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ABSTRACT

The main aim of this paper is to present a longitudinal analysis of the changes in the AmericaEconomia MBA Rankings for the period 2005-2014. The AmericaEconomia ranking was the first international ranking specifically devoted to Latin American business schools, and with data gathered from this ranking we build a panel to study its stability and the main determinants of a school's position in such ranking during the period under study. The final aim of this study is to examine the reliability of the AmericaEconomia ranking, that is whether changes in the ranking positions are not just due to white noise, and compare its stability with those of the US and other global rankings. We also want to empirically determine which are the key quality variables this ranking is promoting for Latin America Business Schools and the evolution of these business schools during the period under study. Unlike previous literature that usually considers dynamic Tobit models for ranking analysis, we put forward an alternative methodology based on a system GMM estimator with first-differenced instruments. We argue that dynamic Tobit models are appropriate only if you have truncated data about the ranking variable but full data on Business Schools variables. This is not always the case, as in our work in which we only have a subsample of Latin American Business Schools, those included in the AmericaEconomia ranking.

Keywords: Business Schools, Rankings, MBA education, Latin America, Longitudinal Analysis, Dynamic Panels.

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1. Introduction

While there are many criticisms and skepticism regarding business schools' Master of Business Administration (MBA) rankings (Gioia & Corley, 2002; Hopwood, 2008; Wedlin, 2006, 2007), there seems to be a consensus about their importance for business schools and their stakeholders (Espeland & Sauder, 2007; Fee, Hadlock, & Pierce, 2005; Kogut, 2008; Sauder & Lancaster, 2006).

In particular, the stability of rankings has been an important vein of research for management education. For example, Morgeson & Nahrgang (2008) empirically examine the US BusinessWeek rankings and find that they are highly stable over time, being some of the best predictors of rankings success characteristics that cannot be easily changed, such as student perceptions of placement outcomes. The stability of rankings is typically used to assess their reliability, determining whether in these structures a substantial portion of any movement is reducible to noise. This implies that a shift in the position of a school at one point in time tends to be compensated by a later countermovement (Dichev, 1999, 2001, 2008). While academic works for internati onal rankings are less abundant, they also suggest similar degrees of stability from one year to another, especially at the top of the rankings (Devinney et al. 2008). This later result about the stability of international rankings has been challenged by some authors analyzing the recent rise of European and Asian business schools in those rankings during the past decade (Bradshaw, 2010; Byrne, 2011). For example, Collet & Vives (2013) empirically examine the Financial Times Global MBA rankings and find that significant changes have happened at the international level: US schools have declined in favor of European and Asian schools, mainly due to that MBAs in those regions have experienced a sustained rise in graduate salaries. They argue that the main variables behind these changes can be found in macro factors such as: aggregate economic demand, overall supply of MBA graduates, student migrations, and shifts in visa policies.

Another line of research uses data from rankings to determine the main determinants of business school's success in such rankings and the impact of such variables on the expected salary of MBA graduates. O'Brien et al. (2010) combining AACSB data with data from the Financial Times Global MBA Rankings, and with publication count data derived from the Institute for Scientific Information's (ISI) Web of Knowledge database, argue that research is relevant and valuable for business schools in the sense that it contributes to enhance the economic value MBA students accrue from their education, estimating that research can potentially enhance student salaries by up to $24,000 per year. The main idea behind this result is that there is a positive correlation between research and business school rankings, even if the rankings do not explicitly consider or effectively measure research activity. In this context, Drnevich et al. (2011) have also provided empirical support for the positive relationship between academic research and rankings.

While there are many academic works analyzing the stability of MBA rankings and the best predictors of success in such rankings for the United States and Europe (Bradshaw, 2010; Byrne, 2011; Collet & Vives, 2013; Devinney et al. 2008; Dichev, 1999, 2001, 2008; Dowling, & Perm-Ajchariyawong, 2008; Morgeson & Nahrgang, 2008; O'Brien, et al., 2010), to our knowledge, there are no works squarely analyzing the specific case of Latin America's business schools regarding these two issues. It is precisely in this context that we want to contribute to the literature by putting forward a longitudinal analysis of the changes in the AmericaEconomia MBA Rankings

for the period 2005-2014. The AmericaEconomia ranking was the first international ranking specifically devoted to Latin American business schools, and its important and influence has risen over the years, as shown by all the Schools in the region that use its results for promotion and marketing activities. We analyze data from this ranking to build a panel to study its stability and the main determinants of a school's position in such ranking during the period under study. The final aim of this study is to examine the reliability of the AmericaEconomia ranking, that is whether changes in the ranking positions are not just due to white noise, and compare its stability with those of the US and other global rankings. We also want to empirically determine which are the key quality variables this ranking is promoting for Latin America Business Schools.

Unlike previous literature that usually considers dynamic Tobit models for ranking analysis analysis (see for instance: O'Brien et al., 2010 and Collet, F., & Vives, L. (2013), we put forward an alternative methodology based on a system GMM estimator with first-differenced instruments (Blundell & Bond,2000). We argue that dynamic Tobit models are appropriate only if you have truncated data about the ranking variable but full data on Business Schools variables. This is not always the case, as in our work in which we only have a subsample of Latin American Business Schools, those included in the AmericaEconomia ranking.

For the case of Latin America, the relevance and importance of business education has increased over time. In fact, demand for MBA graduates have been growing in recent years among local companies, and this trend continues at a sustainable rate of growth (7% growth in 2014 and 10% growth in 2013). Employers in the region are using MBAs as a key piece of information when looking for talent to internationalize their companies across the region. Brazil, Argentina and Mexico are the drivers of MBA growth. According to the survey published by QS TopMBA (2014), there is a 14% increase in demand for MBA graduates in Mexico, 9% in Brazil, and a 13% increase in Colombia.[4] Despite this increasing importance of management education in Latin America, given the scarce participation of LATAM business schools in global MBA rankings, little is known about their evolution and relative performance.

The paper is organized as follows. Section 2 presents a brief account of Latin American Business Schools and MBA programs history and evolution. Section 3 discuss the main methodological aspects of MBA Rankings, specifically comparing similarities and differences of the AmericaEconomia MBA Ranking with other US and Global Rankings. Section 4 describes the data used in the study and Section 5 put forward the proposed empirical strategy. Section 6 provides an analysis of the results, and Section 6 presents some concluding remarks and future research avenues.

2. Background: Business Schools and MBAs in Latin America

MBAs and business schools have been part of the educational landscape in Latin America for many years now. They started almost at the same time than European business schools and gained widespread acceptance in the region, especially over the past twenty years.

[4] For details see: http://www.global-workplace.com/wp-content/uploads/2014/10/2015topmba.com_jobs_salary_trends_report.pdf

The first MBAs in Latin America were created in specific university departments with a certain level of autonomy or, more commonly, as business schools, some of them supported by business schools in the U.S. (Ramos, 2004). **Table 1** below summarizes the risen of business schools and MBA programs in the LATAM Region.

TABLE 1
First Business Schools and MBAs in the Region

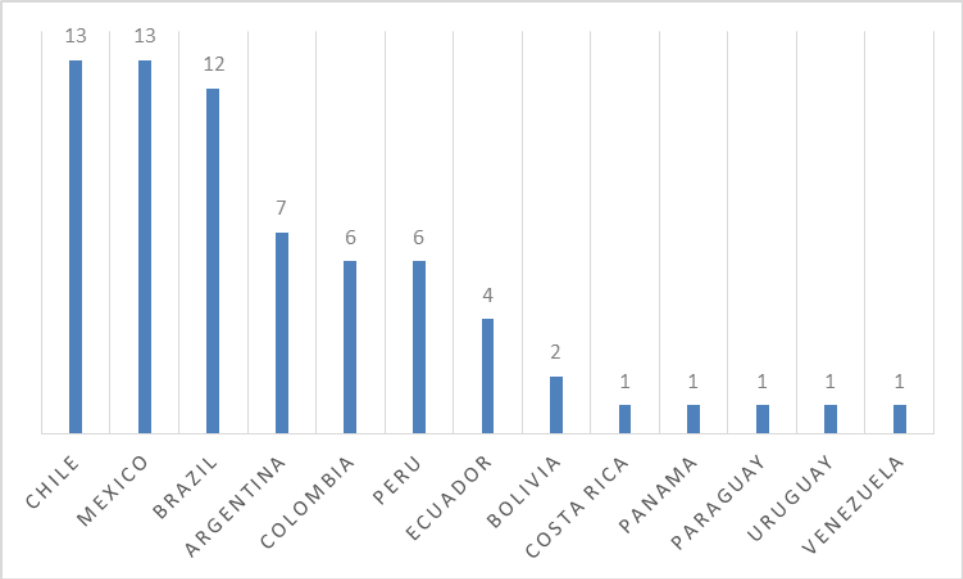
Institution	Country	Foundation Year	Comment
Adolfo Ibáñez University - Business School (AI)	Chile	1953	AI was the first business school in the country and the first in Latin America to offer a university degree in business administration. However, it was until 1979 that the school offered its first postgraduate diploma in Business Administration, which can be considered the first MBA of the school.
Escola de Administração de Empresas de São Paulo – EAESP	Brazil	1958	EAESP (Brazil) that belongs to the Getulio Vargas Foundation (FGV) launched a Postgraduate Course in Administration in São Paulo, Brazil, which can be considered, in terms of content and approach, the first MBA in the region (Ramos, 2004).
Escuela de Administración de Negocios para Graduados – ESAN	Peru	1963	ESAN was established in Lima, Peru and its initial development was entrusted to the Business School of Stanford University, California.
Instituto Centroamericano de Administración de Empresas – INCAE	Costa Rica	1964	INCAE was founded as an initiative of six Central American countries: Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica and Panama with the technical supervision of Harvard Business School and the support of the local private sector. Its first MBA was launched in 1967.
The Business School of Universidad de Los Andes	Colombia	1972	Universidad de Los Andes Business School offered its first MBA program by 1974.
The Instituto de Pós-Graduação e Pesquisa em Administração, Universidad e Federal do Rio de Janeiro – COPPEAD.	Brazil	1973	COPPEAD was founded by a group of professors from the Production Engineering Program (Coppe/UFRJ). In 1980, COPPEAD moved to its own building within the main UFRJ campus and, soon later, acquired the status of an autonomous institute within the structure of the university, thus becoming the COPPEAD Graduate School of Business.
IAE Business School	Argentina	1978	IAE Business School launched its first Management Program by 1978, the school first executive MBA program started in 1981.
Institute of Management Foundation (FIA)	Brazil	1980	FIA was founded in 1980 by professors from the School of Economics, Business and Accounting of the University of São Paulo, Brazil (FEA-USP).
EGADE	Mexico	1995	EGADE is a graduate school of the Monterrey Institute of Technology, founded as a group of business schools, but after a national reorganization in 2010, these business schools merged and became a unified graduate school.

Source: Own elaboration

Today, the proliferation of business schools and MBA programs is widely spread through the region, being executive MBAs, the most common format. The region counts with more than 300 MBA programs from about 140 business schools. From these schools, more than 40 business

schools have consistently appeared in the AmericaEconomia Latin America MBA ranking over the last 10 years. Chile, Mexico, Brazil and Argentina are the countries with more business schools appearing in the AmericaEconomia Latin America MBA ranking for the period 2005 and 2014, as it is showed in **Figure 1**.

FIGURE 1
Number of Business Schools that have participated in the AmericaEconomia Latin America MBA Ranking at least once in the period 2005-2014

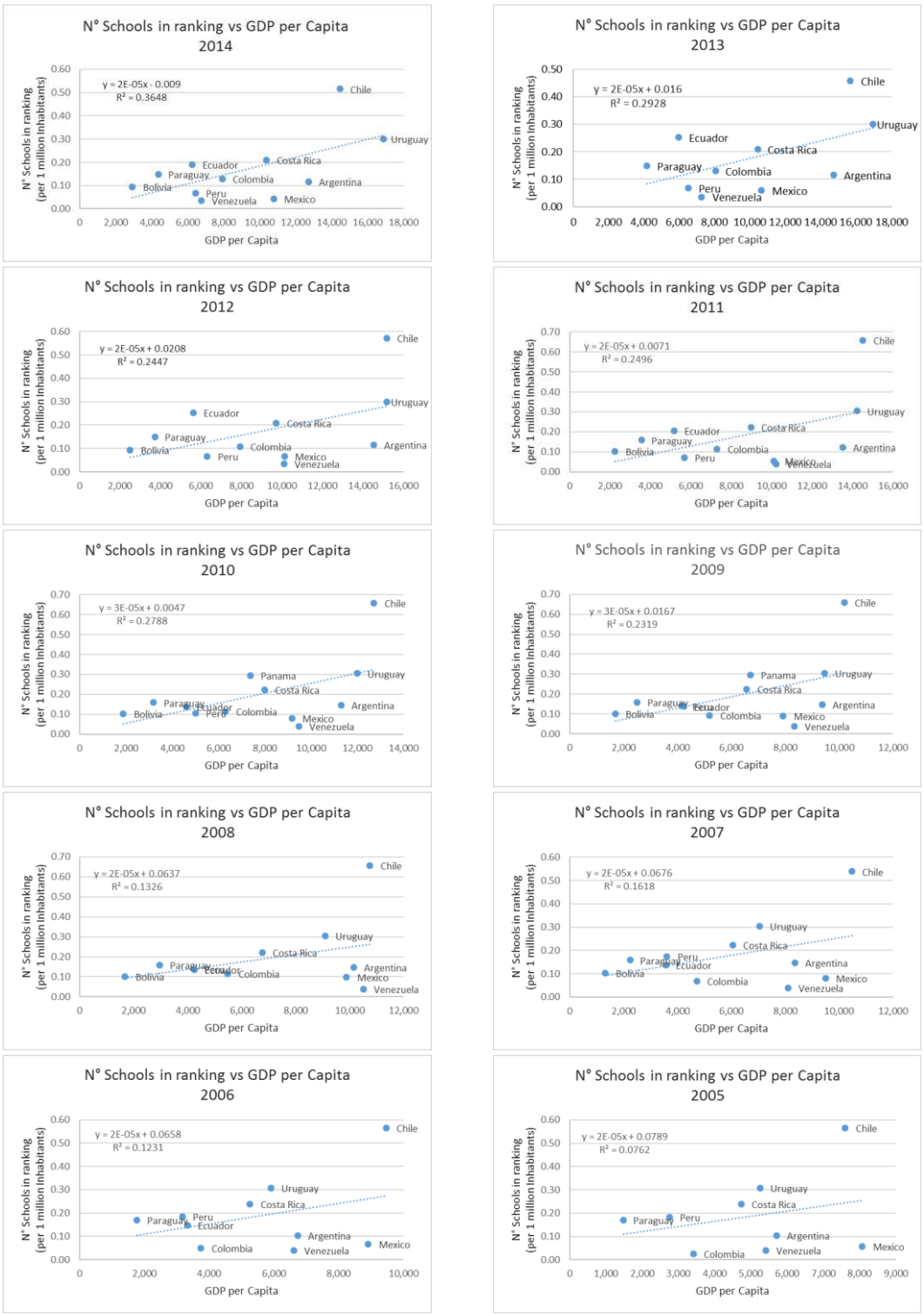


Source: Own elaboration

From the schools participating in the AmericaEconomia ranking, we can infer that the most developed economies in Latin America tend to have a greater representation in the ranking, by comparing the number of schools that have participated in the ranking, adjusted by population and GDP per capita, as a measure of economic development of the country. As we show in **Figure 2**, there is a positive correlation between GDP per capita and number of business schools participating in the ranking.

In the context of a time series analysis, it also transpires that this positive correlation is increasing in time, implying that as economic growth of countries increases over time, this correlation also rises. In other words, the more developed the countries become, the stronger the correlation between these 2 variables gets. This can be seen in **Figure 2** by looking at how the coefficient of determination, denoted by R^2, increases almost uninterruptedly every year from 2005 to 2014, implying a stronger relationship between the number of Schools in the ranking and GDP per capita.

FIGURE 2:
Number of Business Schools participating in the AmericaEconomia Latin America MBA Ranking vs GDP per Capita during the period 2005-2014



Source: Own Elaboration

3. MBA Rankings

With the proliferation of business education, MBA rankings have been gaining importance among business education main stakeholders, such as students, recruiters, faculty, academic administrators, as a way of performance measure for the quality of Business Schools (Wedlin, 2006, 2007).

The first rankings appeared in U.S. and were centered in U.S. business schools, being the first one published by Bloomberg Businessweek in 1988. Bloomberg Businessweek has been ranking the top U.S. full-time MBA programs every other year since then, and international programs since 2000. US News first published a reputation survey in 1987, and in 1990 it developed the methodology and launched its first MBA ranking. All other renowned MBA rankings started in the late 90s and early 2000, such as Forbes (1999), Financial Times (1999), and The Economist (2002). Even though most of these rankings started focusing only in U.S Business Schools, today they include global MBA programs.[5]

In Latin America, some schools from Brazil, Chile, Costa Rica and Peru have appeared in the Financial Times MBA rankings, such as the Global and the Executive MBA rankings, however their appearance is not very relevant nor consistent in time in these global rankings (Collet, F & Vives, L, 2013). AmericaEconomia magazine published the first MBA ranking specifically designed for the Latin American region in 2001.

3.1 Rankings Methodology

International rankings, such as, Businessweek, U.S. News & World Report, Forbes, Financial Times and The Economist are based on a variety of factors including variables we call "input attributes" and "output attributes" of the schools. Input attributes refer to variables that describe the school and its incoming students such as standardized admission test scores, faculty and publications. These attributes are asked directly to the schools. Output attributes denote variables that indicate some sort of result after having completed an MBA, such as alumni salary and propensity to recruit MBAs from a certain school. This information is obtained through surveys to alumni and recruiting companies.

Businessweek ranking is based on three sources of data: student online survey of 45 questions where students rate their program; survey of corporate recruiters, which determines how many MBAs a recruiter's company hired in the previous two years and which schools it actively recruits from; and an Intellectual capital rating, based on a formula incorporating academic publications in journals, books written, and faculty size.

U.S. News & World Report uses a combination of objective and subjective attributes. The magazine seeks expert opinions about program quality and statistical indicators that measure the quality of a school's faculty, research, and students. The business opinion data incorporates responses from deans, program directors, and senior faculty about the academic quality of their programs as well as the opinions of professionals who hire new MBA graduates from business

[5] Some of the rankings distinguish between U.S and non-US Schools (Businessweek and Forbes) and others have one integrated global ranking (Financial Times, Wall Street Journal and The Economist).

schools. The statistical data combines measures of the quality of incoming students and faculty with measures of graduates' placement success. The formula used to calculate the position within the ranking follows a combination of quality assessment (40%), placement success (35%), and student selectivity (25%).

Forbes magazine methodology calculates a five-year return on an investment index by surveying alumni and using pre-enrollment and post-graduate business school salary information as a basis for comparing post-MBA compensation with the cost of attending the programs.

Financial Times ranking is the result of questionnaire to alumni from qualifying business schools. For a program to qualify, it must be internationally accredited, be at least five years old and have produced at least 30 graduates in each of the last three years. The questionnaire uses twenty criteria in three main areas: alumni survey, business school survey, and a research index produced by the Financial Times.

The Economist ranking gathers results from two online questionnaires, one questionnaire to business schools and the other one to MBA students and recent graduates. With these two questionnaires, the magazine rates business schools located all over the world. Information provided by the schools made up 80% of the ranking, while students and alumni responses account for 20%. Attributes included in the questionnaires are faculty/student ratio, GMAT scores of incoming students, student body diversity, foreign languages offered, percentage of graduates finding jobs within three months after graduation, percentage of graduates finding jobs through the school's career service, graduates' salaries and the comparison of pre-enrollment and post-graduation salaries, and student and alumni evaluations of the program, facilities, services, and alumni network.

The AmericaEconomia ranking evaluates 4 dimensions through a questionnaire to business schools. These 4 dimensions are academic strength, knowledge production, internationalization and networking. It should be noted that unlike the others mentioned rankings, AmericaEconomia ranking has changed its methodology for assessing MBA programs over time, being just some of the variables unchanging through the years. The attributes evaluated in this ranking include full time faculty, percentage of faculty with PhD, indexed publications, international accreditations (AACSB, EQUIS, and AMBA)[6] and dual degree agreements. This ranking does not evaluate output attributes such as salaries or recruiting of its graduates. However, it does take into account the best executive positions held by alumni.

Most rankings evaluate performance of business schools by heavily assigning weights to output variables, such as increase in salary after MBA, opinion of recruiters on MBA students and schools and propensity to hire graduates from that business school. Some rankings such as Forbes and Wall Street Journal only evaluate business schools with output variables, Forbes by conducting an alumni survey and Wall Street Journal by sending a questionnaire to recruiter firms. Business

[6] AACSB stands for The Association to Advance Collegiate Schools of Business, EQUIS stands for EFMD Quality Improvement System and AMBA stands for The Association of MBA´s. These are the three most important international accreditations pursued by business schools in Europe, United States, Asia and Latin America. They are designed to mainly achieve three outcomes, each one with its own focus and level of depth: quality, continuous improvement, and better stakeholder management (Miles et al, 2004 and Urgel, J., 2007).

Week conducts surveys to students and corporate recruiters and also have an index intellectual capital. In the case of AmericaEconomia, the ranking is built mostly of input variables. In **Table 2**, we present a summary of the type of variables international rankings use to evaluate business schools' performance.

TABLE 2
Characterization of rankings by type of variables used in the evaluation of business schools

Ranking	Source of data	Input Variables	Output Variables
Business Week	1. Student survey 2. Corporate recruiters survey 3. Intellectual capital rating		
Forbes	1. Alumni survey		
Financial Times	1. Alumni questionnaires. 2. Business School data		
Wall Street Journal	1. Recruiters survey		
Economist	1. Business Schools questionnaires. 2. Students and recent graduates' questionnaires		
AmericaEconomia	1. Business School data 2. Alumni survey		

Source: Own elaboration

2.2 Evidence of Stability

Previous results on US rankings suggest that rankings are stable hierarchies (Dichev, 2001; Morgeson & Nahrgang, 2008), meaning that high-ranked institutions are much more likely than low-ranked institutions to retain their positions from one year to the next. In our analysis, we found the AmericaEconomia Latin America MBA ranking is not as stable as the US and global rankings mentioned. In table 2 we show the percentage of schools remaining in the same quartile in the whole period studied. Our results show that only 59% of schools remain in the first quartile from year to year, in contrast for instance with a nearly 90% of schools remaining in the first quartile in the Financial Times ranking (Collet & Vives, 2013). In the second quartile, the percentage is 14% and 3% for the third quartile, while the percentage of schools remaining in the fourth quartile from year to year is 40%, which compares to 51% schools remaining in this quartile in the Financial Times ranking, see **Table 3** below. As we will later see, in the result section of the paper, this

number is consistent with our empirical measure of ranking stability (ranking last year) put forward in our econometric estimation, which explains 45.7% of the position in the ranking.

TABLE 3
Stability of the AmericaEconomia Latin America MBA Ranking

Percentage of Schools Remaining in the Same Quartile from Year to Year	
Q1	59%
Q2	14%
Q3	3%
Q4	40%

Source: Own elaboration

4. Data

AmericaEconomia is one of the most widely read magazines in the areas of business, economics and finance in Latin America. It has regional presence and provides information and market analysis for the region. The magazine was launched in 1986, while the AmericaEconomia Latin America MBA Ranking started in 2001.

The ranking evaluates 4 dimensions: academic strength, knowledge production, internationalization and networking, although inside each dimension, some of the attributes have changed over time.

The attributes evaluated in the academic strength dimension have had some changes through the years. The variables number of full time faculty and percentage of full time faculty with PhD degree have remained constant. However, the first years of the ranking, schools were asked to inform about the percentage of professors holding an MBA or master degree from a university from US or Europe, same for professors holding PhD degrees, the ranking discriminated by the university in which professors had obtained their graduate degrees (2005 and 2006). In the period 2005-2007, the ranking included as an attribute the percentage of professors holding PhD degrees from top 40 school, based on the Beijing World University Ranking. The idea of evaluating quality of faculty members by the quality of the University from where they obtained their degree was resumed in 2014, when the ranking started taking into consideration full time faculty graduating from top 15 and top 110 schools.

In terms of knowledge production, the main variable, which has remained consistent over time, is the number of papers indexed by Web of Science (WoS, formerly known as ISI Thompson) published by faculty members of the schools during a 3-year period. In 2005 and 2006 the ranking created an innovation attribute, which measured the University capabilities for enterprises creation and patents registered. During these 2 years, it was also evaluated a ratio between quality versus quantity of applied research. Most of the period analyzed (2007, 2008, 2010, 2011, 2012 and 2013), the ranking took under consideration the amount of papers indexed other than WoS. Excluding the years 2006 and 2014, the ranking also considered books as contributing to the attribute production of knowledge.

The internationalization attribute has been measured through the variables international accreditations and dual degree agreements. Some of the years under study have also included variables such as branding power, global and local, and the number of international agreements.

Networking has been evaluated through surveys to alumni with different information requirements from year to year. During the years 2005 and 2006, the networking attribute was evaluated as local or regional. In 2007, the existence of a graduate association was evaluated, if the school had a placement center (exclusively for the school or University shared) and the degree of institutional support. From 2010 to 2013, the ranking evaluated the existence of a placement center and a successful graduate's index. During these years, the ranking also evaluated the existence of a graduate association, excluding 2013 when the evaluation criteria was the number of members belonging to the graduate´s association.

Some of the attributes to evaluate business schools in the ranking have changed over the years, which may be a cause for the ranking to be less stable than other international rankings.

Over the period under study, 68 business schools from 13 countries have participated at least once in the ranking, being Chile, Mexico, Brazil and Argentina the ones with more presence of business schools in the ranking. We can infer from **Table 4**, the total number of schools by country participating in the ranking has not changed substantially, however the composition of schools have change over time, registering 41 entries and 37 exits over a period of 10 years. Over the 10 years under study, 19 Universities have participated every year, 6 of them have participated 9 years and 4 have participated 8 years.

TABLE 4
BSs included in the AmericaEconomia MBA ranking per country, 2005-2014

Country	# Schools	Number of Entries	Number of Exits	Average Rank	Highest School Ranking
Argentina	7	3	2	21	7
Bolivia	2	2	1	42	25
Brazil	12	9	11	20	3
Chile	13	6	6	19	1
Colombia	6	6	1	27	4
Costa Rica	1	0	0	2	1
Ecuador	4	4	1	36	24
Mexico	13	8	9	21	1
Panama	1	1	1	44	44
Paraguay	1	0	0	42	35
Peru	6	2	5	24	12
Uruguay	1	0	0	30	25
Venezuela	1	0	0	11	7

Source: Own elaboration

For our analysis, we collect and analyze data from the AmericaEconomia Latin America MBA ranking from 2005 to 2014 to understand what attributes of the ranking are more relevant in order

to explain the position of schools in the ranking in a specific year. Thus, we use as independent variables the attributes that remain consistent through the years in the ranking, including number of fulltime faculty (nproffull), percentage of faculty holding a PhD degree (porproffull), number of papers indexed in WoS (nisi), international accreditations (AACSB, EQUIS and AMBA) and number of dual MBA degree agreements (convdobtit). In the **Table 5** below, we present the summary statistics of the dataset used.

TABLE 5
Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Nproffull	432	31.89583	19.07953	0	124
Porproffull	432	.6324259	.2949746	0	1
Nisi	432	19.28009	33.06968	0	229
Aacsb	432	.2268519	.4192816	0	1
Equis	432	.1851852	.3888981	0	1
Amba	432	.3796296	.4858574	0	1
Convdobtit	432	1.854167	1.935031	0	13

Source: Own elaboration

5. Empirical Strategy

Previous literature usually considers dynamic Tobit models for ranking analysis (see for instance: O'Brien et al., 2010 and Collet, F., & Vives, L. (2013). From a technical point of view, this would be appropriate only if they have truncated data about the ranking variable but full data on Business Schools variables. This means that they have information regarding the control variables for all Business Schools, those included and those not included in the ranking. This is not always the case, as in our work in which we only have a subsample of Latin American Business Schools included in the AmericaEconomia ranking. Therefore, we only have full data for this subsample which will not allow us to use a Tobit model specification.

Given this setup and that we are interested in ranking persistence (among other determinants), it seems natural to use dynamic panel models. In linear dynamic panels (i.e. with lagged dependent variable), traditional estimation methods (e.g. within and GLS) are inconsistent because of the correlation between the explanatory variables and the error term. Due to this, Arellano & Bond, 1991 suggest a methodology which consists of differentiating the equation and use the lags of the variables as instruments. However, these instruments can be weak in certain cases, as it is demonstrated by Blundell & Bond (2000). Instead Blundell-Bond suggest a system GMM estimator with first-differenced instruments. We follow their approach.

The estimated general model is as follows:

$$y_{it} = \delta_1 y_{iy-1} + x'_{it}\beta + \sum_{j=2006}^{2014} \gamma_j d_j + \alpha_i + \varepsilon_{it} \qquad (1)$$

in which the dependent variable is the inverse of the ranking of institution “i” in period “t”. This is because the estimation method assumes that the higher the number, the better. The lag of the dependent variable is the inverse lag of the ranking. The matrix “x” includes several controls, such

as the number of full time faculty, percentage of fulltime faculty with PhD, number of indexed publications, accreditations and number of dual MBA degree agreements plus a constant term. Year dummies are then added, leaving 2014 as a base and finally the school fixed effect α_i, to consider individual heterogeneity.

6. Results

As we show in column 1 of table 6, all variables are statistically significant at 10% level, except the variables dual degree agreements and number of indexed publications. The variable ranking last year is significant at 1% level and it accounts for nearly half of the ranking position of this year (45.7%), which is a statistical measure of the ranking stability. This measure is consistent with the static indicator: percentage of schools remaining in the fourth quartile from year to year, 40%, which was presented in **Table 3**. AACSB accreditation and the percentage of full time faculty with PhD are significant to 5%. In fact, the latter is significant at 1%.

TABLE 6
Outputs Regression

Inverse Ranking	Specification 1	Specification 2	Specification 3	Specification 4
Lagged (t-1) Inv. R.	0.457*** (0.114)	0.417*** (0.113)	0.486*** (0.113)	0.441*** (0.097)
Lagged (t-2) Inv. R.	-	0.167* (0.095)	-	0.199* (0.074)
Number of Prof. FT	0.067** (0.031)	0.064** (0.028)	0.092** (0.041)	0.078** (0.033)
Nisi	0.033 (0.023)	0.019 (0.020)	0.038 (0.031)	0.013 (0.024)
Aacsb	3.107** (1.552)	3.699* (1.920)	-	-
Equis	2.832* (1.632)	2.190 (1.92)	-	-
Amba	2.801* (1.611)	1.825 (1.167)	-	-
Triple Crown	-	-	3.769* 1.992	2.181 1.456
Dual Degree	0.382 (0.248)	0.279 (0.231)	0.619** (0.294)	0.594** (0.255)
% FullTime	7.639*** (2.574)	7.079*** (2.509)	10.453*** (2.753)	8.153*** (2.660)

Year Dummies	Yes	Yes	Yes	Yes
N° Observations	356	292	356	292
F	62.39***	953***	61.42***	117.74***
AB(2) (P-Value)	0.434	0.637	0.503	0.895
Hansen Test (P-Value)	0.285	0.424	0.273	0.270

Note: specification 1 refers to a linear dynamic panel data with one lagged dependent variable (y_{t-1}). Specification 2 adds and additional lagged dependent variable (y_{t-1} and y_{t-2}). Specifications 3 and 4 repeat the previous two specifications but replacing the three accreditations by one dummy called "triple crown". *** p<1%, **p<5% and * p<10%.

Being accredited in each of the international accreditation agencies included in the ranking increases (on average) as follows a school position in the ranking: AACSB increases 3.1 places, EQUIS increases 2.8 places and AMBA increases 2.8 places.

An increment of 1% in the percentage of full time faculty holding PhD degrees increases in 7.6 the places in the ranking (on average).

Lastly, hiring one new faculty member increases by 0.7 places in the ranking (on average).

The methods of Arellano-Bond and Blundell-Bond deliver tests to check the validity of the estimates. In particular, **Table 6** shows test AR (2), which allows us to check the autocorrelation of error differences. The null hypothesis is that there is No autocorrelation. So, it is expected that ideally the AR (2) test is not significant as one would expect no correlation in two lags. By looking at the results we found what it is expected, the null hypothesis of AR (2) is not rejected with a P-value of 0.434.

Finally, Hansen test checks the null hypothesis that the instruments are exogenous as a group. Ideally one would expect a high p-value, which is what we found (p-values of 0.285), concluding that the instruments used by Blundell-Bond in our regression are exogenous as a group.

In order to check the robustness of our results, we also estimate several other specifications (columns 2-4 of **Table 6** present some of them). In column 2 we replicate specification 1 but with the addition of a two-year lag of the dependent variable. We observe that the past year persistence is significant at 1% and its magnitude (0.417) is similar although slightly smaller relative to the one in specification 1 (0.457). Furthermore, we find that the two-year persistence is significant at 10% but it is much smaller in magnitude (0.167), suggesting a declining persistence.[7] The rest of the control variables have similar effects relative to specification 1 except for the loss of significance of AACSB and EQUIS accreditations. In specification 2 the AB test and the Hansen test give a P value of 0.637 and 0.424 respectively suggesting no rejection of the null hypothesis. These imply no autocorrelation of second order and exogeneity of the instruments respectively.

Specifications 3 and 4 are the same than specifications 1 and 2 respectively but replacing the three accreditation dummies for a joint triple crown dummy (i.e. =1 if a business school has all three accreditations). Point estimates are similar to those in previous specifications although slightly

[7] We also test a three-year lagged dependent variable but it was not significantly different from 0. Results not displayed but available upon request.

bigger in magnitude. For example, in specification 3 the one-year persistence is 0.486 relative to 0.457 of specification 1. In the same line, the two-year persistence displayed in specification 4 is 0.199 relative to 0.167 of specification 2. In both cases, the one-year persistence is significant at 1% while the two-year persistence is significant at 10%.

The point estimate for the triple crown dummy is 3.769 and significant at 10% in specification 3 and smaller and not statistically significant in specification 4. The dual degree variable becomes significant at 5% although its magnitude is very small. Again, the effect of the percentage of the full-time faculty with PhD is the biggest among all controls (10.453 and 8.153 in specifications 3 and 4 respectively) and in both cases, it is significant at 1%. Thus, results are very similar in all specifications, in particular for the most important determinants such as last year ranking and the % of the full-time faculty with PhD.

The interpretation of the coefficients of the previous regressions might be complicated due to the existence of collinearity among the different variables that try to capture business school quality. Due to this, a further way to check the robustness of our results is to use principal component analysis (PCA). In this way, we would be able to keep the latent orthogonal information that captures most of the variance of the dependent variable as well as to decrease the dimensionality of the problem. This analysis is presented in the next section.

6.1 Robustness of Results: Principal Component Analysis

The estimation and interpretation of the effect of each control variable are complicated, because of the existence of collinearity among them (as all of them try to capture business school quality to some extent). To see this, we present in **Table 7** below a simple correlogram of the control variables:

TABLE 7
Control Variables Correlogram

	N prof FT	% Prof FT PhD	N ISI	AACSB	Equis	Amba	Dual Degree
N prof FT	1.00						
% Prof FT PhD	0.3113	1.00					
N ISI	0.5714	0.3702	1.00				
AACSB	0.4418	0.2682	0.3100	1.00			
Equis	0.2997	0.3029	0.2215	0.6524	1.00		
Amba	0.4398	0.3382	0.3950	0.3394	0.2288	1.00	
Dual Degree	0.3672	0.1431	0.2633	0.4298	0.3535	0.2713	1.00

Source: Own elaboration

Hence, in order to deal with this inconvenient, we use a principal component analysis (PCA), which in practical terms can be thought of as a preprocessing step that uncorrelated the columns of the dimensions' matrix. It also helps us to reduce the number of variables in the dimension's matrix by describing a series of uncorrelated linear combinations of the variables that contain most of the variance.

Therefore, we re-estimate specifications 1 and 2 but replacing the control variables with the more relevant principal components, see **Table 8** below. We follow the standard approaches used in the literature for principal component selection such as keeping the eigenvectors with the eigenvalues bigger or equal than 1.00.

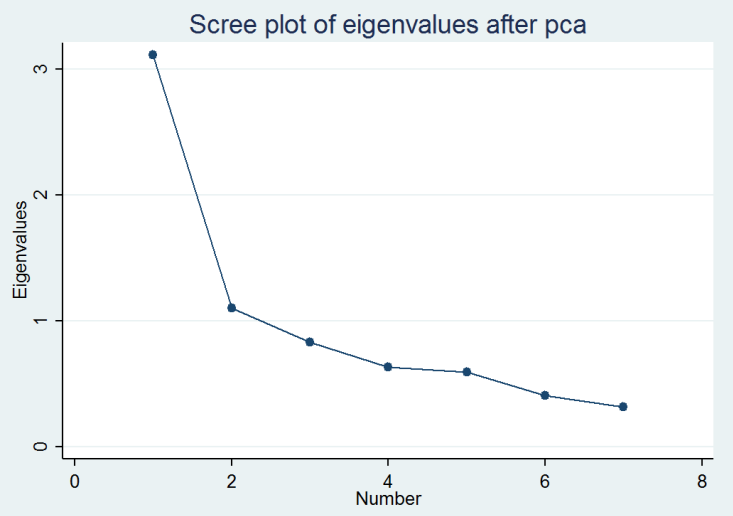
TABLE 8
Principal Components/Correlation

Principal components/correlation — Number of obs = 432
Number of comp. = 7
Trace = 7
Rotation: (unrotated = principal) — Rho = 1.0000

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	3.11652	2.0134	0.4452	0.4452
Comp2	1.10312	.273483	0.1576	0.6028
Comp3	.829632	.195839	0.1185	0.7213
Comp4	.633793	.0382019	0.0905	0.8119
Comp5	.595591	.190175	0.0851	0.8969
Comp6	.405416	.0894787	0.0579	0.9549
Comp7	.315937	.	0.0451	1.0000

A criterion corroborated with the Scree plot showed below in **Figure 3**:

FIGURE 3
Scree Plot of Eigenvalues after PCA



Given the above information, we select the principal components with the highest two eigenvalues, which explain almost two-thirds of the total variance. The chosen eigenvectors are the first two of the **Table 9** below:

TABLE 9

Principal Components (eigenvectors)

Principal components (eigenvectors)

Variable	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6	Comp7	Unexplained
nproffull	0.4268	0.2452	-0.2980	-0.2958	-0.1828	-0.7003	0.2402	0
porproffull	0.3184	0.2959	0.6994	0.0525	0.5199	-0.1941	-0.1055	0
nisi	0.3827	0.4419	-0.1449	-0.4802	-0.0207	0.6333	-0.0717	0
aacsb	0.4279	-0.4249	0.0789	-0.0493	-0.2973	-0.0738	-0.7307	0
equis	0.3739	-0.5244	0.3418	-0.1055	-0.1782	0.2026	0.6200	0
amba	0.3635	0.3204	-0.0669	0.7924	-0.3253	0.1412	0.0839	0
convdobtit	0.3391	-0.3143	-0.5229	0.1941	0.6855	0.0672	0.0260	0

As we can see, the first principal component score, which we call "Overall Quality," includes all seven covariates almost equally weighted, capturing the general importance of all measures. The second principal component score, which we call "Research relative to Accreditation" is the contrast between the number of papers indexed by Web of Science (WoS, formerly known as ISI Thompson) and two of the three accreditations (AACSB and EQUIS). Therefore, by replacing the control variables with these two eigenvectors we obtain the following results, see the **Table 10** below.

TABLE 10

Outputs PCA regression

Inverse Ranking	**Specification 5 PCA**	**Specification 6 PCA**
Lagged (t-1) Inv. R.	0.502*** (0.107)	0.432*** (0.113)
Lagged (t-2) Inv. R.	-	0.143* (0.082)
Overall Quality	3.055*** (0.779)	2.551*** (0.662)
Research relative to Accreditation	0.191 (0.629)	0.095 (0.491)
Year Dummies	Yes	Yes
N° Observations	356	292
F	79.73***	1,048.26***
AB(2) (P-Value)	0.354	0.418
Hansen Test (P-Value)	0.328	0.228

Note: specification 5 refers to a linear dynamic panel data with one lagged dependent variable (y_{t-1}). Specification 6 adds and additional lagged dependent variable (y_{t-1} and y_{t-2}). *** p<1%, **p<5% and * p<10%.

Specification 5 includes only the one year lagged dependent variable (similar structure to specification 1) while specification 6 includes the one and the two-year lagged dependent variable (similar to specification 2). As we can see, the one-year persistence is slightly bigger although similar to what we obtained above with specification 1 (i.e. 0.502 relative to 0.457). In the same line, specification 6 also suggest a slightly although similar persistence relative to the one obtained with specification 2 (i.e. 0.432 relative to 0.417). The two-year persistence it is also similar to the one found with specification 2 (0.143 relative to 0.167). Finally, it is possible to see that the "Overall Quality" score has a significant effect (at 1%) on the business school ranking while the "Research relative to Accreditation" score has no significant effects.

To sum up, it is possible to see that irrespective of the specification results for the persistence of the AmericaEconomia ranking are similar and around (0.42-0.50) approximately. Additionally, we observe that the most relevant covariates to explain ranking positions seems to be the percentage of full time faculty with PhD.

7. Concluding Remarks

The AmericaEconomia ranking was the first international ranking specifically devoted to Latin American business schools, and in this work we present a formal study of its stability and the main determinants of a school's position in such ranking during the period 2005-2014.

Unlike previous literature that usually considers dynamic Tobit models for ranking analysis, we put forward an alternative methodology based on a system GMM estimator with first-differenced instruments. We argue that dynamic Tobit models are appropriate only if you have truncated data about the ranking variable but full data on Business Schools variables. This is not always the case, as in our work in which we only have a subsample of Latin American Business Schools, those included in the AmericaEconomia ranking.

From our dynamic panel model, we estimated what factors were the most relevant for schools to improve their position in the ranking. From our model, it transpires that the position of a business school in last year ranking predicts 45.7% of the position that the school will occupy this year. This is a measure of the ranking stability, and hence, we can infer that a change in a single variable cannot imply an important movement in the ranking, so to improve significantly in the ranking several simultaneous actions must be taken by the business school, which necessarily implies strategic changes by the school.

In order to improve a business school position in the ranking, the more relevant variables are the percentage of full-time faculty with doctoral degrees, the holding of AACSB, EQUIS and AMBA accreditations and ultimately the number of full time faculty. In fact, being accredited in each of the international accreditation agencies included in the ranking increase (on average) as follows a school position in the ranking: AACSB increases 3.1 places, EQUIS increases 2.8 places and AMBA increases 2.8 places. An increment of 1% in the percentage of full time faculty with PhD increases in 7.6 the places in the ranking (on average). Lastly, hiring 1 new faculty member increases by 0.7 places in the ranking (on average).

Our empirical analysis also shows that the percentage of schools remaining in the same quartile year to year suggests the AmericaEconomia Latin America MBA ranking is not as stable as other international rankings. In fact, in the case of the AmericaEconomia ranking, near 60% of schools belonging to the first quartile remain in this quartile year to year while for other international rankings near 90% of schools belonging to the first quartile have little change position year to year, remaining in the first quartile. This clearly suggests that AmericaEconomia should avoid changing the ranking's methodology and variables from year to year in order to achieve certain stability and reliability of its measure.

When analyzing the AmericaEconomia ranking, which is based on an internal evaluation built upon a questionnaire answered by business schools, the dimensions mainly addressed are *Faculty & Research and Internationalization*, including variables such as: number of fulltime faculty, percentage of faculty holding PhD degrees, number of papers indexed in WoS, international accreditations (AACSB, EQUIS and AMBA) and number of dual MBA degree agreements, and so on. By contrast, the most prestigious international rankings such as Businessweek, U.S. News & World Report, Financial Times, Forbes, The Economist and Wall Street Journal do typically emphasize the *Employers and Students* dimensions including variables such as: the performance of recent graduates and/or alumni in the job market as a measure for business schools' success, return on an investment to students by comparing post-MBA compensation with the cost of attending the programs and students and alumni's ratings of their program (including placement and network). We can explain the different approach used by AmericaEconomia due to the stage of evolution that Latin American's business schools were when the ranking began. At the beginning of the 2000's, most of Latin America's business schools were based on part time lecturers, the schools were not research oriented and few schools had full time programs, lagging far behind from their peer's schools in the U.S. or Europe. In this context, we can argue that the AmericaEconomia business school ranking has somehow contributed to rise the academic standard of Latin America's business schools, by providing incentives for schools to improve the quality of their faculty, research output, their international accreditation and internationalization in general.

Given the continuous improvement of Latin American Business School in terms of academic variables, in the foreseeable future it would be advisable for AmericaEconomia to start incorporating in a more relevant way (with more weight in the final evaluation) *employers and students* variables in its ranking, such as: alumni salary and propensity to recruit MBAs from a certain Schools and corporate recruiters' perceptions, and quality and diversity of incoming students and students and alumni's ratings of their program (including placement and network).

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