be expected under normality.

[Figure 2 goes here]

The time series plots of the OLS estimates of TFCI, TFCI(OLS), resemble the plots of the Taiwan composite coincident index, RTCC. These two variables are given in Figure 3, where it is clear that the overall pattern of TFCI(OLS), though not the extreme values observed in 2008 and 2009, are tracked reasonably accurately by the variations in RTCC.

[Figure 3 goes here]

The OLS estimates of TFCI obtained from equation (5) are given in Table 4. The nominal effective exchange rate returns have a positive but insignificant impact on the estimated TFCI, while the one-year interest rate difference has a significant negative effect. The returns on the Taiwan composite coincident index, RTCC, have a significant and positive effect on the estimated TFCI, using both the OLS and robust Newy-West HAC standard errors. It is not surprising that the composite coincident index should have a statistically significant impact on the tourism stock index returns as the composite coincident index is based on the industrial production index, electric power consumption, index of producer’s shipment for manufacturing, sale index of wholesale retail and food services, nonagricultural employment, real customs-cleared exports, and real machinery and electrical equipment import. Finally, the Jarque-Bera Lagrange multiplier statistic for normality indicates that the residuals from the OLS regression are not normally distributed.

[Table 3 goes here]

The differences in the magnitudes of RTS and the OLS estimates of TFCI, TFCI(OLS), which is equivalently an estimate of RTS from equation (5), indicate the importance of the model-based estimates of TFCI in discussing the tourism sector. The use of RTS as the sole indicator of the tourism sector, as compared with the general activity of the economic variables on the tourism stock variable, would seem to provide an exaggerated and excessively volatile explanation of tourism financial conditions. The use of the estimated TFCI, TFCI(OLS), exhibits far less volatility than does RTS, as can be seen clearly in Figure 5.

[Figure 4 goes here]

6. Conclusion

The paper used monthly data on composite coincident index returns, tourism stock sub-index returns, nominal effective exchange rate returns and one-year interest rate differences from April 2005 to August 2013 for Taiwan to construct a novel monthly tourism financial indicator, namely the Tourism Financial Conditions Index (TFCI).

The TFCI is an adaptation and extension of the widely-used Monetary Conditions Index (MCI) and Financial Conditions Index (FCI) to the tourism industry stock data that is listed on the Taiwan Stock Exchange (specifically, the Taiwan Stock Exchange Over the Counter Tourism Subindex). However, the method of calculation of the monthly TFCI is different from existing methods of constructing the MCI and FCI in that the weights are estimated empirically from a regression model using publicly available data. The empirical results showed that TFCI can be estimated quite accurately using a regression model to explain the tourism stock index returns.

The monthly TFCI is straightforward to use and interpret, and provides interesting insights in predicting the current economic and financial environment for tourism stock index returns. The use of returns on the tourism stock index as the sole indicator of the tourism sector, as compared with the general activity of the economic variables on the tourism stock variable, was shown to provide an exaggerated and excessively volatile explanation of tourism financial conditions.

Overall, the empirical findings should be helpful for public and private decision makers, such as government, business executives and investors, as the TFCI provides useful insights that can be based on straightforward calculations and interpretations of publicly available information.

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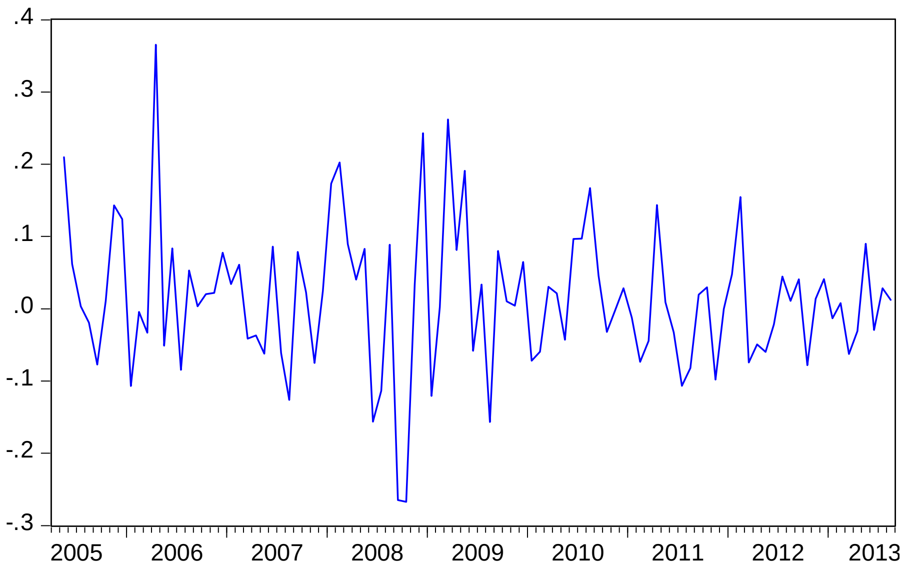
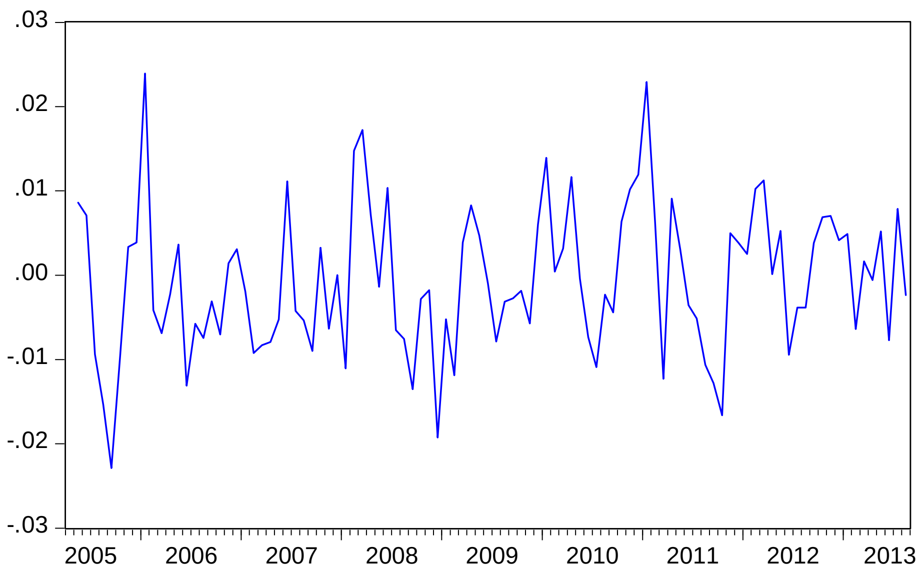
Figure 1

Time Series Plots for April 2005 – August 2013

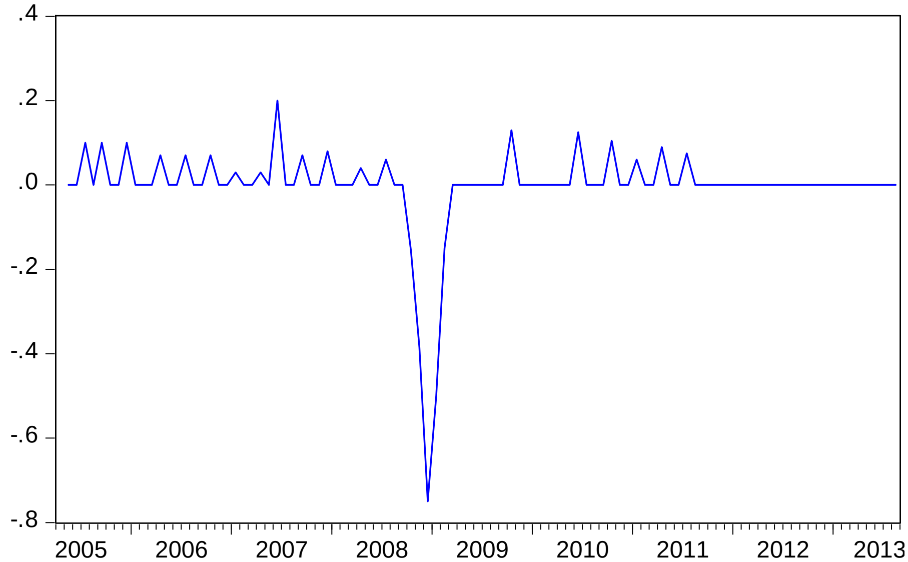
(a) Returns on Tourism Stock Index (RTS)



(b) Effective Exchange Rate Returns (REE)



(c) Differences in Interest Rates (DIR)



(d) Returns on the Taiwan Composite Coincident Index (RTCC)

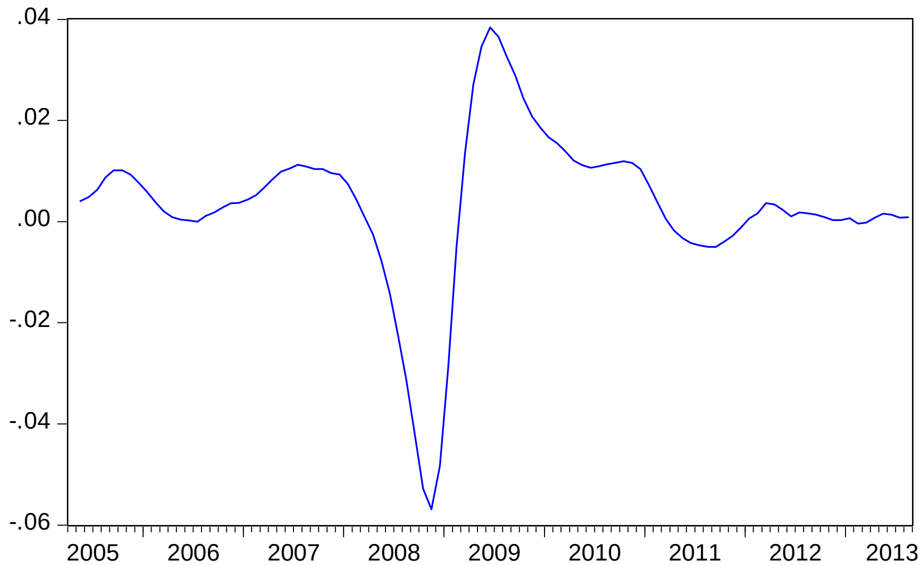


Figure 2

OLS Estimates of TFCI for April 2005 – August 2013

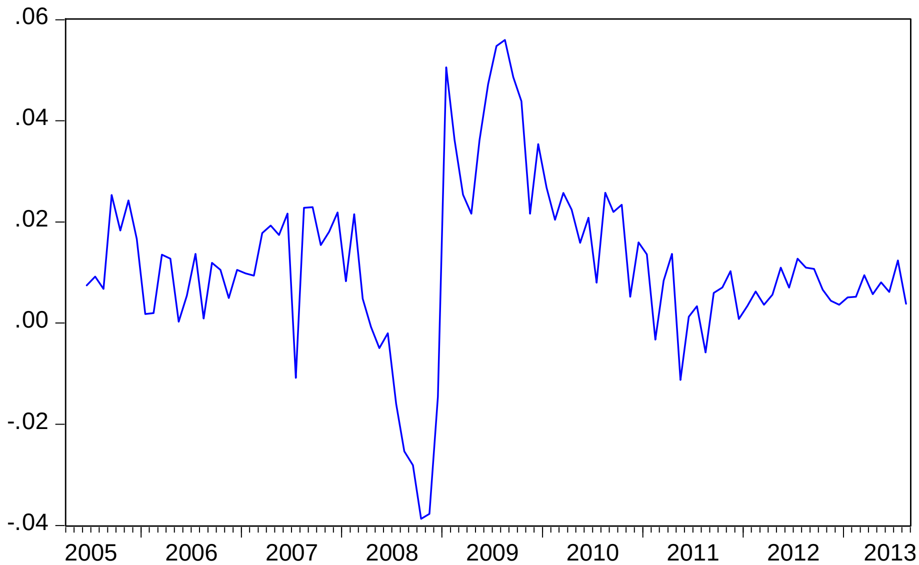


Figure 3

RTCC and OLS Estimates of TFCI for April 2005 – August 2013

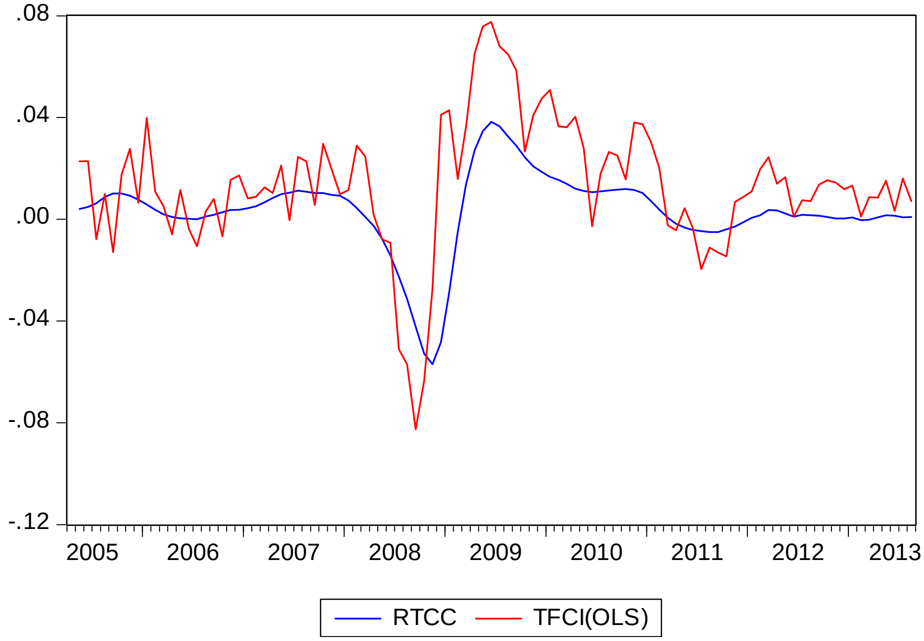


Figure 4

RTS and OLS Estimates of TFCI for April 2005 – August 2013

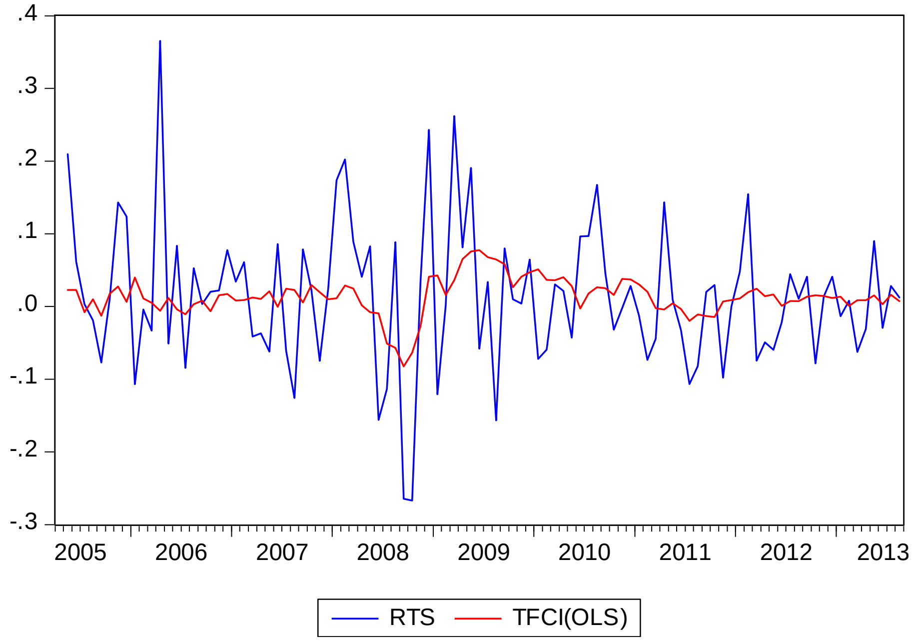


Table 1

Description of Variables

Variables	**Description**
RTS	Monthly returns on Taiwan Stock Exchange Over the Counter Tourism Subindex
REE	Monthly returns on nominal Effective Exchange Rates
DIR	Monthly Differences in the one-year Interest Rates
RTCC	Monthly returns on the Taiwan Composite Coincident Index
TFCI	Unobservable monthly Tourism Financial Conditions Index
TFCI(OLS)	OLS estimates of monthly Tourism Financial Conditions Index

Table 2

Descriptive Statistics for RTS, REE, DIR, RTCC and OLS Estimates of TFCI for April 2005 – August 2013

Variables	RTS	REE	DIR	RTCC	TFCI (OLS)
Mean	0.0135	-0.0007	-0.0034	0.0032	0.0135
Median	0.0109	-0.0018	0	0.0036	0.0129
Maximum	0.3656	0.0239	0.2	0.0384	0.0776
Minimum	-0.2671	-0.0229	-0.75	-0.0569	-0.0826
Std. Dev.	0.0996	0.0087	0.1087	0.0155	0.0257
Skewness	0.3766	0.2359	-4.5781	-1.4368	-0.5539
Kurtosis	4.624	3.1187	28.9964	7.6571	5.5369
Jarque-Bera	13.353	0.986	3165.2	124.78	31.93
Prob-value	0.0013	0.6107	0	0	0
Sum	1.3539	-0.068	-0.335	0.3218	1.3539
Sum Sq. Dev.	0.9822	0.0075	1.17	0.0237	0.0655
Observations	100	100	100	100	100

Table 3
OLS Estimates of TFCI for April 2005 – August 2013

Parameters	OLS
Constant	0.0076 (0.01) [0.01]
θ_1	0.898 (1.159) [1.059]
θ_2	-0.187 (0.11)* [0.147]
θ_3	1.847 (0.771)** [1.107]*
Diagnostics	
Adjusted R^2	0.375
F-statistic	2.286*
Jarque-Bera	15.42**

Notes: The dependent variable is RTS, the returns on the Taiwan Stock Exchange Over the Counter Tourism Subindex. The numbers in parentheses [brackets] are standard OLS and robust Newey-West HAC standard errors. ** and * denote the estimated coefficients are statistically significant at the 1% and 10% levels, respectively.