Implications of MBA Durability for Providers of Masters in Business Administration Degrees

Warren Farr
95 Greentree Road, Moreland Hills, OH 44022 USA
216-525-8213
warren3@me.com

Abstract

The Masters in Business Administration degree is a popular graduate degree offering the promise of employment at high income levels. MBA enrollment rates have generally increased since the degree was first established at the end of the 20th century. Once granted, an MBA degree remains with its recipient for the remainder of their lifetime. Considering the MBA degree as a durable good, a dynamic diffusion model is used to explore the eventual saturation of MBA enrollments in the US. Reference data is used to ground the model results and to generate possible future enrollment rate scenarios. Sensitivity analysis is performed on model parameters to explore policy decisions for the benefit of MBA degree granting institutions.

Keywords: MBA degree, MBA enrollment, MBA candidates, Bass diffusion, Durable good

Introduction

The Masters in Business Administration degree is a popular graduate degree offering the promise of employment at high income levels. MBA enrollment rates have generally increased since the degree was first established at the end of the 20th century. More recently, there have been articles in the popular press declaring "Decline in Full-time MBA Applications Steadies" (Financial Times, 9/25/13); "MBA Demand and Pay are Up, but Weak in the US" (Bloomberg Business Week, 10/1/13); and "Is the MBA Obsolete?" (Forbes, 5/30/12).

It has been said that nothing can grow forever. So when will growth in MBA enrollments in the US slow down? What are the key factors that will drive a permanent change in demand for MBA degrees? This paper explores these questions using a computer model designed to simulate the spread of MBA degrees into the available US population. Of special interest is the fact that once granted, an MBA degree remains with its recipient for the remainder of their lifetime, making the MBA degree comparable to a durable good.

The model confirms that the growth in the number of enrolling MBA candidates will slow and then reach a peak. The model also predicts a contraction in the number of enrolling MBA candidates before a sustainable equilibrium level is reached. The enrollment contraction can be explained using the dynamics of a durable good industry alone, without reference to specific economic cycles or booms/busts within the available population. In addition, some possible strategies for weathering the enrollment peak and decline are suggested. Based on these results, further research may be warranted.

The Model and Its Assumptions

The MBA durability model is a small system dynamics model describing the diffusion of the Masters in Business Administration (MBA) degree into the available US working population. The model explores the longer-term implications of an MBA as a durable degree (once obtained, the MBA degree does not expire). The subject is presented in market-aggregate without regard for competition among the providers of MBA degrees.

The model consists of three stocks in an aging chain of people seeking and obtaining an MBA degree (see figure 1 below). The model begins with the portion of the US working population that is "available" for an MBA degree ("Working Population Available for MBA"). While some of the available population age out of the work force without obtaining an MBA degree, the majority of the "available for MBA population" enroll in an MBA degree program and become "MBA Candidates". After completing their MBA degree, the MBA Candidates become part of the "Working MBA Population" and remain there during the balance of their working career.

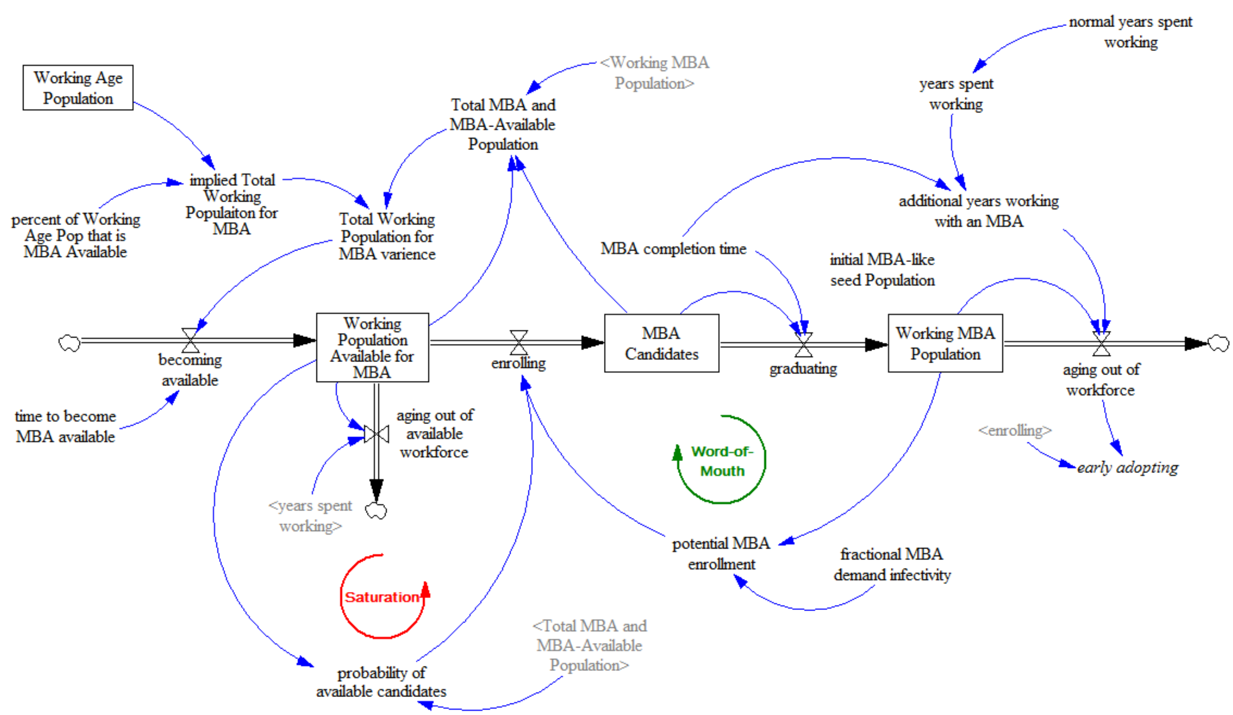

Figure 1: Model Diagram

The total model population (sum of all three stocks of people) is driven exogenously using an estimate of the portion of the US working population that either has an MBA degree, is an MBA degree candidate, or is available for an MBA degree. This estimated population is calculated by starting with the US working population provided by the US

Department of Labor (2014). The Department of Labor estimate of non-institutionalized people ages 16 and older from 1948 to 2014 have been extended to include the entire simulation period of the model (1900 to 2050) and called "Working Age Population" in the model (see figure 2 below).

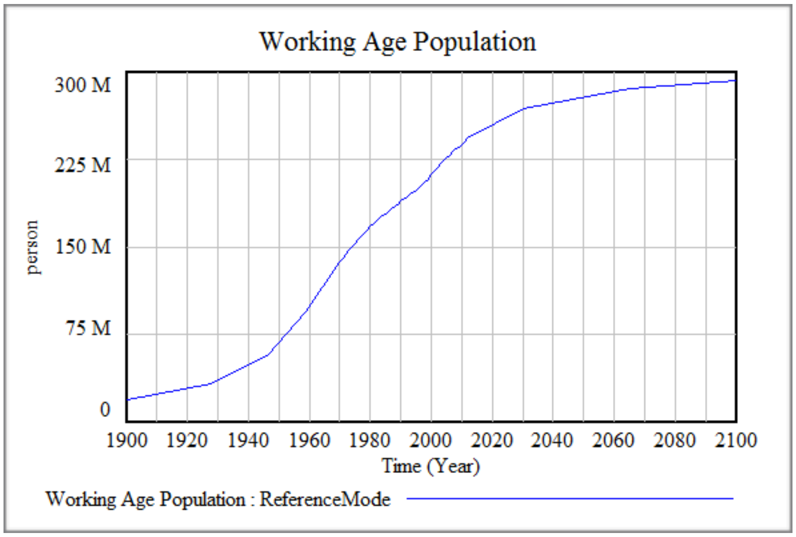

Figure 2: US Working Age Population Data Extended to the Model Simulation Period

The US Department of Commerce (2013) estimates that about 10% of the US working population has one or more advanced degrees (including MBA degrees). Some portion of this advance-degree portion of the population either has an MBA degree or will consider earning an MBA degree during their career. Using an initial estimate of 25% (of the advanced-degree working population), the model calculates a "implied Total Working Population Available for MBA" equal to 2.5% (25% of 10%) of the overall working population. This exogenously driven implied available population is compared to the model's "Total MBA and MBA-Available Population" and the difference is averaged into the "Working Population Available for MBA" stock through the "becoming available" inflow (using a five year "decision-making" time).

MBA available people enroll into MBA programs and become MBA candidates. (A small percentage of MBA available people age out of the working population before enrolling in an MBA degree program.) The number of people enrolling in MBA degree programs grows with an increase in the Working MBA Population through a word-of-mouth reinforcing process. The growth of MBA candidates is eventually limited by a saturation process as the population available for an MBA degree shrinks. The "enrolling" flow of people is the primary dynamic behavior of interesting in the model.

The spread of MBA degrees into the population is structured as a "Bass Diffusion" model (Bass, 1969). A "fractional MBA demand infectivity" rate is multiplied by the working MBA Population creating "Potential MBA Enrollment". (Note: the Working MBA Population is seeded with some pre-existing MBA-like people. Seeding this population allows the word-of-mouth process to begin without adding the complexity of an advertising or initiation process to the model.) Growth in Potential MBA Enrollment, all else being equal, causes more people to enroll into MBA programs. Enrollments continue to grow until the population available for MBAs declines relative to the overall MBA population. As this happens, the “probability of available candidates” (the probability that a member of the model’s total population is still available and does not already have an MBA degree) decreases, causing the number of people enrolling to slow. The resulting (baseline scenario) S-shaped increase in the Working MBA Population is shown in figure 3 below.

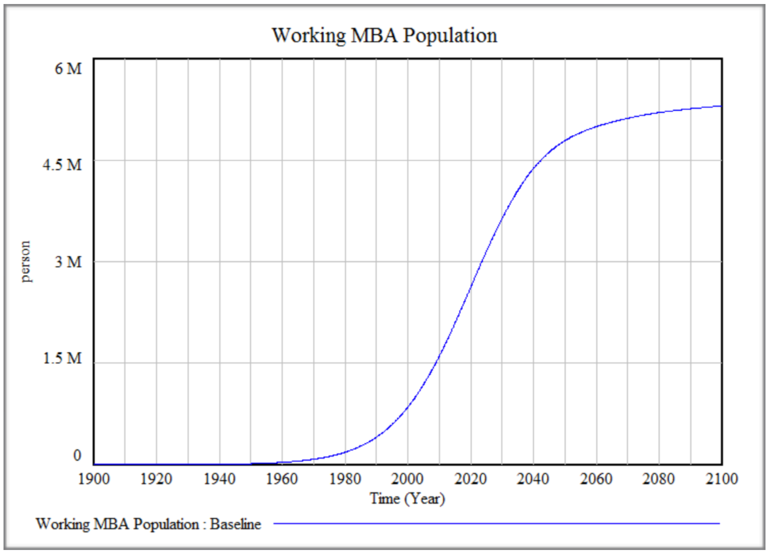

Figure 3: Baseline Scenario- Working MBA Population

Once enrolled in an MBA program, the process of graduating with an MBA degree is controlled by the average MBA completion time. While a standard full-time MBA program is typically two years, the baseline MBA completion time in the model is estimated to be somewhat longer to take into consideration part-time programs available to people who continue working. Similarly, the Working MBA Population ages out of the workforce based on the average “additional years spent working with an MBA” (equal to the “years spent working” minus the “MBA completion time”). Since the working population data includes people 16 years of age and older, the baseline “years spent working” parameter value is 50 years (15 + 50 = 65, a reasonable baseline retirement age). The baseline value of all model parameters are shown in figure 4 below.

Model Parameters	Baseline Values
percent of working population that is MBA available (dimensionless)	2.5%
time to become MBA available (years)	5
years spent working (years)	50
MBA completion time (years)	2.78
fractional MBA demand infectivity ((people per year) per person)	0.134
initial MBA-like seed Population (people)	250

Figure 4: Baseline values of model parameters

As described above, baseline model parameter values were estimated using generally available information and common sense. To further refine these parameter values and increase confidence in the model's behavior, two available reference points were used. First, the beginning of University level business education in the US occurred in 1881 at the University of Pennsylvania (Wharton School of Business, 2014), known today as the Wharton School of Business. The Harvard Business School, reported to be the second US University level business college, was founded in 1908 (Harvard Business School, 2014). Using these two founding dates as an anchor, the model's simulation starting time (when there are only an initial seed quality of people with an MBA-like degree) is set to the year 1900.

Second, detailed estimates of the number of MBA degrees conferred and the number of MBA students enrolled in the US for the year 2008 were published in the Business Education & Accreditation Journal (Murray, 2011). Using the methodology described in this journal paper, the 2008 estimates provided were extended back in time for the years 2007 through 2002 as shown in italics in figure 5 below. The model variables "MBA Candidates" and "graduating" were fitted to these two reference points, beginning at zero in the year 1900 and then staying within the corresponding 2008 high/low estimates. (In addition, the "MBA completion time parameter" was estimated to be 2.78 years by using the average ratio of 2008 MBA Students Enrolled to 2008 MBA Degrees Conferred in this data.)

Program Year Ending:	2008	2007	2006	2005	2004	2003	2002
MBA Degrees Conferred - Low Estimate	**106,347**	*101,561*	*96,991*	*94,481*	*92,314*	*84,589*	*79,315*
MBA Degrees Conferred - High Estimate	**121,968**	*116,479*	*111,238*	*108,359*	*105,874*	*97,014*	*90,996*
MBA Students Enrolled - High estimate	**272,219**	*259,969*	*248,270*	*241,845*	*236,299*	*216,523*	*203,025*
MBA Students Enrolled - Low Estimate	**365,502**	*349,054*	*333,346*	*324,719*	*317,274*	*290,721*	*272,597*

Figure 5: Estimates for 2008 Extended back in Time to 2002

With reasonable baseline values for the model's parameters estimated, the model behavior was fitted to the reference mode data using the remaining "fractional MBA demand infectivity" parameter. This parameter has units of potential MBA enrollment (people) per year per person (who has an MBA) and should be much less than one. The resulting model behavior for the baseline scenario fitted to the available high/low reference data is shown in figures 6 and 7 below.

Unlike the smooth S-shaped result of the Working MBA Population, both the MBA Candidate Population and the MBA candidates graduating grow to peak value and then contract to a sustainable "replacement" level (people) and rate (people/year). While this behavior is somewhat counter-intuitive, it is the behavior of a durable good predicted by Bass in his paper describing diffusion of a good into an available market (Bass, 1969). A durable good has a long life span relative to a non-durable good. Once adopted, the replacement rate of a durable good is much smaller than that of a non-durable good because the durable good lasts longer. A consumer may replace their dishwasher every 15 to 20 years, while they may replace the milk in the refrigerator once or more per week. It is the replacement rate of the good that determines the sustainable "sales" rate of the good in the long run.

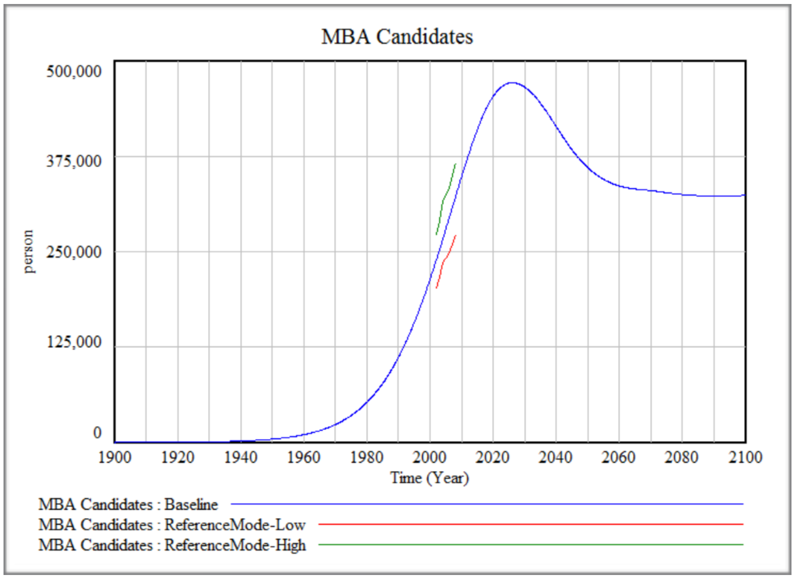

Figure 6: Baseline MBA Candidates versus High/Low Reference Data

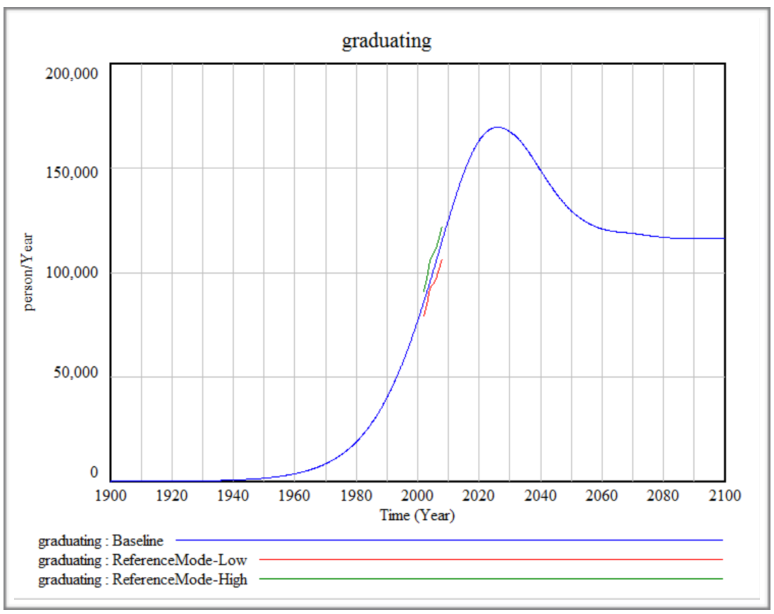

Figure 7: Baseline Graduating MBA Candidates versus High/Low Reference Data

Model Behavior

The baseline scenario behavior of the three model stocks (people) are shown in figure 8 below. The available population (green) initially grows as the overall population grows, but eventually peaks and then declines as the stock of MBA candidates (blue) and the stock of MBAs working (red) grow with the increasing popularity of earning an MBA degree. The majority of the baseline model dynamics occur prior to 2060 when diffusion of MBA degrees has reached a more steady state.

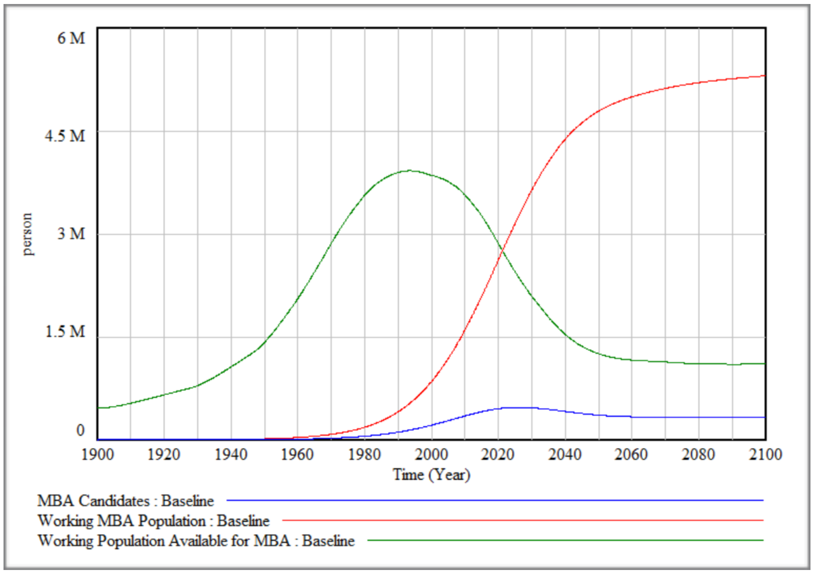

Figure 8: Baseline Scenario- Behavior of Stocks

The corresponding flows (people per year) are shown in figure 9 below. (The "aging out of available workforce" flow is negligible and not included in the figure.) The "becoming available" flow (red) reflects the jagged nature of the exogenous population data that drives it. People become available at a generally increasing rate until they are almost equal to the number of people aging out of the workforce (blue). The steady difference between these two represents modest continued growth in the overall model population. The number of people aging out of the workforce (blue) grows with the size of the Working MBA Population. The small difference between the flow of people enrolling in MBA programs (green) and those graduating (grey) is the result of the constant and relatively short 2.78 years that it takes on average to complete a MBA degree.

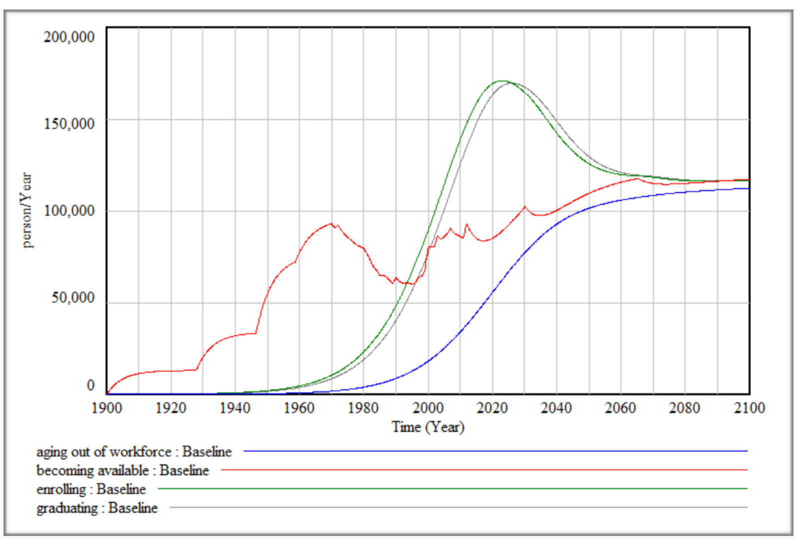

Figure 9: Baseline Scenario- Behavior of Stocks

The baseline scenario behavior clearly indicates that institutions offering MBA degrees should expect a significant slowing in the growth of enrollments occurring over a ten year period, followed by a peak around the year 2020, followed 30% decline in MBA enrollments occurring over a 30 year period. While this is an accurate description of the baseline scenario, it is not being offered as an accurate forecast or point prediction of the future. Gaining confidence around exactly when MBA enrollments will peak and at exactly what peak value is not the focus of this paper. The focus of this paper is the overall behavior pattern that MBA enrollments will follow: they will reach a peak value followed by a significant contraction before reaching a sustainable replacement rate.

The fact that this behavior pattern emerges from such a simple model with only a single time dependent exogenous input (Working Age Population) is remarkable. No additional model structure is required to produce this behavior pattern. Indeed, replacing the exogenous input with a constant value yields the same behavior pattern for enrolling MBA candidates. This is shown in figure 10 below (blue line- Working Age Population is held constant throughout the simulation period at 350M people; red line- previous baseline scenario with variable exogenous Working Age Population). Holding the Working Age Population steady changes the timing and height of the peak, and sustainable enrollment rate, but it does not change the overall behavior pattern of MBA enrollments.

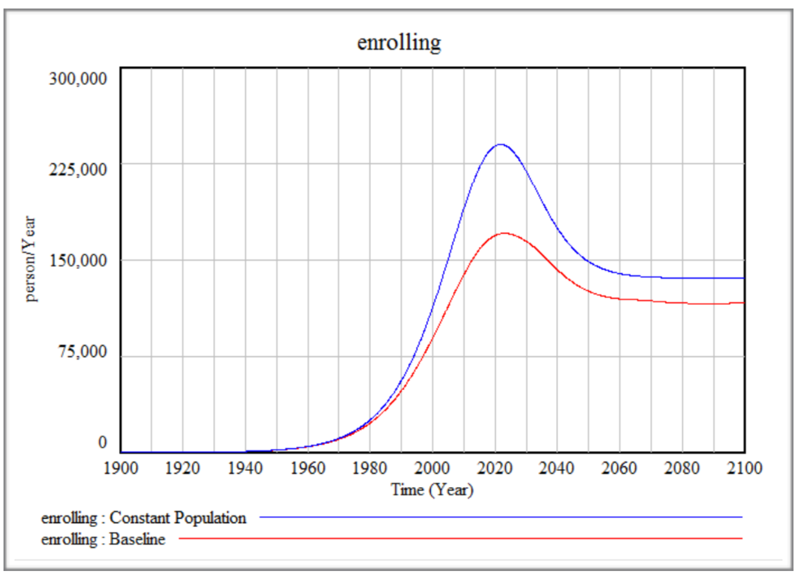

Figure 10: Enrolling MBA Candidates: Baseline vesus Constant Population

The source of the contraction in the enrolling flow can better be explained by dividing the enrolling flow into component parts as shown in figure 11 below. First, consider that at the end of the baseline simulation, people enrolling into MBA programs (green) are equal to people with MBAs aging out of the workforce (blue). Thus, at the end of the simulation, the flow of people enrolling in MBA programs is just enough to replace the flow of people with MBAs aging out. (This is why the population of Working MBAs remains constant towards the end of the simulation.)

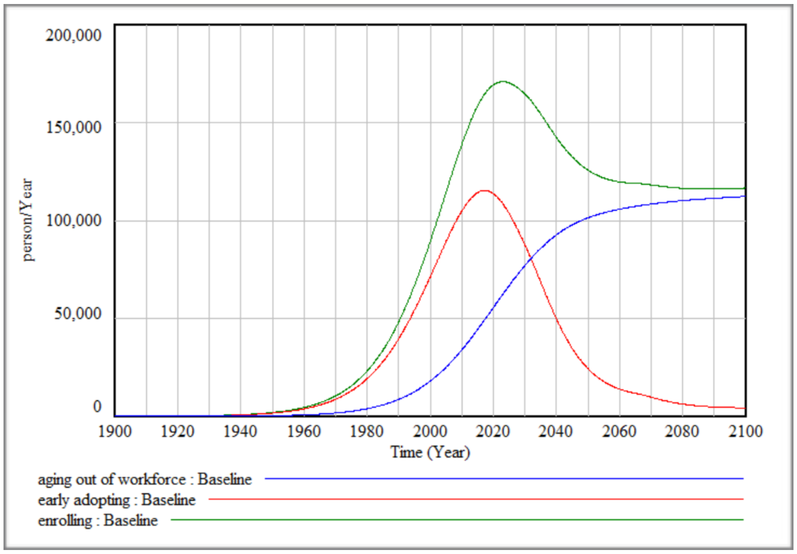

Figure 11: Enrollment flow broken into Early Adoption and Replacement flows

During the earlier years of the simulation, the enrolling flow (green) is greater than the flow of people aging out of the workforce (blue). The mathematical difference between these flows is shown in red and labeled “early adopting”. At the beginning of the baseline simulation the percent of the total model population that is a Working MBA is zero (except for the seed value), whereas at the end of the simulation, the percent of the total model population that is a Working MBA has reached an “equilibrium” level of nearly 80%. To go from just a few working MBAs to a sustainable 80% of the model’s population required many people to be “early adopters” of the MBA degree. As can be seen in the graph, early adopting (red) is most of the enrolling flow near the beginning of the simulation. As the stock of Working MBAs grows, they begin aging out of the workforce and need to be replaced (blue). As the percent of the model’s population with an MBA reaches its long-run equilibrium, the early adopting flow is reduced to a rate equal to the small growth in the model’s population.

Because an MBA is a durable good, the aging out of the workforce (replacement) flow is relatively small when compared to the early adopting flow. A less durable good would require frequent replacement making the aging out of the workforce (replacement) flow much larger in comparison. A hypothetical example where MBA degrees are not durable, expiring 12 years after being granted, is shown in figure 12 below.

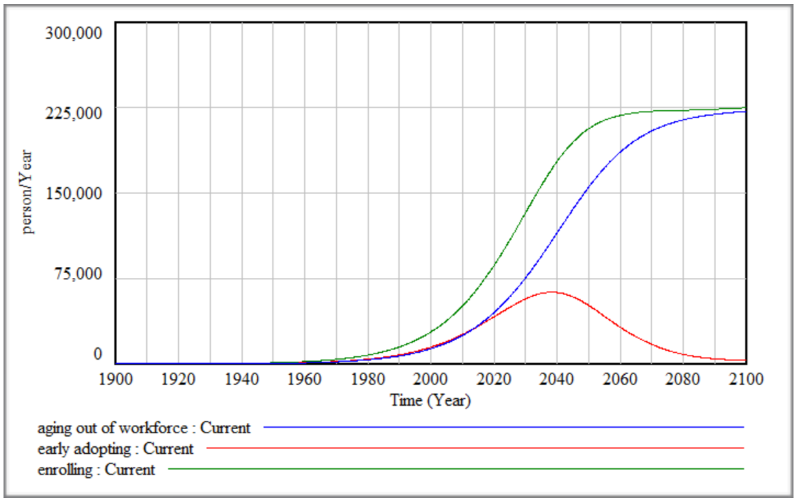

Figure 12: Enrollment, Adoption, and Replacement with expiring MBA degree

In this hypothetical example, MBA degrees expire (non-durable) requiring them to be replaced during a person's working career. As a result, the number of people (re)enrolling in MBA programs (green) is substantially larger than the baseline scenario. The difference between total enrollments and replacements is again labeled "early adopting" (red). Because the bell-shaped early adopting flow is now relatively small compared to the greatly enhanced replacing flow (blue), the shape of the overall enrolling flow is less influenced by the bell-shape and avoids contracting before reaching its equilibrium level. This hypothetical example is offered as an additional intuitive explanation for why MBA enrollments (as a durable product) must reach a peak and then contract before reaching a long-run equilibrium flow rate.

Model Sensitivity to Parameter Values

The overall behavior pattern for MBA enrollments has been discussed. Gaining an understanding of the timing of this behavior pattern is more difficult. When will enrollments peak? What will peak enrollments be? How fast will enrollments contract? What will long-run sustainable enrollments be? The model as presented can be used to begin to answer these questions by varying parameter values and observing the corresponding sensitivity of the model behavior. (For increased confidence, additional model structure may be required and is beyond the scope of this paper.)

In this section three parameter values (initial MBA-like seed population, percent of the working age population that is MBA available, and years spent working) will be modified and the effect on MBA enrollments will be described. In each case, the "fractional MBA demand infectivity" parameter was adjusted to recalibrate the model behavior to the available reference mode data. The sensitivity scenarios considered and the corresponding parameter values are shown in the figure 13 below.

Scenarios: Parameters	Baseline Scenario	Small and Large seed Population	Small and Large Working Population	Short and Long Years Working
initial MBA-like seed Population (people)	250	**50** **1,000**	250	250
percent of working population that is MBA available (dimensionless)	2.5%	2.5%	**1.8%** **5.0%**	2.5%
years spent working (years)	50	50	50	**30** **70**
time to become MBA available (years)	5	5	5	5
MBA completion time (years)	2.78	2.78	2.78	2.78
fractional MBA demand infectivity (dimensionless)	0.134	**0.154** **0.118**	**0.142** **0.128**	**0.151** **0.127**

Figure 13: Comparison of Baseline Scenario and Sensitivity Scenarios

Results of changing the seed population are shown in figure 14 below. A smaller MBA-like seed population of 50 people (red) causes the word-of-mouth feedback process to get a slower start. Reaching the reference mode value of MBA candidates in 2008 requires a larger infectivity multiplier. The result is a delay in early MBA enrollments causing a higher peak enrollment value. A larger MBA-like seed population of 1,000 people (green) causes the word-of-mouth feedback process to get a faster start. Reaching the reference mode value of MBA candidates in 2008 requires a smaller infectivity multiplier. The result is an acceleration of early MBA enrollments causing a smaller peak enrollment value. Long-run equilibrium enrollments are relatively unchanged across all three scenarios shown (including the baseline in blue).

The actual value of the seed population (or the actual effectiveness of early “MBA degree advertising” activities) is unknown. Estimating an historical value such as this could prove difficult. The fact that the peak enrolling value is significantly changed by the seed value (at the beginning of the simulation) shows how difficult accurate forecasting will be. In this case, additional reference mode data would be required to gain a more confident estimate of the enrolling growth rate.

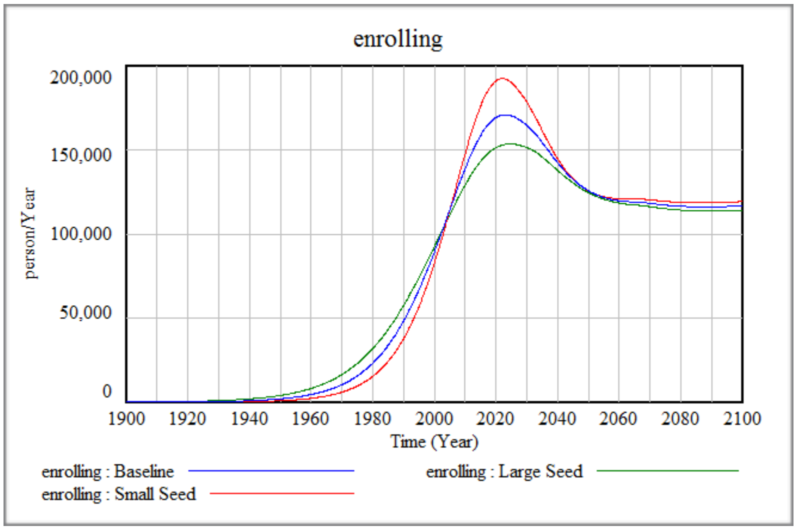

Figure 14: Sensitivity of Enrolling to the size of the MBA-like Seed Population

Results of changing the percent of the working age population that is MBA available are shown in figure 15 below. A smaller percent available of 1.8% (red) reduces the overall MBA opportunity significantly, reducing peak enrollments and more importantly reducing long-run sustainable enrollments. (Note: any percent available value smaller than 1.8% caused 2008 MBA candidates to fall short of the 2008 reference mode data.) A larger percent available of 5.0% (green) enhances the overall MBA opportunity significantly, increasing peak enrollments and more importantly increasing long-run sustainable enrollments. This is an important result with policy implications for institutions currently granting MBA degrees.

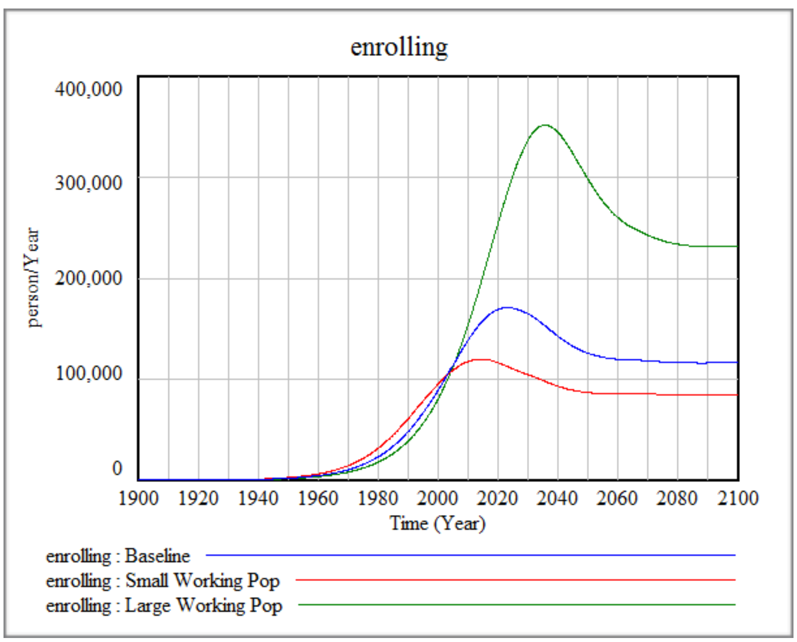

Figure 15: Sensitivity of Enrolling to the size of the Available Working Population

Results of changing the number of years spent working are shown in figure 16 below. Fewer years spent working (red) enhances the overall MBA opportunity significantly, increasing peak enrollments somewhat and more importantly increasing long-run sustainable enrollments. More years spent working (green) reduces the overall MBA opportunity significantly, reducing peak enrollments somewhat and more importantly reducing long-run sustainable enrollments. This is an important result with policy implications for institutions currently granting MBA degrees.

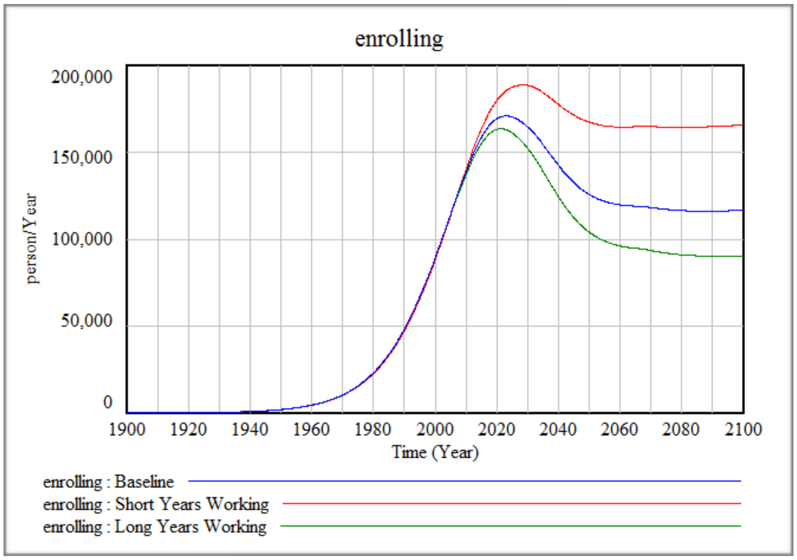

Figure 16: Sensitivity of Enrolling to the size of the Years Spent Working

While changing the initial MBA-like population seed value indicates that precise value and timing forecasting may be difficult, the remaining two sensitivity experiments imply that MBA granting institutions who choose to understand these dynamics may have some influence over the results. This will be discussed further in the next section.

Implications for MBA Granting Institutions

While the overall behavior pattern of people enrolling into MBA programs is unavoidable, the range of results for people enrolling into MBA programs indicates possible policy enhancements for MBA granting institutions. One opportunity facing these institutions is developing a strategy around how to approach slowing enrollment growth and then how to absorb a contraction in the enrollment flow of candidates. Each institution may approach this challenge differently depending on their relative strengths and weaknesses. Highly selective institutions might choose to lower acceptance standards for a period of time (or introduce MBA-light programs), while the least selective institutions may decide to exit. The end of enrollment growth followed by a contraction in enrollments could be especially challenging for recent MBA granting institution entrants.

Although the inevitable peak and contraction of MBA enrollments is important, a healthy sustainable long-run enrollment rate is the ultimate goal for surviving institutions. With this in mind, the model results indicate that policies targeted at recruiting more people into the pool of people available for an MBA degree and/or reducing the perceived durability of an MBA degree will increase the sustainable long-run MBA enrollment rate. Reducing the cost of enrolling and increasing flexibility of MBA degree programs would be one way to encourage a larger available customer population. The increase in part-time as well as distance learning MBA granting programs is an example of lowering the cost of enrolling and increasing program flexibility. Both offerings are likely to increase the available customer population.

Another policy to increase the long-run sustainable enrollment suggested by the model is to reduce the durability of an MBA degree. While an MBA degree is good for life, marketing business executive “refresher courses” to MBA program graduates is a way to earn additional revenue from the working MBA population. This policy could be represented in the model as reducing the perceived life of the MBA degree as MBA degree holders enroll in ale carte classes to keep their business knowledge fresh.

The good news is that baring an unforeseen exogenous reduction in overall demand for business administration skills, the number of people enrolling in MBA grating programs will remain large. The results of this model study show specifically why the number of people enrolling in MBA programs will not continue to grow forever. Having a prepared strategy for MBA market saturation is a good policy. The paper attempts to explore the MBA market saturation process in a way that suggests meaningful policy formation. The long time periods over which the model dynamics develop will likely hinder an institution’s ability to plan until such time as symptoms of an enrollment slow-down are evident.

Possible Model Enhancements

The model presented in this paper was confined to the diffusion dynamics of MBA degrees in the US. There are many possible enhancements to this model depending on the topic of discovery. An MBA granting institution might want to add competitive dynamics to this model in an effort to better understand how one institution’s policy decisions and the resulting competitive reaction will affect the institution’s outcome as well as the overall size and timing of enrollments.

Someone familiar with the business of MBA granting institutions would be able to suggest many additional model structures to further refine the resulting dynamics. Some of the parameters that this model holds as exogenous could be made endogenous to the model by adding model structure. For example, the MBA completion time may changed over time based on other factors, such as intensity of competition, calculated in an enhanced model.

Another possible enhancement would be to define and track different kinds of business degrees that may act as complete or partial substitutes for the full-time MBA degree. The inter-relationship of the diffusion of MBA degrees with “certificate programs” or “executive education” programs may be of interest to institutions deciding which of these programs to offer. In such a model, it may be necessary to separate the degrees earned from the people that earned them into co-flowing structures.

While not directly a model enhancement, this modeling effort would benefit from additional reference data, especially one or more estimated values for the population of MBA candidates at different times along the simulation timeline. This reference information could be used to further refine the historical trajectory of people enrolling in MBA programs and thus lend some additional confidence to the specific values contained in the model results.

Acknowledgements

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Biography

Warren Farr received his Master of Science in System Dynamics from Worcester Polytechnic Institute in 2011. He has been working in the heating, ventilating, air conditioning, and refrigeration industry as a wholesaler since 1993. Prior to learning to operate a wholesale business, Warren worked in the computer industry developing and marketing network control products, and as a contractor to the military developing communication and targeting systems. He has a Bachelor of Science degree from Duke University and a Master of Business Administration also from Duke.