

Modeling Foreign Student Enrolments in the USA: An Exploratory Analysis

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Abstract

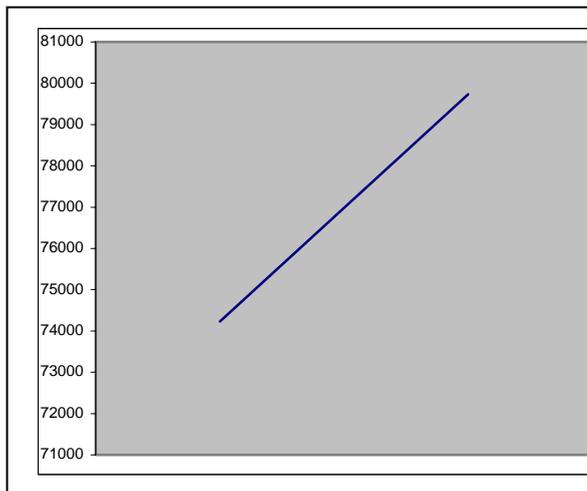
This paper attempts to explain the declining trend in foreign student enrolments in the USA. The popular press attributes the negative trend in international student enrolments to factors such as the US foreign policy in the Middle East, and competition from other English speaking countries. This paper adopts the marketing viewpoint and argues that the decline in international student enrolments in the US can be explained using the concept of “brand equity” of the US in the origin places. Data analyses reveal that while increases in brand equity increases enrolments from China and India, the effect of brand equity is minimal for Japan and Korea. The paper concludes by drawing implications for higher education marketing in major source countries.

Keywords: International students, higher education, brand equity, differential equation, time series

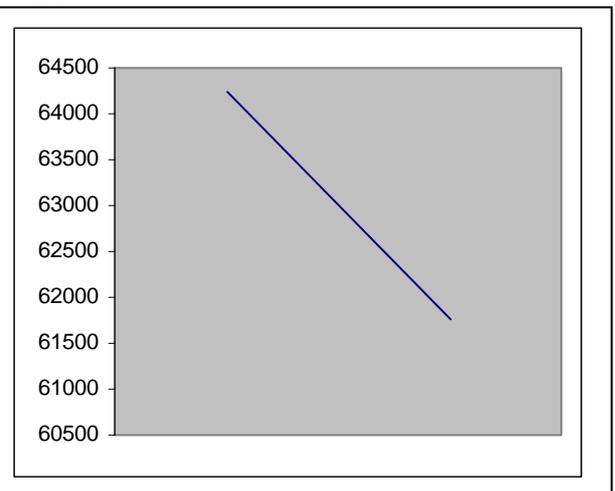
Introduction

In 2003-04, foreign students in universities in the United States contributed \$17.371 billion to the US economy (Institute of International Education, 2005). In terms of number of students or headcounts, in 2003-04, there were 572,509 students. This number represents a 2.4% decline in enrolments from the 2002 - 2003 time period. In fact, a negative trend in foreign student enrolments has been observed since 2000 (AEI, 2005). Figure 1 is a time series representation of foreign students to the US from the top four places of origin.

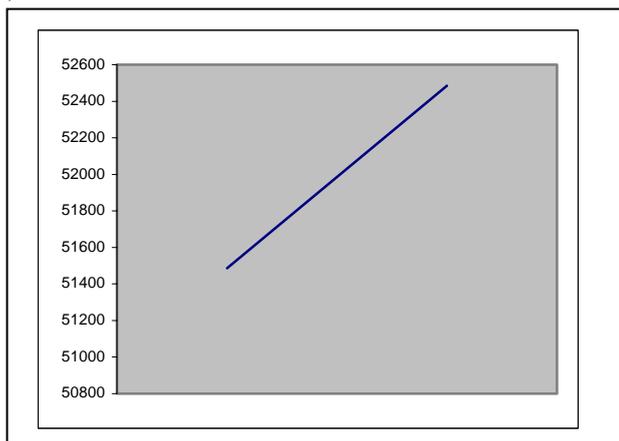
(a) India



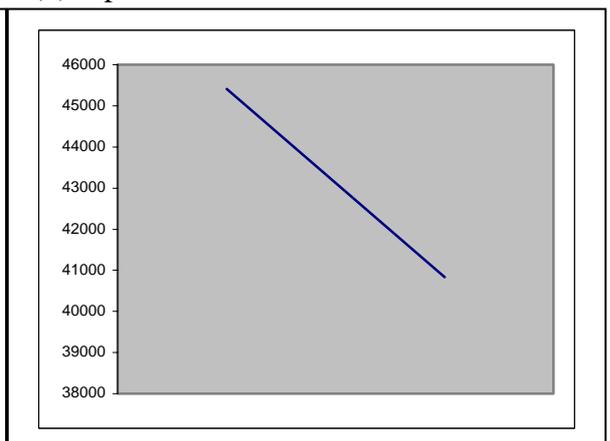
(b) China



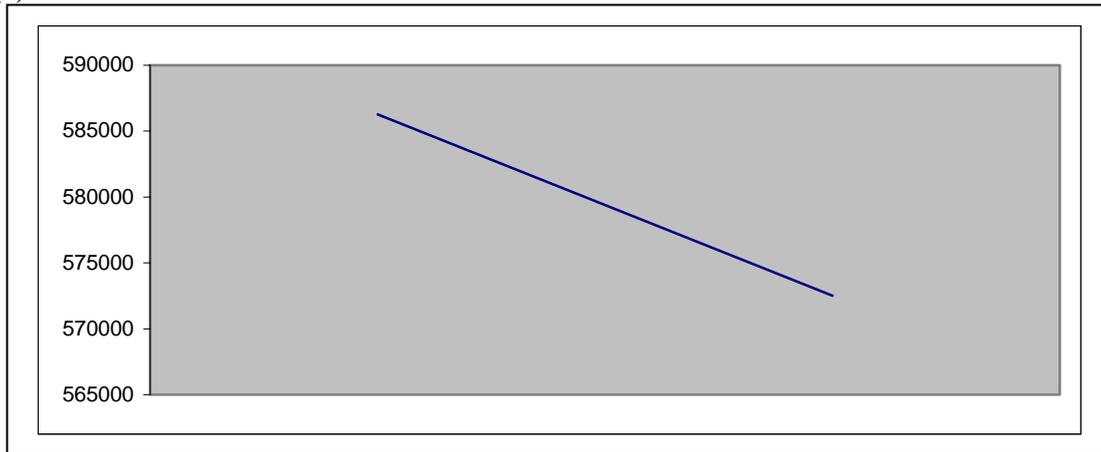
(c) South Korea



(d) Japan



(e) Total US



Note: The “Y” Variable has been linearized using “ln”. The “x” variable pertains to the time period 2000-2004.

Figure 1 - Foreign Student Enrolments: Time Series Representation (2000 to 2004)

The decline in total enrolments is attributed to increased competition from other major English language countries, specifically, the United Kingdom, Australia, and New Zealand (Institute of International Education, 2005). If US want to remain competitive in international education, then it has to enhance its attractiveness as a place of study to foreign students.

Research in marketing demonstrates the importance of customer satisfaction to brand equity or brand attractiveness to the target market (Kotler and Keller, 2006). In terms of higher education, a satisfied student or alumni is expected to talk positively about the place of study, and these word-of-mouth recommendations, in turn, are expected to create positive brand attitude or brand equity about the place of study among potential students (Peter and Olson, 2005). It is assumed that positive attitude will result in desired behaviour: that is, student enrolment.

The objective of this paper is to highlight the importance of brand equity to enrolments. Specifically, the question, “What is the impact of US brand equity on foreign student enrolments” is addressed.

Conceptual Framework

In order to address the research question, we need to highlight the “nomological net” of brand attitude or equity, and highlight its impact on enrolments. We start with a behavioural explanation of brand equity.

If one modifies his behaviour based on experience, then one is said to have learned from the experience. In terms of consumer behaviour, if one rejects a product based on a dissatisfying consumption experience, then one is said to have learned or modified his or her behaviour based on the consumption experience (Guthrie, 1950).

The above explanation could be elaborated using the concepts, “satisfaction”, “word-of-mouth communications”, and “brand equity”. We contend that satisfaction will result in word-of-mouth communications about the university, which in turn will affect brand attitude or brand equity and enrolments. To be specific, consider a university graduate associating his university education (stimulus) with him not being able to perform his job up to the satisfaction of his employer. According to Guthrie’s (1950) “principle of association”, the graduate, will conjure up the university experience, and because of the inability to perform his job adequately, the original tendency to recommend the university to other potential students is displaced by other tendencies such as advising students not to enrol in the university. Thus, the unsatisfied graduate becomes a source of creating a negative attitude about the place of study among potential students. Figure 2 presents the nomological net for the theoretical discussions given above.

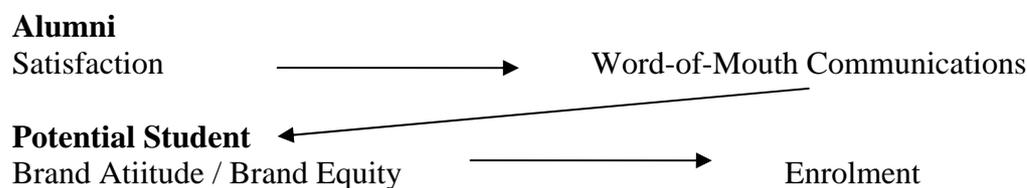


Figure 2 - Nomological Net involving Satisfaction, Word-of-Mouth Communications, and Brand Equity

Method

We posit a simple mathematical model to explain the linkage between satisfaction and enrolments. The model construction phase begins with an examination of international student enrolment data for the period 2000 to 2004 (Figure 1 (e)).

We express the relationships shown in Figure 1 (e) mathematically as:

$\ln P = -\lambda t + \mu$, where P = Number of students; λ and μ are parameters.

This expression can be rewritten as

$$P = e^{-\lambda t + \mu}$$

We are interested in changes to “ P ” over time.

Mathematically, $\delta P / \delta t = e^{-\lambda t + \mu} (-\lambda) = -P\lambda$

Now we introduce the concept of student or alumni satisfaction into the equation. We denote satisfaction by the term “ S ”.

If $S = S(t)$ is the satisfaction rate at time t , and, if $S_t = 0$ or dissatisfaction, and $\delta P / \delta t = -P\lambda$, then, in this scenario, enrolments will continue to decline.

If $S > 0$, we assume that increases in enrolment will be proportional to the satisfaction rate (r). In other words, we equate satisfaction with brand equity, based on the assumption that alumni satisfaction leads to word-of-mouth communications, which in turn, results in stronger brand equity / attitude among potential students. Furthermore, it is assumed that positive attitude towards the object (place) results in enrolment decision.

In addition to satisfaction, we build in the equation the concept of market potential (M) to account for the upper limit of the market. In line with Vidale and Wolfe’s (1957) formulation of the advertising model, we represent the opportunity to increase enrolments as $(M-P) / M$.

Combining the above assumptions leads to the differential equation:

$$dP / dt = rS [(M - P) / M] - \lambda P$$

Where, r and λ denote parameters.

Re-expressing this equation in “standard form” involves working with the “homogenous” equation. That is:

$$dP/dt - rS [(M - P) / M] + \lambda P = 0$$

$$dP/dt - \{ [rSM / M] - [rSP / M] \} + \lambda P = 0$$

$$dP/dt - rS + [rSP / M] + \lambda P = 0$$

$$dP/dt - rS + P [(rS / M) + \lambda] = 0$$

$$\text{Therefore, } dP/dt + P [(rs/M) + \lambda] = rs$$

We solve this linear, first order differential equation with the integrating factor:

$$e^{[rs/M + \lambda] dt}$$

$$= e^{[rs/M + \lambda] t}$$

Specifically, we compute the product of ‘standard form’ representation of the differential equation and the ‘integrating factor’ to arrive at:

$$dP/dt e^{[rs/M + \lambda] t} + e^{[rs/M + \lambda] t} [rs/M + \lambda]P = e^{[rs/M + \lambda] t} rS$$

Integrating both the sides with respect to “t” gives:

$$\begin{aligned}
 [(e^{[rS/M + \lambda] t}) (P)] &= \int rS e^{[rS/M + \lambda]t} dt \\
 &= rS \int e^{[rS/M + \lambda]t} dt \\
 &= rS \{e^{[rS/M + \lambda] t} / ([rS / M] + \lambda) + C\} \\
 P &= rS / \{[rS / M] + \lambda\} + C / e^{[rS/M + \lambda]t}
 \end{aligned}$$

$$\text{If } t = 0, \quad C = P_0 - [rS_0 / \{rS_0 / M_0 + \lambda\}]$$

In order to calibrate the mathematical model, we “operationalized” the variables as follows:

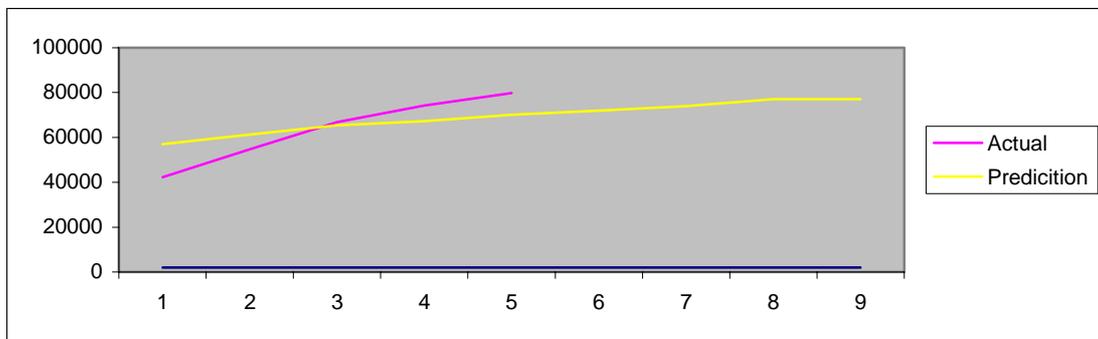
- (i) Student Enrolment (variable label = P): Foreign students enrolled in institutions of higher education in the United States. Only the following, leading places of origin were considered: India, China, Korea, and Japan. Data on enrolments were obtained from the Institute of International Education’s web site: <http://iie.org>
- (ii) Market Potential (variable label = M): Student enrolment in tertiary education in the origin nations. The World Bank’s “EdStats” resources were utilized to gather the information. Specifically, EdStats’ “Data Query” system was employed to list tertiary enrolment figures. The system was accessed at the following URL: <http://devadat.worldbank.org/edstats/cd.asp>
- (iii) Satisfaction (variable label = S): Image of the US in the origin. For instance, in 2003, 43% of the South Koreans viewed US favourably. We applied this to “M₂₀₀₃” to arrive at “S₂₀₀₃”. Image data were gathered from

the online data bank maintained by the “Pew Research Center for the People & the Press”. The URL for the Center is: <http://people-press.org>

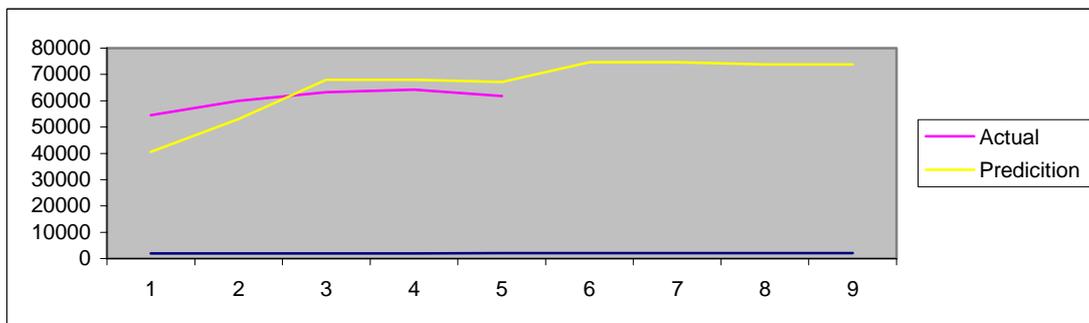
Results and Discussion

What is the impact of US brand equity on foreign student enrolments? The empirical analysis suggests that it is a relevant variable for inclusion in predicting foreign student enrolments from India and China. Specifically, increases in brand equity increases enrolments from these countries. On the other hand, the effect of brand equity is minimal for Japan and Korea (Figure 3).

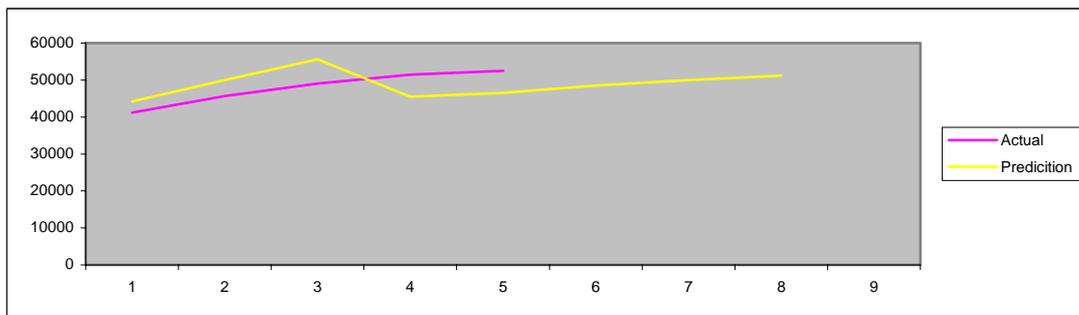
(a) India (Impact = 1.27)



(b) China (Impact = 5.13)



(c) South Korea (Impact = .009)



(d) Japan (Impact = .006)

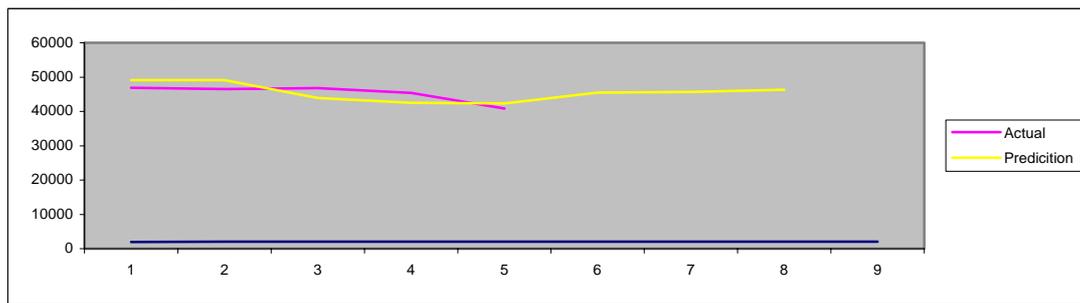


Figure 3 - Impact of Brand Equity on Enrolments

The differences in impact ratio among countries could be explained using the concept “functional literacy”. Functional literacy denotes the ability of workers to create, analyse, and transform information into economic value (Greenspan, 1997). Theoretically, it is a higher order skill to procedural knowledge. For example, a factory worker needs to know how to operate machinery (procedural knowledge) before thinking about optimising its performance (functional literacy).

Thinking about China and India, the production processes in these countries: that is, stock of plant and equipment, are vintage compared to the technologically advanced US. Thus, it is highly likely, that Chinese and Indian students value US education that provides knowledge about modern day production processes. In other words, the “need” for US higher education is to gain procedural knowledge.

On the other hand, Japan, and Korea are much closer to the US in terms of production processes. In these countries, the need for higher education is most likely to be associated with “functional literacy”. The empirical analysis performed for this paper suggests that Japanese, and Korean graduates from the US may not be satisfied with their educational outcomes. Would this be due to the non-teaching / training of functional literacy skills? Future research should explore this issue.

Conclusions

It is now widely recognised that foreign students in U.S. classrooms widen the perspectives of their U.S. classmates, contribute to vital research activities, strengthen the local economies in which they live, and build lasting ties between their home countries and the United States. In fact, the number and quality of foreign students

coming to the United States for higher education determines the country's long-term competitiveness (Greenspan, 1997).

The results of this research suggest that student satisfaction with higher education be managed on a continual basis: that is, during student's attendance and post graduation. This should result in strong brand equity and strong demand for US higher education overseas. Future research should expand the conceptual framework to include measures of social norms to account for further variance in the criterion variable.

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