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The real exchange rate and the balance of trade in US tourism

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ABSTRACT

This paper investigates the effects of the real exchange rate and income on US tourism export revenue and import spending with quarterly data for the floating exchange period from 1973 to 2010. Separate estimates of export revenue and import spending functions prove more revealing than estimates of the trade balance. Vector autoregressions capture dynamic adjustments to exchange rate and income shocks. Depreciation raises US tourism export revenue but does not affect import spending. US tourists going abroad respond to income while foreign tourists coming to the US do not.

1. Introduction

Tourism is a growing component of the US trade balance in the international current account. The US has had a surplus in tourism since the 1990s with tourism receipts accounting for over 5% of export revenue in 2010. The US ranks first in tourism receipts and second in spending (UNWTO, 2011).

Following depreciation the trade balance may exhibit a J-curve, falling at first due to set contracts but rising over time. Empirical evidence on the J-curve is mixed. There are J-curve studies at the industrial trade level but the present is the first to explicitly examine tourism trade. Tourism might be more sensitive to exchange rates than other trades.

The present paper estimates US tourism export revenue and import spending separately with quarterly data from 1973 through 2010. The following section discusses the theoretical framework with export revenue and import spending functions of the real exchange rate and income. A review of the applied J-curve literature on disaggregated data follows. The third section presents the vector autoregressive model followed by a section on results.

2. Theoretical framework

Socher (1986) makes the point that tourism had not been explicitly integrated into trade theory as has more recently been done by Hazari and Ng (1993), Hazari (1995), Hazari and Nowak (2003), and Hazari and Sgro (2004).

Vogt (2008) estimates US tourism export and import demands with annual data from 1973 to 2002 in partial adjustment models with error correction. Vogt finds that US tourists are more sensitive to the real exchange rate while foreign tourists to the

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US are more sensitive to real income. Results differ in the present study with quarterly data extended through 2010 and vector autoregressive methods, revealing foreign tourists to the US are more sensitive to the exchange rate while US tourists are more sensitive to income.

The present study adopts a two-country partial equilibrium model between the US and the rest of the world ROW. International and domestic tourism are imperfect substitutes especially for cultural and natural resource attractions. The present assumption of imperfect substitutes follows Rhomberg (1973), Magee (1975), Goldstein and Khan (1985), and Rose and Yellen (1989).

Dollar depreciation raises the price of foreign tourism for US tourists. Depreciation also lowers the foreign currency price for foreign tourists coming to the US. US demand for tourism abroad and foreign demand for tourism in the US are assumed to depend on respective incomes.

Various measures have been put forth to investigate the effects of depreciation on the trade balance. Goldstein and Khan (1978) and Rosenweig and Koch (1988) examine volume indices while Houthakker and Magee (1969), Senhadji (1998a), and Senhadji and Montenegro (1999) utilize real export revenue and import spending. Rose (1991) examines the difference between export revenue X and import spending M in $BOT = X - M$, and Demirden and Pastine (1995) and Senhadji (1998b) utilize the ratio of the trade balance to national income BOT/Y.

Haynes and Stone (1982) propose the ratio X/M as utilized by Bahmani-Oskooee and Brooks (1999), Boyd, Caporale, and Smith (2001), and Onafowora (2003). The present study similarly defines the tourism trade balance B as the ratio of export revenue X to import spending M. With lower case letters indicating natural logarithms, $b = x - m$. A rise in the real exchange rate $R = EP^*/P$ would lower the quantity of imports and raise the quantity of exports. In natural log form, the real exchange rate is $r = e - p + p^*$.

Export revenue and import spending functions are specified as:

$$x = a_0 + a_1 y^* + a_2 r + \varepsilon \tag{1}$$

$$m = b_0 + b_1 y + b_2 r + \nu \tag{2}$$

where y and y^* are home and foreign incomes. The trade balance becomes:

$$b = (a_0 - b_0) + a_1 y^* - b_1 y + (a_2 - b_2) r + (\varepsilon - \nu). \tag{3}$$

The Marshall–Lerner coefficient $(a_2 - b_2)$ is the condition for depreciation to raise the trade balance. The sum of the absolute values of elasticities of export and import demands must exceed unity, assuming balanced trade initially.

The J-curve effect is the hypothesis that the balance of trade falls immediately following a depreciation due to previously arranged contracts but rises after an adjustment lag as developed by Magee (1973) and Junz and Rhomberg (1973) and reviewed by Bahmani-Oskooee and Ratha (2004). The empirical results are mixed but the methodology has developed over the years.

Some studies investigate sector specific responses to depreciation. Meade (1988) finds no J-curve adjustment for non-oil industrial supplies, capital goods excluding automobiles, and consumer goods. Doroodian, Jung, and Boyd (1999) report a J-curve effect for agriculture but not for manufacturing. Yazici (2006) finds an S-curve for the balance of trade in Turkish agriculture, rising initially before falling and finally increasing. In export and import data for 66 US industries, Ardalani and Bahmani-Oskoosee (2007) find the J-curve for only 6 industries in an error correction model. Goldstein and Khan (1985) point out that aggregation across different products may bias estimates and disguise different underlying adjustments.

The present paper estimates export revenue and import spending functions separately. Estimating the trade balance in Eq. (3) directly in fact disguises the effects of the exchange rate and income on US tourists. The trade balance model cannot capture adjustment dynamics of export revenue and import spending functions. The present vector autoregressive (VAR) methods, impulse response functions, and variance decomposition analysis capture these dynamic adjustment processes.

3. Econometric model

We employ three vector autoregressive VAR models. First, the export model is based on a tri-variate VAR(p) with the exchange rate r_t, tourism export x_t, and foreign income y_t^*. Second, the import model is based on a tri-variate VAR(p) with the exchange rate, tourism import m_t, and home income y_t. Third, the tourism trade balance model is a quad-variate VAR(p) with the exchange rate, tourism trade balance $b_t = x_t - m_t$, and a vector of the income variable, $y_t = [\, y_t \quad y_t^* \,]'$. All variables are real and natural logarithms.

In all three models, r_t is placed the first assuming that the exchange rate is not contemporaneously affected by other variables during the quarter. The trade variables (x_t, m_t, b_t) are ordered second in each model, prior to income, assuming tourism decisions are made in advance.

We propose the following VAR(p) model for these variables with deterministic trends,

$$x_t = Ad_t + B(L)x_{t-1} + Cu_t, \tag{4}$$