Mark Lett (2013) 24:71–84
DOI 10.1007/s11002-012-9204-3

# Customer portfolio composition and customer equity feedback effects: Student diversity and acquisition in educational communities

**Michael Lewis · Debanjan Mitra · Yeujun Yoon**

Published online: 4 September 2012


**Abstract** Researchers in marketing have long recognized that current populations of customers can influence the behavior of prospective customers. This paper draws on existing marketing theories to empirically examine how changes in student body demographic segments influence future demand for MBA programs. Using a longitudinal analysis of data spanning 18 years, we find that higher proportion of female students leads to significant increases in future applications. This implies a marketing rationale for business schools in encouraging gender diversity. In contrast, we find evidence of prejudice towards minority and international students among business school applicants. We discuss the results of the analysis in the context of the current affirmative action debate and changes in demographic trends.

**Keywords** Customer equity · Student diversity

## 1 Introduction

Several marketing theories explain how current customers may influence the behavior of prospective customers. For instance, the diffusion of innovation literature considers the role of penetration rates on demand levels (e.g., Bass 1969) and the word-of-mouth literature considers the role of referrals and customer contacts (e.g., Godes and Mayzlin 2004). The idea of brand communities (Muniz and Guinn 2001, McAlexander et al. 2002) has also been advanced to explain how shared experiences

All authors contributed equally to the work.

M. Lewis (✉)
Emory University, Atlanta, GA, USA
e-mail: Mike.lewis@emory.edu

D. Mitra
University of Florida, Gainesville, FL, USA

Y. Yoon
HSBC Business School, Peking University, Shenzhen, China

with a brand can enhance loyalty and preference. In decisions to join virtual or real communities a prospect's perceived comfort with existing members may be salient. Likewise, in categories from fashion to automobiles, a brand's current customers can influence the extent to which a prospective consumer identifies or feels comfortable with a brand (*Business Week* 1997; New York Times 2011).

We study a concrete instance of such feedback effects in the context of student segments at business schools. In particular, we examine how customer acquisition, as reflected in MBA program applications, is influenced by the demographic characteristics of a school's student community. While this is a nontraditional marketing application, it is an environment where students are referred to and often think of themselves as customers (Armstrong 1995). While the decision to apply to and attend an MBA program is obviously influenced by program specific characteristics (e.g. school prestige, employment opportunities, tuition, etc.), the degree to which school selection may also be influenced by the demographic profile of its student community has not been examined. For example, international applicants may favor student communities with large contingents from their home countries while domestic applicants may prefer more domestic students. If so, an empirical question is whether changes in the size of a school's international student segment positively or negatively impact the application rates. Similar questions can be raised for the female and minority student segments. Answers to these questions have two important implications.

First, if applicants are attracted to programs based on student body demographics, schools can potentially benefit by customizing efforts to attract students from specific segments. Such a segment-level student acquisition programs may be useful since there is evidence that individuals find it easier to form connections with members of their own identity groups (McPherson et al. 2001; Marsden 1988). This is particularly relevant for business school students since the decision to join an MBA community may be influenced by expectations for developing a professional network (Merritt 2003). Therefore, having sufficient students from different population segments and in particular, from growing segments, may facilitate future acquisition of students. This line of argument provides a marketing-oriented rationale for diversity-oriented admissions policies, wherein current diversity represents an investment in customer equity (Blattberg and Deighton 1996). For a university, a customer oriented approach does need to be viewed with flexibility to account for the differences in objective functions between firms and universities. Flexibility is required because universities do not possess an objective similar to maximizing long-term profitability. Descriptions of universities' objectives tend to emphasize factors related to reputation or intellectual distinction (Clotfelter 1996). Our argument implies that management of student demographics may impact application levels by affecting the attractiveness of a program.

Second, our results should weigh on the current debate on affirmative action in educational institutions. Affirmative action is usually justified by the existence of social prejudice (Epstein 2002). While prejudice towards specific demographics is a historical fact, questions linger on the extent of such prejudice in today's society. In fact, in Grutter v. Bollinger (2003), the US Supreme Court noted "that 25 years from now, the use of racial preferences will no longer be necessary." This view assumes that we can easily determine the extent of social prejudice and can then

decide on the continuance of affirmative action. In reality, this is far more difficult since social prejudice is often latent, subtle, and almost never self-reported. Consequently, it cannot be observed directly but only deduced. For example, social prejudice is a potential explanation for the wage gaps across racial groups that have been documented in the labor economics literature (e.g., see Darity and Mason 1998, for an excellent review). Yet, there can be alternative explanations. Indeed, it is difficult to establish what proportion of wage gap reflects prejudice versus objective differences in ability and/or motivation (Heckman 1998). Our research approaches this issue from a different perspective. If we are able to find evidence of negative changes in application demand in response to increases in a specific student demographic segment over time, it provides objective evidence of social prejudice. This evidence, in some ways, is cleaner than that of wage differences since applicants, unlike employers, should be unaware of the abilities and motivation of existing students. Therefore, our empirical analyses may be considered as an innovative large-scale test of a key justification behind affirmative action.

Overall, we have two distinct objectives in this paper. First, following marketing theory, we seek to examine empirically how changes in specific customer demographic segments can influence customer acquisition. Second, we provide an instance of how findings of a marketing model are relevant to educational institutions and provide valuable findings to a longstanding public policy debate. The paper is organized as follows. Section 2 introduces the data and provides descriptive statistics. Section 3 describes our model and its estimation. Section 4 presents the results. Section 5 concludes with a discussion of the implications of our research on marketing and public policy, its limitations, and future research opportunities.

## 2 Data

The data for our study is collected from the *Business Week* MBA rankings for the years from 1990 to 2008. Business Week publishes biennial reports on program rankings, admissions selectivity, tuition, graduate satisfaction, salaries and demographic profiles of MBA programs. Table 1 defines the variables used in the subsequent analyses. Table 2 provides descriptive statistics for the percentage of female, foreign and minority students as well as measures of selectivity such as acceptance rates and GMAT scores.

The table highlights the significant differences between schools. The percentage of female students ranged from 19 % to more than 41 %, and the reported acceptance rates ranged from 6 % to 48 %. The final two rows of the table describe the dispersion in tuition prices and graduate salaries. To account for inflation, these measures are adjusted by dividing each school's reported value by the sample average for a given year. The range for the relative tuition is from 22 % of the annual average to 186 %. The relative salary ranges from 70 % to 145 %.

Table 3 reports correlations between key variables. While the positive correlations between GMAT scores and salaries or the negative relationship between program rank and acceptance rates are expected, the positive correlation between the proportion of female students and measures of student quality such as GMAT scores and

**Table 1** Variable descriptions

| Variables | Abbrev. | Definition |
|---|---|---|
| Percent Women | Wom% | Percentage of female students |
| Percent International | Int% | Percentage of non-U.S. students |
| Percent Minority | Min% | Percentage of students classified as minorities |
| Work Experience | Work | Average work experience of graduates |
| Business Week Rank | Rank | *Business Week* ranking of MBA programs. |
| Graduate Satisfaction Rank | Grad | Ranking based on graduate satisfaction survey results |
| Acceptance Rate | Acc% | Percentage of applicants accepted |
| Average GMAT Score | GMAT | Average GMAT score of matriculated students |
| MBA Salary | Salary | Average starting salary of MBA graduates |
| Relative Salary | Sal | Average salary relative to average of all ranked schools |
| Tuition Costs | Tuition | Tuition and fees |
| Relative Cost | Tui | Tuition fees relative to that of all ranked schools |

relative salaries are interesting. In contrast, while the percentage of foreign students is positively correlated with average GMAT scores, it is also positively correlated with higher (less prestigious) ranks.

Furthermore, we also use aggregate GMAT candidate demographic data for additional control variables to capture the effect of population increase of each demographic sector. The data is taken from The Graduate Admission Management Council (GMAC) from 1990 to 2008. On average, female and minority candidates are 37.24 % and 28.72 % respectively of GMAT takers in US. Also, Non US candidates represent 36.86 % of overall GMAT takers.

## 3 Analyses

We examine how changes in a school's student body demographics influence the attractiveness of the school to future applicants. We assume that these dynamic effects operate through a goodwill or reputation stock. In our context, the goodwill stock is a function of current and past student body demographics. The current demographic composition of the student body combines with historical rates to determine the

**Table 2** Descriptive statistics

| Measure | Mean | Std. Dev. | Range |
|---|---|---|---|
| Percent Women | 29.7 % | 0.045 | 19 % to 41 % |
| Percent Foreign | 28.1 % | 0.074 | 11 % to 44 % |
| Percent Minority | 10.4 % | 0.041 | 1 % to 25 % |
| Average GMAT | 674.5 | 30.59 | 610 to 727 |
| Acceptance Rate | 21.8 % | 0.092 | 6 % to 48 % |
| Relative Salaries | 1.00 | 0.149 | 70 % to 145 % |
| Relative Costs | 1.00 | 0.387 | 22 % to 186 % |

**Table 3** Correlation coefficients

| | Rank | Grad | Acc% | GMAT | Sal | Wom% | Int% | Min% |
|---|---|---|---|---|---|---|---|---|
| Grad | 0.63 | | | | | | | |
| Acc% | 0.36 | 0.28 | | | | | | |
| GMAT | −0.30 | −0.18 | −0.48 | | | | | |
| Sal | −0.45 | −0.27 | −0.53 | 0.31 | | | | |
| Wom% | −0.17 | −0.05 | −0.43 | 0.40 | 0.13 | | | |
| Int% | 0.03 | 0.06 | −0.13 | 0.61 | 0.11 | 0.22 | | |
| Min% | −0.16 | −0.05 | −0.08 | −0.05 | 0.03 | 0.27 | −0.16 | |
| Tui | −0.32 | −0.14 | −0.17 | 0.81 | 0.20 | 0.28 | 0.59 | −0.05 |

school's "goodwill", i.e., its reputation regarding that population subgroup. We denote the goodwill stock related to demographic group D of school i at time t as $G^D_{i,t}$ s. $G^D_{i,t}$ influences the decisions of the $(t+1)$ cohort of applicants since they cannot observe the school's current period decisions when selecting which schools to apply. We also assume the goodwill stock to be affected by a stochastic term denoted as $v^D_{i,t}$ . For group D, the goodwill term equation is given in (1) as

$$G^D_{i,t+1} = \varphi_D * G^D_{i,t} + (1 - \varphi_D) * Demo^D_{i,t} + v^D_{i,t+1} \quad (1)$$

where $\varphi_D$is a decay factor, Demo is a measure of the population of segment D, and $v^D_{i,t}$ is distributed i.i.d. N(0, $\sigma_v$). The equation structure implies that the goodwill stock depreciates stochastically over time. This type of goodwill stock specification for a latent state variable has been employed in the advertising literature (Dube et al. 2005).

We next consider the form of the "Demo" terms. As noted our interest is in the populations of female (WOM), international (INT) and minority (MIN) students. For our model we use the change in percentage of each demographic category. In terms of notation, $WOM\%_{i,t}$ indicates the percentage of female students in school i at time t and $\overline{WOM\%}_{i,t}$ indicates the change in the percentage of female student ratio at the time t compared to the previous time, t-1. In our model, we use one period lagged variables because students only observe information from the previous cycle (Business Week publishes only the previous percentages). The change variables are defined as follows:

$$\overline{WOM\%}_{i,t-1} = WOM\%_{i,t-1} - WOM\%_{i,t-2}$$
$$\overline{INT\%}_{i,t-1} = INT\%_{i,t-1} - INT\%_{i,t-2}$$
$$\overline{MIN\%}_{i,t-1} = MIN\%_{i,t-1} - MIN\%_{i,t-2}$$

The stock of goodwill related to each demographic category is then computed as follows:

$$G^{WOM}_{i,t} = \varphi_{WOM} * G^{WOM}_{i,t-1} + (1 - \varphi_{WOM}) * \overline{\mathrm{WOM\%}}_{\mathrm{i,t-1}} + v^{WOM}_{i,t}$$
$$G^{INT}_{i,t} = \varphi_{INT} * G^{INT}_{i,t-1} + (1 - \varphi_{INT}) * \overline{INT\%}_{i,t-1} + v^{INT}_{i,t}$$
$$G^{MIN}_{i,t} = \varphi_{WOM} * G^{MIN}_{i,t-1} + (1 - \varphi_{MIN}) * \overline{MIN\%}_{i,t-1} + v^{MIN}_{i,t}$$

For example, $G^{WOM}_{i,t}$ is the goodwill stock related to female students and is a function of the school's previous goodwill stock adjusted by the decay factor $\varphi_{WOM}$

for female goodwill, the change in the percentage of female students, $\overline{WOM\%}_{i,t-1}$ , and a random shock, $v_{i,t}^{WOM}$ .

Because the goal of our investigation is to understand how a school's reputation regarding student demographics effects demand, our primary metric is the school's acceptance ratio. We use an aggregate linear model to predict acceptance ratio as a function of the goodwill stocks described above and other factors that are likely to influence demand levels. Therefore, the acceptance ratio of school i in year t is:

$$\begin{aligned} Acc\%_{i,t} = {} & \beta_0 + \beta_{WOM} * G_{i,t}^{WOM} + \beta_{INT} * G_{i,t}^{INT} + \beta_{MIN} * G_{i,t}^{MIN} + \beta_{Rank} * Rank_{i,t-1} + \beta_{Sal} * Sal_{i,t-1} \\ & + \beta_{Tui} * Tui_{i,t} + \beta_{GMAT} * GMAT_{i,t-1} + \beta_{WOM\%_{GMAT}} * WOM\%_{GMAT\,t} \\ & + \beta_{INT\%_{GMAT}} * INT\%_{GMAT\,t} + \beta_{MIN\%_{GMAT}} * MIN\%_{GMAT\,t} + School_i * \gamma + \varepsilon_{i,t} \end{aligned} \quad (2)$$

where $G_{i,t}^{WOM}$ , $G_{i,t}^{INT}$ , and $G_{i,t}^{MIN}$ are the goodwill stocks for each demographic segment, $Rank_{i,t-1}$ is the previous ranking of the program, $Sal_{i,t-1}$ is inflation adjusted salary, $Tui_{i,t}$ is the inflation adjusted tuition and $GMAT_{i,t-1}$ is the average GMAT score of students. $WOM\%_{GMATi,t}$, $INT\%_{GMATi,t}$, and $MIN\%_{GMATi,t}$ are the percentage of GMAT takers in each demographic sector (woman, international, and minor) at t. Finally, school dummies, $School_i$, are included. We use also lagged values of tuition prices as instrumental variables to address the possibility that tuition prices are endogenously determined. We discuss the possibility of endogeneity in detail in the estimation section.

Estimation of the model is complicated by the dynamic goodwill elements which are not observable directly. We estimate the goodwill and demand parameters in two steps by using the Method of Simulated Moments (David and MacKinnon, 2004). In the first step, we begin with the initial values of goodwill parameters and compute the goodwill stock of each school over time. In the second step, we build up the simulated moments with the initial value of goodwill stock defined in the first step. We then search over the potential range of goodwill parameters to minimize the criterion function. Similar two step estimation methods have been used in the economic and marketing literature (Berry et al. 1995).

For explanation purposes we define $\varphi = \{\varphi_{WOM}, \varphi_{INT}, \varphi_{MIN}, and\ \sigma_\upsilon\}$ to be the vector of goodwill parameters in Eq. 1 and $\theta = \{\beta_0, \beta_{WOM}, \beta_{INT}, \beta_{MIN}, \beta_{Rank}, \beta_{Sal}, \beta_{Tui}, \beta_{GMAT}, 1\beta_{WOM\%_{GMAT}}, \beta_{MIN\%_{GMAT}}, \beta_{INT\%_{GMAT}}, \gamma\}$ to be the demand parameters defined in Eq. 2. In addition, we define $X_{i,t} = \Big\{1, G_{i,t}^{WOM}, G_{i,t}^{INT}, G_{i,t}^{MIN}, Rank_{i,t-1}, Sal_{i,t-1}, Tui_{i,t}, GMAT_{i,t-1}, WOM\%_{GMAT\,t}, INT\%_{GMAT\,t}, MIN\%_{GMAT\,t}\ and\ I_i\}$ , as the covariate vector in Eq. 2 where $I_i$ is a vector of school indicators. We also define $Z_{i,t}$as a vector of instrumental variables which includes all exogenous covariates in $X_{i,t}$ and lagged tuition. The estimation technique completes the following steps:

1) Given the initial parameters of goodwill $\varphi^0 = \left\{\varphi_{WOM}^0, \varphi_{INT}^0, \varphi_{MIN}^0, and\ \sigma_\upsilon{}^0\right\}$ and randomly simulated $\upsilon_{i,t}^{D,ns}$ random shocks from a normal distribution of $\left(0, \sigma_\upsilon^0\right)$ , we compute initial goodwill values for each school's reputation for each demographic segment, $G_{i,t}^{D}\left(\varphi^0, \upsilon_{i,t}^{D,ns}\right)$ .

2) The initial goodwill values $\left(G_{i,t}^{D}\left(\varphi^{0}, \upsilon_{i,t}^{D,ns}\right)\right)$ are included in the complete covariate vector, $X_{i,t} = \left\{1, G_{i,t}^{D}\left(\varphi^{0}, \upsilon_{i,t}^{D,ns}\right) Rank_{i,t-1} Sal_{i,t-1}, Tui_{i,t}, GMAT_{i,t-1}, WOM\%_{GMAT\,t}, INT\%_{GMAT\,t}, MIN\%_{GMAT\,t}, and\, I_i\right\}$ and we compute the demand parameters $\widehat{\theta}^{0} = (X'X)^{-1}(X'Y)$ where $X$ equals the matrix of $X_{i,t}$ and $Y$ equals the vector of $Acc\%_{i,t}$. Along with the estimated parameters $\widehat{\theta}^{0}$, we compute the residual of the demand equation as $\widehat{\varepsilon}^{0} = Y - X'\widehat{\theta}^{0}$.
3) The residuals and the instrument matrix are then used to construct the moment of the sample, $gm(\varphi^{0}, \upsilon^{D,ns}) = \frac{1}{NT}(Z'\widehat{\varepsilon}^{0})$ and the criterion function is constructed as,

$$Q\left(\varphi^{0}, \upsilon^{D,ns}\right) = gm\left(\varphi^{0}, \upsilon^{D,ns}\right)' gm\left(\varphi^{0}, \upsilon^{D,ns}\right).$$

4) We then construct the criterion function of the simulated moments with $\upsilon^{D,ns}$ and the integrated criterion function, $Q_I(\varphi^{0}) = \frac{1}{NS}\sum_{ns=1}^{NS} \mathrm{Q}(\varphi^{0}, \upsilon^{D,ns})$
5) The procedure then iterates until we find the $\varphi^{i}$ that minimizes the criterion function. This is accomplished using a standard nonlinear optimization procedure.0

Estimation of the model is complicated by several factors. First, we need to assume an initial value of goodwill stock $\left(G_{i,t}^{D}\right)$. Given that these initial goodwill factors are not observable we use the mean change in the percentage of each group for each school over the sample period as an initial value of goodwill (Dube et al. 2005). Second, there may be concerns about whether variables such as price are endogenously determined. For instance, tuition may be endogenously correlated with the unobserved applicants' demand error term if a school's (unobserved) marketing activity affects tuition levels as well as applicants' decisions (*Business Week* 2004). To account for this issue we use lagged tuition as IVs for current tuition in our estimation procedure. In addition, one might conjecture that other school policies might affect application decisions as well as the school's reputation for diversity.[1] However, this is unlikely to influence applicant decisions because the information on affirmative action policies tends to be highly confidential. Indeed, affirmative action policies remain one of most controversial issues in the admission process of US schools and schools are reluctant to reveal these policies to their applicants making it a "mystery".[2] We also control for other sources of endogeneity by including school fixed effect terms and control variables for changes in the population in each demographic $(WOM\%_{GMAT\,t}, INT\%_{GMAT\,t}, MIN\%_{GMAT\,t})$.

[1] We thank the anonymous reviewers for pointing out this possibility.
[2] We contacted MBA admission offices to ask whether they use any objective affirmative action in their admission decisions, but every school declined to answer this question.

## 4 Results

Table 4 reports the estimation results for the model given in Eq. 2 and for a null model that does not include the goodwill terms.

In the full model, the coefficients of the demographic reputation factors are all significant at the .05 level. The reputation effect for females is −0.338 while the estimates for the international and minority reputation factors are 0.153 and 0.235, respectively. Given that a lower acceptance rate indicates that the school is able to be more selective, the negative sign for the female goodwill term indicates that increased percentages of women increase demand. In contrast, the positive sign of the international and minority terms indicates that higher percentages of these groups decrease demand. The other elements of the goodwill equations are the $\varphi_D$ terms. These terms indicate how quickly the goodwill stock adjusts in response to changes in student body composition. For the international group the coefficient for the change ($1$- $\varphi_D$) in the group's percentage is relatively low. The implication is that school's reputation for having significant amounts of international students is relatively slow to adjust. In contrast, the female and minority goodwill stocks adjust rapidly.

In terms of the other factors, the coefficient for program rank is positive. This is intuitive because rankings are defined such that a lower number corresponds to a higher ranked program (ranking number 1 versus 20). The negative salary coefficient is also as expected since higher average salaries lead to greater selectivity. In contrast,

**Table 4** Estimation results (DV: Acceptance Ratio)

| Variables | Model I (2SLS) | | Model II (2 Step MSM) | |
|---|---|---|---|---|
| | Estimate | S.E. | Estimate | S.E. |
| Diversity | | | | |
| Decay factor for Woman ($\varphi_{WOM}$) | | | 0.562*** | 0.180 |
| Decay factor for International ($\varphi_{INT}$) | | | 0.709*** | 0.006 |
| Decay factor for Minor ($\varphi_{MIN}$) | | | 0.565*** | 0.011 |
| % of Woman (1-$\varphi_{WO}$) | | | 0.437*** | 0.180 |
| % of International (1-$\varphi_{INT}$) | | | 0.290*** | 0.006 |
| % of Minor (1-$\varphi_{MIN}$) | | | 0.434*** | 0.011 |
| Demand (Acceptance Ratio) | | | | |
| Reputation of Woman | | | −0.338*** | 0.0230 |
| Reputation of International | | | 0.153*** | 0.0022 |
| Reputation of Minority | | | 0.235*** | 0.0233 |
| Rank | 0.0009 | 0.0015 | 0.0008*** | 0.0001 |
| Salary | −0.026*** | 0.0074 | −0.027*** | 0.0005 |
| Tuition | 0.096*** | 0.0432 | 0.019*** | 0.0043 |
| GMAT score | −0.126*** | 0.0457 | −0.054*** | 0.0048 |
| % of Woman candidates (GMAT) | −0.783*** | 0.3156 | −0.339*** | 0.0191 |
| % of Intl candidates (GMAT) | −0.440*** | 0.1272 | −0.306*** | 0.0354 |
| % of Minority candidates (GMAT) | −0.157 | 0.4410 | 0.082*** | 0.0092 |

the positive sign for the tuition term indicates that as tuition increases, acceptance rates rise. The coefficient on the average GMAT term is negative. On one hand, we might expect that higher GMAT score would be a signal of future program prestige and might therefore have a positive effect on demand. Alternatively, higher GMAT scores might discourage demand if prospective students believe that their chances for admission are lower at schools with higher test scores. Our estimation result supports the first argument. It is worth noting that the parameter estimates are generated from a specification that includes school level fixed effects. As such, the specification is conservative and it is striking that the model yields significant results using only the percentage change in segment size while including school specific dummy variables.

Given the dynamic nature of the model and the context of the study, the estimation results cannot be fully interpreted by only considering static marginal effects. To investigate the dynamic implications of student diversity, we conducted simulation studies based on the acceptance rate model. For the simulations we assumed a baseline case of a school that has an acceptance rate of 21.8 %. Table 5 shows the impact of student diversity changes on demand.

For example, a 1 % increase in the proportion of female students leads to a 0.683 % increase in applicant demand next year. However, the growth in the female population is even larger in the long-run. The long-term impact is a 1.6 % increase in applicants. The difference between short and long term effects is more significant for the case of international students because the International segment decay rate is lower than for females. In the short term a 1 % increase in international students induces a 0.20 % decrease in the demand next year. In the long-term the decrease in applications is 0.70 %.

The preceding analysis reports on the direct relationship between changing demographics and demand. As such we may have potentially neglected indirect effects of student demographics. For instance, the increase in applicants that follows the growth of the percentage of female students may result in a positive feedback effect since increased selectivity can improve program ranking. While a full analysis of these types of feedback effects is beyond the scope of our analysis, the Business Week data does contain two measures that reflect program outcomes, graduate satisfaction rank and average salary that may be useful to consider. Both these measures are interesting since they provide a sense of the academic experience in the eyes of the students and employers. Table 6 provides results of regression analyses of these two measures as a function of diversity and key metrics such as average GMAT and relative tuition price.

We find that greater percentages of international students are associated with lower satisfaction while the percentage of female students is positively correlated with higher salaries. This result is consistent with research that has found that certain

**Table 5** Impact of 1 % increase in student diversity proportion on applicant demand

| | % Increase in Applicants | |
|---|---|---|
| | Static | Dynamic |
| Women% | 0.68 % | 1.55 % |
| International% | −0.20 % | −0.70 % |
| Minor% | −0.47 % | −1.08 % |

**Table 6** Graduate satisfaction and demographic profiles

| | Graduate Satisfaction Rank Coefficient (Std. Err.) | Relative Salary Coefficient (Std. Err.) |
|---|---|---|
| Intercept | 49.51*** (8.93) | −0.15 (0.11) |
| Female Percent | 0.90 (9.34) | 0.24** (0.11) |
| Minority Percent | −12.51 (9.20) | −0.072 (0.11) |
| International Percent | 37.10*** (5.31) | −0.024 (0.068) |
| Average GMAT | −0.02 (0.017) | 0.0015*** (0.00019) |
| Relative Salary | −30.51*** (4.55) | |
| Graduate Rank | | −0.0043*** (0.00064) |
| Relative Cost | −2.15 (2.19) | 0.17*** (0.024) |
| R-Square | 0.344 | 0.546 |

***p-value <0.01, **p-value<0..05, *p-value<0.10

demographic differences can lead to increased conflicts (Pelled 1996), as we find a positive relationship between student satisfaction rank and the percentage of international students (higher satisfaction rank indicates lower satisfaction). The lack of a relationship between satisfaction and the percentage of female students is consistent with the conflicting forces of preferences for mixed gender groups (Wood 1987) but increased conflict in groups with other forms of diversity (Jehn et al. 1999). The results related to salary are also noteworthy. While corporate interests have supported affirmative action policies based on an expressed desire for diverse workforces (Wall Street Journal 2003), only the female percentage variable yields a significant positive estimate. For the international student segment there are mixed anecdotal findings. Some reports suggest that international students are especially attractive to employers given recent trends towards globalization (Fisher 2006) while other sources suggest that international students are more difficult to place due to language concerns (Hankins 2001). The preceding discussion concerning the outcome measures highlights the complexity of the environment under study.

## 5 Discussion

The main theme of our research is that an MBA program can be viewed as a brand community and that student acquisition may be driven by the demographics of members of the community. Our goals in this paper were (1) to empirically study how changes in customer demographics can influence customer acquisition and (2) to provide an instance of how marketing theory and empirics can weigh on important public policy issues.

In terms of the first goal, marketers have long recognized that the composition of a customer base can have consequences for future customer acquisition. Cadillac, for example, suffered market share losses among younger customer segments as it became associated with older customers (Intini 2004). In brand-oriented contexts,

the customer base influences prospective customers by affecting brand image. In contrast, in our application, the effects of demographics are more direct given the tendency of individuals to form closer bonds with similar individuals (McPherson et al. 2001).

Our discussion has been based on the idea that student acquisition can be viewed as a customer acquisition problem. The logic of customized student acquisition policies is different in a key respect from most segment-level marketing policies. Practices such as customizing insurance premiums or promotional discounts according to demographics can be justified via demographics-based forecasts of behavior. However, rather than using demographic data to predict individual behavior, in our context the demographic characteristics positively or negatively influence the future behavior of prospective customers.

In terms of the second goal, our findings are relevant for educational institutions and the current debate on affirmative action. For administrators of educational institutions, our results indicate that there may be a compelling marketing argument for improving gender diversity. Researchers in law have provided conceptual arguments related to schools' ability to compete. (Wilkins 2004). For example, Epstein (2002) argues affirmative action should be allowed in public universities because state schools are in competition with private universities that employ affirmative action. However, our work goes beyond theoretical arguments as we offer empirical evidence supporting our marketing-based approach.

Perhaps more important, our findings provide a unique glimpse into the current state of social prejudice. While affirmative action remains a topic of ongoing debate, there is a belief that modern society does not suffer from significant social prejudice (Bertrand and Mullainathan 2004). Consequently, over time there should be no need for affirmative action policies. Notably, there is limited large-scale empirical evidence on social prejudice (Holzer and Neumark 2000). The labor economics literature on wage disparities between genders and races is an important exception. However, since most results are based on cross-sectional differences, it is difficult to show that the disparities are based on prejudice rather than any objective differences on ability and motivation (Heckman 1998). Furthermore, while the labor economics literature focuses on employment market outcomes, our results provide evidence about the educational choices of the general population.

Additionally, since our data is longitudinal, we are able to control for endogeneity and parse out the impact of changes in student demographics on future application levels, thus establishing *Granger* causality. In fact, the identification of significant relationships between demographics and demand are dramatic given that the specification uses differences in group percentages and school level fixed effects. This structure combined with the decay parameters means that after a period of time demographic effects become embedded in the school level fixed effects. This approach is conservative and hence, the true effect of diversity is likely to be greater than our reported results. However, we do acknowledge that the non-experimental nature of our data does limit the strength of our conclusions. As such, we feel it is important to explicitly comment on the limitations to our analysis and to call for future research on some key issues.

First, in an ideal analysis we would utilize data on the demographics of applicants as well as matriculated students. This data would enable testing of how student body

composition impacts the behavior of similar and dissimilar groups. Because we rely on aggregate data for our analyses, we are unable to distinguish whether changes in demand levels are due to changes in demand from growing groups or changes in demand from other segments. Given the survey evidence, it seems likely that prospective students will gravitate to programs with more students who are similar to themselves (Merritt 2003). If so, for the effect of an increase in international and minority student segments on overall applications to be negative, it is necessary that applications from other segments suffer a larger drop. However, future research needs to directly examine our interpretation.

Second, our research is unable to delineate the specific processes underlying the results. Researchers have found that demographic similarity within groups reduces conflict (Jehn et al. 1999). This result suggests a potential explanation for the negative findings related to increasing numbers of international and minority students. Prospective students may avoid applying to schools with larger minority and international student segments owing to preferences for more homogeneous environments (Kochan et al. 2003). In contrast, we find a positive impact of female percentage on student demand. This result is consistent with surveys that have found that female students prefer environments with significant numbers of women (Wall Street Journal 2000), and sex-balanced groups are preferred to primarily male or female groups (Wood 1987).

Third, the discussion thus far has not considered demographic trends. The relationships observed in the data along with current demographic trends suggest MBA programs may benefit from management of diversity. As the population of prospective MBA students becomes increasingly diverse, MBA programs' efforts to increase levels of non-traditional segments may yield future benefits. Over the past 40 years the composition of graduate business student bodies has shifted from being almost monolithically white and male to being diverse in terms of gender, ethnicity and national origin. During this time period there has been a significant shift in the proportions as the share of master's degrees in business conferred to females has grown from 3.4 % in 1968 to more than 40 % in 2000. Still, graduate business programs tend to have smaller proportions of female students than other graduate programs, as women constitute 57 % of students in full-time graduate programs. Moreover, it has been noted that the percentage of female students at the top MBA schools has leveled off despite efforts to attract female students (Lublin 2000). International students have also become a key constituency for MBA programs. The percentage of non-USA GMAT test takers has grown from about 25 % in the mid-1980s to 45 % in 2000. In the *Business Week* data the percentage of international students has grown from 16 % in 1988 to about 30 % in 2004. However, continued growth of the international segment may also be difficult to achieve. Limitations on H-1B visas (Wall Street Journal 2001) and improved universities in Asia and Europe may constrain growth.

In contrast to female and foreign applicants, minority students may be a future growth segment. While the percentage of MBA degrees awarded to minorities grew from about 6 % of all degrees in 1987 to more than 11 % in 2001, this population is underrepresented relative to overall population levels. Current projections suggest that by the year 2050 the U. S. population will be roughly 53 % white, 15 % African American and 25 % Hispanic. Thus, demographic trends suggest minority communities are likely to be an

increasingly important source of students for graduate business programs in the US (New York Times 2012). Yet, we find evidence that support the existence of social prejudice that causes a decrease in applications as a consequence of an increase in minority students.[3] This calls for a continuance of affirmative action policies towards these segments. However, even in the absence of such policies, increasing minority diversity may represent an investment in the future, given the growth potential of the minority segment.

## References


Armstrong, S. (1995). The Devil's advocate responds to an MBA student's claims that research harms learning. *Journal of Marketing, 59*, 101–106.

Bass, F. (1969). A new product growth model for consumer durables. *Management Science, 15*, 215–227.

Bertrand, M., & Mullainathan, S. (2004). Are Emily and Greg more employable than Lakisha and Jamal? A field experiment on labor market discrimination. *The American Economic Review, 94*(4), 991–1013.

Berry, S. T., Levinsohn, J., & Pakes, A. (1995). Automobile prices in market equilibrium. *Econometrica, 63* (4), 841–890.

Blattberg, R., &Deighton, J. (1996). Manage marketing by the customer equity test. *Harvard Business Review*, July-August, 136–144.

Business Week. (1997). Levi's is hiking up its pants; But will the brand's revamped products and marketing play with turned-off teen? by Linda Himelstein, Dec. 1, 70.

Business Week. (2004). Why African Americans are Shying Away from Top Colleges. by Roger Crockett, June 21, 50.

Clotfelter, C. (1996). *Buying the best: Cost escalation in elite higher education*. Princeton: Princeton University Press.

David, R., & MacKinnon J.G. (2004), *Econometric theory and methods*. Oxford University Press

Darity, W., Jr., & Mason, P. (1998). Evidence on discrimination in employment: codes of color, codes of gender. *The Journal of Economic Perspectives, 12*(2), 63–90.

Dube, J. P., Hitsch, G., & Manchanda, P. (2005). An empirical model of advertising dynamics. *Quantitative Marketing and Economics., 3*, 107–144.

Epstein, R. (2002). A rational basis for affirmative action: a shaky but classical liberal defense. *Michigan Law Review, 100*(8), 2036–2061.

Fisher, A. (2006). MBA Hiring, Pay Soaring. CNNMoney.com, April 18.

Godes, D., & Mayzlin, D. (2004). Using online conversations to study word-of-mouth communication. *Marketing Science, 23*(4), 545–560.

Hankins, M. (2001). Broken Dreams: Foreign students are pouring into U.S. business schools, but many recruiters won't even talk to them. *Wall Street Journal,* April 30, p. 13.

Heckman, J. J. (1998). Detecting discrimination. *The Journal of Economic Perspectives, 12*(2), 101–116.

Holzer, H., & Neumark, D. (2000). Assessing affirmative action. *Journal of Economic Literature, 38*(3), 483–568.

Intini, J. (2004). A Brand Reborn: It may not last but, for the moment, Cadillacs are the hipsters' ride of choice. *Maclean's, 117*(8), 36.

Jehn, K., Northcraft, G., & Neale, M. (1999). Why differences make a difference: a field study of diversity, conflict and performance in workgroups. *Administrative Sciences Quarterly, 44*(4), 741–763.

Kochan, T., Bezrukova, K., Ely, R., et al. (2003). The effects of diversity on business performance. *Human Resource Management, 42*(1), 3–21.

Marsden, P. (1988). Homogeneity in confiding relationships. *Social Networks, 10*, 57–76.


[3] It is worth noting that we find significant positive correlations between group percentage and lagged percentage of that group. The correlation for women is 0.63, for minorities it is 0.37 and for International students it is 0.77. These results are consistent with the idea that students are attracted to programs with more students of similar background. However, given the lack of data on applicant demographics we cannot state with certainty that this is the case.

McAlexander, J., Schouten, J., & Koenig, H. (2002). Building brand community. *Journal of Marketing, 66* (1), 38–54.

McPherson, M., Smith-Lovin, L., & Cook, J. (2001). Birds of a feather: homophily in social networks. *Annual Review of Sociology, 27*, 415–444.

Merritt, J. (2003). B-School: a failing grade on minorities. *Business Week*, May 12.

Muniz, A., & Guinn, T. (2001). Brand community. *Journal of Consumer Research, 27*(4), 412–432.

New York Times, The (2011). Mocked as uncool, the minivan rises again. by Nick Bunkley, January 3.

New York Times, The (2012). To enroll more minority students, colleges work around the courts. by Richard Perez-Pena, April 1.

Pelled, L. (1996). Demographic diversity, conflict, and work group outcomes: an intervening process theory. *Organization Science, 7*(6), 615–631.

Wall Street Journal, The (2003). Corporate Goal: Ethnic Variety, No Quotas. by Matt Murray, June 24.

Wall Street Journal, The (2000). Women's stagnant M.B.A. enrollment prompts call for changes in new study. by Joann Lublin, May 12.

Wilkins, D. (2004). From 'Separate is Inherently Unequal' to 'Diversity is Good for Business': the rise of market-based diversity arguments and the fate of the black corporate bar. *Harvard Law Review, 117* (March), 1548–1615.

Wood, W. (1987). Meta-analytical; review of sex differences in group performance. *Psychological Bulletin, 102*, 53–71.