

## The determinants of the performance in the entrance exam of the Federal University of Minas Gerais

Os determinantes do desempenho no exame de seleção da Universidade Federal de Minas Gerais

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**Abstract:** In order to decrease inequalities in tertiary education attendance, many Brazilian public institutions implemented affirmative action policies in the last decades. In particular, a bonus policy was implemented at UFMG in 2009, which was substituted by a quota policy in 2012. Besides, other policies also implemented by this and other public universities in Brazil may have had an indirect effect of promoting an increase in minorities' attendance, such as the Restructuring and Expansion of Federal Universities (Reuni) policy and the use of the National Exam of the Secondary Level (ENEM) as a tool for tertiary education student's selection. This paper analyzes the determinants of the performance in the entrance exam of Federal University of Minas Gerais (UFMG), between the years of 2009 and 2013, with a focus on these policy changes. Affirmative action and Reuni policies did not affect remarkably the performance of minorities at the UFMG's selection process. However, the use of ENEM as the first stage in this process relatively decreased the performance of minorities. Moreover, differences for skin color were dwarfed by other inequalities, such as the household income, the parent's educational level or the type of the secondary school attended by the student.

**Keywords:** performance; National Exam of the Secondary Level – ENEM; Federal University of Minas Gerais - UFMG.

**Resumo:** Muitas instituições públicas brasileiras de ensino superior implementaram recentemente políticas de ação afirmativa com o intuito de diminuir desigualdades no acesso de grupos minoritários. Em particular, a política de bônus foi implementada na Universidade Federal de Minas Gerais (UFMG) em 2009, e ela foi substituída pela política de cotas em 2012. Além disso, outras políticas implementadas por essa e por outras instituições de ensino superior no Brasil também podem ter afetado indiretamente o acesso de minorias nas universidades, tais como a política de Reestruturação e Expansão das Universidades Federais (Reuni) e o uso do Exame Nacional do Ensino Médio (ENEM) como ferramenta de seleção de alunos. Esse artigo analisa os determinantes do desempenho no vestibular da UFMG, entre os anos de 2009 e 2013, tendo como foco essas mudanças de política citadas. As políticas de ação afirmativa e do Reuni não afetaram notavelmente o desempenho das minorias no processo de seleção da UFMG. No entanto, o uso do ENEM como primeira etapa desse processo diminuiu relativamente o desempenho das minorias. Além disso, as diferenças de cor da pele foram bem menores que outras desigualdades, como a renda familiar, o nível educacional dos pais ou o tipo de escola secundária frequentada pelo aluno.

**Palavras chaves:** desempenho; Exame Nacional do Ensino Médio – ENEM; Universidade Federal de Minas Gerais - UFMG.

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## 1 Introduction

Tertiary education attendance in Brazil varies remarkably among different population groups (PEDROSA *et al.*, 2007). Race, household income and parent's educational attainment are among the most decisive factors that impact the student's probability of attending a tertiary education institution (SILVA; HASENBALG, 2002), as students of higher socioeconomic status (SES) have better performances in the selection process at these institutions. Consequently, students from the best private elementary and secondary schools tend to be disproportionately enrolled in the best public universities (TELLES; PAIXÃO, 2013).

In order to decrease inequalities and to increase the competitiveness of Black/Pardo/Indigenous students and those from low-income families in public universities, many public institutions in Brazil implemented affirmative action policies in the last decades (FRANCIS; TANNURI-PIANTO, 2012b; PEDROSA *et al.*, 2007; TELLES; PAIXÃO, 2013). In particular, the Federal University of Minas Gerais (UFMG) implemented a bonus policy in the entrance exam of 2009. This policy increased in 10% the grades obtained in this exam for individuals who had attended public schools in the last seven years of elementary and secondary education. In addition, an extra 5% bonus was given to those who considered themselves Blacks/Pardos. This policy with minor changes was valid until the entrance exam of 2012. In 2012, it was approved the national federal law of quotas to be implemented in all federal higher education institutions in four years (TELLES; PAIXÃO, 2013). Beginning in the entrance exam of 2013, at least 12.5% of the students in each course at UFMG had to originate from disadvantaged schooling and/or race backgrounds. This number increased to 25%, 37.5% and 50% respectively in the years of 2014, 2015 and 2016, and remained in this last level since then.

Besides, other policies were also implemented by UFMG and they may have had an effect on the determinants of the performance in the selection process at higher education institutions. Mostly due to the Restructuring and Expansion of Federal Universities – REUNI, policy, there was a remarkable increase in the number of slots in federal universities in Brazil. In particular for UFMG, the number of slots increased between 2009 and 2011 from 4.6 thousands to 6.6 thousands annually (ARANHA *et al.*, 2012; LIMA; MACHADO, 2016). In the period, 27 new courses were created. Other 23 courses that already existed increased the number of slots.

Moreover, there were recent changes in the entrance exam. Until recently, most universities had their own exams, which differed from other institutions. In the last years, the ENEM exam began to be used as part or as the unique exam of tertiary education student's selection (LIMA; MACHADO, 2016). In UFMG, there were two main changes in the entrance

exam since 2009. Until 2010, there was an UFMG's exam in two stages. From 2011 and 2013, the ENEM was used as the first stage, while there was an UFMG's exam for the second stage. Since 2014, the ENEM and the Unified Selection System (SISU) have been used as the main methods of student selection (LIMA; MACHADO, 2016; NOGUEIRA *et al.*, 2017; SILVEIRA *et al.*, 2015). The federal government claimed three positive points using this last selection process: the increase in student's mobility; the gain in efficiency of the process; and the increase in the proportion of minorities in the university, this last point associated with the quota policy. Nonetheless, Nogueira *et al.* (2017) and Silveira *et al.* (2015) concluded that none of the expectations was reasonably fulfilled.

**Table 1** – Summarizes the changes that occurred in the selection at UFMG between 2009 and 2013

Year	Exams	Number of slots	Affirmative action policy
2009	UFMG exam in the two stages	Increased remarkably	Bonus policy: 10%/15%
2010			
2011	ENEM in the first stage and UFMG exam in the second	Approximately constant	Quota policy: 12.5%
2012			
2013			

All these policy changes might have changed the UFMG's applicant's pool, how students are selected, the student body and, in particular, the determinants of the performance in the selection process. Concerning this last point, many studies addressed the determinants of academic performance in tertiary education institutions (FRANCIS; TANNURI-PIANTO, 2012a, b; GOLGHER *et al.*, 2015; PEDROSA *et al.*, 2007; TELLES; PAIXÃO, 2013).

As opposed from those studies, the main objective of this paper is to analyze the determinants of the performance in the entrance exam of students who applied at UFMG, being selected or not by this university, between the years of 2009 and 2013. In this period, there were the above-mentioned changes in the number of slots, in the affirmative action policy and, most importantly, in the type of exam used to select students. The variables of main interest are race, household income and the type of secondary school the student attended, as they are directly related to the attendance of minorities in public universities in Brazil. However, it should be clear that the paper does not discuss how the evolution of minorities' attendance at UFMG was, but whether the determinants of performance in the selection process varied for these variables and due to these policy changes. Nonetheless, changes in these determinants may have an influence on how minorities are absorbed at UFMG. The study concerning the evolution of

minorities' attendance at UFMG is better addressed using the students actually selected at the institution, nonetheless, this topic is not addressed here as it is beyond the scope of this paper. To the best of my knowledge, this is the first analysis using econometric models that deals with the issues proposed by this paper.

The paper uses official records of UFMG developed by the Permanent Commission of the Vestibular - COPEVE and by the Department of Academic Registry - DRCA. The databases were kindly conceded to research purposes and preserve the anonymity of the students.

Besides this introduction, the paper is further divided into four sections. Section two presents the literature review, which is the background of the paper. Section three describes the methodology used in the statistical analysis. Section four depicts the empirical results, and last section concludes the paper.

## **2 Literature review**

Many factors are associated with academic performance in different schooling levels. Among these determinants there are the individual's attributes (sex, race, age, etc.), household's characteristics (parent's schooling level, income, number of siblings, etc.) and school factors (infrastructure, administration, teachers, etc.), (BARROS *et al.*, 2001).

In particular for the elementary and secondary levels in Brazil, Araújo and Siqueira (2010) analyzed the determinants of schooling performance in Mathematics for students in the fourth year. They observed that students whose mother had higher levels of formal education, who lived with their father, in higher income households and who had a computer at home had higher performance. Moreover, individual attributes were also related to performance: girls, blacks, those who worked and those who attended public schools had lower levels of performance. Machado *et al.* (2008) studied the schooling performance in Mathematics at the elementary and secondary levels. They observed that white individuals and those who lived in a household with more books had higher performances. Similar to the previous study, students who did not work and had a mother with higher levels of education also had higher performance. Soares and Alvez (2013) studied the determinants of schooling performance for students of the elementary level in reading and Mathematics. They observed that individual and school variables were significantly associated with performance. Females had higher performances in reading, but lower in mathematics. As above, blacks and poor individuals had lower performances. They compared students from state and municipal schools and the second had higher performances.

Other studies described the determinants of academic performance in the tertiary level. Bai and Chi (2011) observed that females had a better GPA than males and that minorities had similar performances than non-minorities. Fryer Jr. *et al.* (2008) also analyzed the determinants of college GPA and observed that SAT scores, high school ranks, parental education and neighborhood's racial demographics (fewer blacks) were positively correlated with academic performance.

In particular for Brazilian institutions, many authors addressed factors that were associated with academic performance. Francis and Tannuri-Pianto (2012b) observed that males, pardos and indigenous had lower performances. In particular for UFMG, Golgher *et al.* (2015) verified that students that had studied in municipal, federal or private secondary school, that hadn't attended a specific course preparing for the exam of tertiary education institutions (*pré-vestibular*), who did not work or who worked up to twenty hours per week, from a higher income household and who had computer at home had higher performances.

All these cited studies addressed the determinants of academic performance at different schooling levels. However, although related, the focus of this paper is the performance in the entrance exam of tertiary education institutions. Concerning this topic, Behrendt *et al.* (1986) observed that students from private secondary schools, with less siblings and in regions with greater proportion of educated individuals had higher performance in the SAT exam. Rothstein (2004) observed that blacks, Asians, Hispanics and women had lower performances in the SAT.

In particular for Brazil, Francis and Tannuri-Pianto (2012a) analyzed the performance in the entrance exam at UnB in 2004. They regressed vestibular score on race, gender, and a number of family-level socioeconomic measures. They observed that blacks, females, individuals with lower SES, student's whose mother had a lower level of formal education and who had attended public schools had lower overall scores.

This paper analyses the determinants of the performance in the selection process at UFMG between 2009 and 2013. Hence, in some aspects, it is similar to the last cited study, however, it addresses these determinants rather differently. Based on the main changes in the selection process policies, there are some possibilities of analysis regarding the determinants of performance in the entrance exam of UFMG. First, did the determinants alter due to the change of the exam, as the UFMG's own exam was replaced by ENEM in the first stage of selection? Second, did the determinants alter because of the increase in slots between 2009 and 2011? Third, which were the changes due to the replacement of the bonus policy by the quota policy? These are the main questions being empirically addressed by this paper. In addition, the paper also associates individual's attributes, household's characteristics and school factors with the

academic performance at the selection process at UFMG, focusing in possible changes in the analyzed period for variables related to the minorities' attendance in higher education institutions.

### **3 Methodology**

#### **3.1 Databases**

The paper uses as databases official records of UFMG that were developed by the Permanent Commission of the Vestibular - COPEVE and by the Department of Academic Registry - DRCA. These databases were kindly granted to research purposes and preserve the anonymity of the students. The databases have the results of the entrance exams of all the students that applied for UFMG from 2009 and 2013, the years with available data. Unfortunately, due to the lack of data, the paper could not properly address the implementation of the quota policy. Moreover, they contain socioeconomic variables and information regarding affirmative action policies, as will be detailed in next subsection. This or similar databases were used in other studies (GOLGHER *et al.* 2014, 2015). However, these analyses had different approaches and objectives.

#### **3.2 Empirical strategy**

The main objective of the paper is to analyze the determinants of performance at the selection process at UFMG. Thus, the dependent variables in the econometric models are the performances in the first stage of UFMG own exam in the years of 2009 and 2010 and the results of ENEM of 2011, 2012 and 2013. I selected the first stage of the selection process because all applicants did the same exams. The second stage differs depending on the chosen course and using these results would incorporate a huge amount of analytical details that are beyond the scope of this paper. Given that these variables are continuous and approximately normally distributed, OLS models are used for each year separately. In order to make comparisons between the years more insightful, these dependent variables were transformed into normal distributions with mean zero and variance equal to one. Besides, the econometric models have the same set of explanatory variables and were estimated with the same technique.

The variables of main interest are variables associated with minorities' attendance at higher education institutions. They are categorical variables for: race (1- Did not declare, 2 - White/Asian, 3 – Black/Pardo/Indigenous); household income (1 - Less than 2 minimum wages (MW), 2 - Between 2 and 5 MW, 3 – Between 5 and 10 MW, 4 – Between 10 and 20 MW, 5 – More than 20 MW); and the type of secondary school the student attended (1 – Private, 2 –

State, 3 – Municipal, 4 - Federal). As described in the theoretical section, it is expected a higher performance for White/Asian individuals, for students from households with higher income and for students from private or federal secondary schools.

Besides, other explanatory variables were also included in the econometric models. All of them are detailed in table 3. The variables are related to individual's features (sex; civil status; work load; whether the individual had already graduated; whether the individual had attended a *pré-vestibular*; the student's previous knowledge in foreign languages; and place of residence), characteristics of the households (the father's and the mother's schooling level; household income; and the father's and the mother's occupation), features related to the student's secondary education (years since high school graduation; regime of the secondary school; and type of secondary school) and assets in the household (domestic servant; fridge; car; and computer). Most of these variables are commonly used in studies that address the determinants of schooling performance in different levels, as described in the theoretical section.

## 4 Results

### 4.1 Descriptive statistics

Table 2 shows the distribution of applicants among different categories of selected explanatory variables. Nonetheless, first, as shown in the last line of the table, notice that the number of applicants increased remarkably between 2009 and 2011, from 55573 to 68974, when occurred the increase in the number of slots, mostly due to the Reuni policy. Afterwards, the number of applicants decreased to 60015, being the most remarkable decrease between 2011 and 2012. The selection process did not change much between these years, thus, the reason for this decrease should be pursued elsewhere. The affirmative action policy changed between 2012 and 2013, when the number of applicants decreased slightly, suggesting a small negative influence of a very restricted quota system of 12.5% when compared to the bonus policy. It is expected that the number of applicants may have increased with the further implementation of this policy.

These changes in the number of applicants may have influenced the applicant's profile, what is directly addressed for selected variables in table 2. Most variables were quite stable even though there were changes in the number of applicants, in the type of exam and in the affirmative action policy. Males were a minority and the number slightly decreased in the period. The results for race were closely to stable, although the proportion of

Blacks/Pardos/Indigenous increased slightly. The students that did not declare their skin color were a small minority. The mother's education evolved positively slightly, as did in general the educational level of the Brazilian population. The results for household income and type of the secondary school were nearly stable. Thus, it can be concluded that the applicant's pool did not vary remarkably qualitatively during the analyzed period. The only variable that changed outstandingly due to the use of the ENEM exam was the place of residence. This exam facilitated the application of students that lived in other state or country.

**Table 2** – The distribution of applicants by group for selected variables in UFMG between 2009 and 2013

Variables	Categories	UFMG – 1 <sup>a</sup> stage			ENEM	
		2009	2010	2011	2012	2013
<b>Sex</b>	Male	42.8	42.3	40.4	39.9	40.2
<b>Race</b>	Did not declare	5.1	5.4	4.5	4.2	4.1
	White/Asian	51.7	50.7	52.2	52.7	50.9
	Black/Pardo/Indigenous	43.2	44.0	43.4	43.2	45.0
<b>Place of residence</b>	Belo Horizonte	50.9	48.0	38.1	38.8	39.2
	Outskirts of RMBH	15.5	14.6	12.7	12.4	12.9
	Interior of MG	24.4	27.6	26.7	26.5	25.8
	Other state or country	9.2	9.8	22.5	22.3	22.2
<b>Mother's schooling level</b>	Don't know/did not answer	1.5	1.5	1.4	1.3	1.2
	Less than elementary	17.6	16.1	15.0	14.1	13.3
	Elementary	11.7	10.7	10.6	10.1	9.9
	Secondary	33.2	33.5	32.6	32.6	32.5
	Tertiary	36.0	38.2	40.5	41.9	43.1
<b>Household income</b>	Less than 2 minimum wages	16.5	15.8	17.1	16.5	17.4
	Between 2 and 5 minimum wages	35.5	36.6	37.4	36.8	37.1
	Between 5 and 10 minimum wages	23.2	23.6	23.5	23.7	23.4
	Between 10 and 20 minimum wages	17.9	17.3	16.0	16.5	16.1
	More than 20	6.2	6.7	6.1	6.5	6.0
<b>Type of the secondary school</b>	Private	53.2	53.8	54.7	54.5	54.2
	State	36.2	36.2	36.2	36.1	36.8
	Municipal	5.7	5.2	4.3	4.0	3.4
	Federal	4.7	4.6	4.6	5.3	5.4
<b>Observations</b>		55573	58051	68974	61306	60015

Table 3 shows the mean values for the dependent variable for each year between 2009 and 2013 for each explanatory variable. The focuses here are possible changes due to the policies implemented in UFMG in the period. Besides, the table details the explanatory variables.

The statistical significance of the differences was accessed. For two group comparisons, the means were compared by t-tests. **M** represents the higher value and **m** the lower value if differences were statistically significant. For categorical variables, it was used ANOVA and Bonferroni tests. M1 stands for the highest value, M2 for the second highest and so on for

statistically significant differences. If two categories have the same indicator (i.e. M3), the difference between them was not statistically significant.

Some variables presented similar results in the five years without showing any remarkable trend. Males and individuals who had attended *pré-vestibular* had better performances. Those who lived in another state or country had better performances, while those who lived in the outskirts of the Metropolitan Region of Belo Horizonte – RMBH, or in the interior of Minas Gerais – MG state had the worst performances. Concerning, the father's and the mother's occupation, the students whose father and/or mother had occupations classified as highly skilled or skilled had better performances. The contrary was observed for those whose parents had an occupation classified as unskilled or did not know the occupation of their father or mother. The next two variables are associated with the student's secondary school. Those who had finished this level between two to three years before taking the entrance exam of UFMG had a better performance. This was not expected at first, as initial expectations suggested that those with a better performance would be the more recently graduated from secondary school. Those who had graduated less than two years before taking the exam or for four years or more had similar and worst values. As expected concerning the school's regime, those in regular or vocational schools had a better performance than students classified as in other regimes. Most schools classified in this last category are shorter span lower quality courses that substitute the other types of schools concerning the secondary school diploma.

The other variables showed some differences between the years. For race, Whites/Asians had a better performance than Blacks/Pardos/Indigenous, as expected. However, those who did not declare their race had the best performance, which are a sizable minority of those who applied to UFMG. Besides, the use of the ENEM increased the differences between Whites/Asians and Blacks/Pardos/Indigenous.

Concerning civil status, singles had better performance and, apparently, differences also increased with the use of ENEM. Those who did not work had a better performance and those who worked more than 20 hours weekly had the worst. Differences seemingly increased with the use of ENEM. The applicants that had previously graduated had a better performance than others, however differences decreased with the ENEM exam.

Those who knew how to read in a foreign language besides Spanish had a higher performance, and differences apparently increased in the last two years. As expected, the performances of students with a father and/or a mother with higher levels of educations were higher, especially for those with parents with a tertiary diploma, and differences apparently increased with the ENEM exam. The same was observed for household income.

The type of secondary school is commonly considered among the most decisive features promoting academic performance differentials. Students from federal public schools had the best performance and those from private schools came afterwards. State and municipal showed similar and worst results. Differences in this variable apparently increased with the ENEM exam.

The last four variables area related to assets in the household. Notice that the asset fridge separates the poor from the very poor. The asset car distinguishes lower classes from medium and higher classes. Computers in the household indicate not only wealth but also a focus on the leaning process. Domestic servants indicates whether the household is a rich one, and the focus on gaining time from domestic shores. Mostly, the students that lived in households with more assets had a better performance, as expected. The exceptions are students who lived in households with two or more domestic servants who had a worst performance when compared to those who lived in households with one servant. These results suggest a different point of view concerning efforts and perspectives. Differences in general regarding assets apparently increased with the ENEM exam, a trend already observed for other variables.

These results suggest that minorities were penalized by the ENEM exam being a substitute of the UFMG's exam in the first stage. However, other aspects should be taken into account, such as, changes in the applicant's pool, discussed in table 2, and the incorporation of a more controlled study, addressed by the econometric models.

**Table 3** – Performance in the entrance exam in UFMG between 2009 and 2013 for deferent groups of applicants

Variables	Categories	UFMG – 1 <sup>a</sup> stage			ENEM	
		2009	2010	2011	2012	2013
<b>Sex</b>	Male	0.173 <sup>M</sup>	0.157 <sup>M</sup>	0.169 <sup>M</sup>	0.180 <sup>M</sup>	0.180 <sup>M</sup>
	Female	-0.130 <sup>m</sup>	-0.115 <sup>m</sup>	-0.115 <sup>m</sup>	-0.120 <sup>m</sup>	-0.121 <sup>m</sup>
<b>Race</b>	Did not declare	0.461 <sup>M1</sup>	0.392 <sup>M1</sup>	0.413 <sup>M1</sup>	0.447 <sup>M1</sup>	0.447 <sup>M1</sup>
	White/Asian	0.137 <sup>M2</sup>	0.124 <sup>M2</sup>	0.184 <sup>M2</sup>	0.197 <sup>M2</sup>	0.204 <sup>M2</sup>
	Black/Pardo/Indigenous	-0.218 <sup>M3</sup>	-0.190 <sup>M3</sup>	-0.264 <sup>M3</sup>	-0.284 <sup>M3</sup>	-0.271 <sup>M3</sup>
<b>Civil status</b>	Single	0.022 <sup>M</sup>	0.016 <sup>M</sup>	0.020 <sup>M</sup>	0.017 <sup>M</sup>	0.018 <sup>M</sup>
	Others	-0.423 <sup>m</sup>	-0.339 <sup>m</sup>	-0.516 <sup>m</sup>	-0.479 <sup>m</sup>	-0.522 <sup>m</sup>
<b>Work</b>	Do not work	0.097 <sup>M1</sup>	0.090 <sup>M1</sup>	0.106 <sup>M1</sup>	0.107 <sup>M1</sup>	0.112 <sup>M1</sup>
	Up to 20 hours weekly	-0.213 <sup>M2</sup>	-0.285 <sup>M2</sup>	-0.296 <sup>M2</sup>	-0.311 <sup>M2</sup>	-0.310 <sup>M2</sup>
	More than 20 hours weekly	-0.372 <sup>M3</sup>	-0.358 <sup>M3</sup>	-0.477 <sup>M3</sup>	-0.501 <sup>M3</sup>	-0.524 <sup>M3</sup>
<b>Already graduated</b>	Yes	0.312 <sup>M</sup>	0.298 <sup>M</sup>	0.205 <sup>M</sup>	0.241 <sup>M</sup>	0.190 <sup>M</sup>
	No	-0.010 <sup>m</sup>	-0.010 <sup>m</sup>	-0.007 <sup>m</sup>	-0.009 <sup>m</sup>	-0.007 <sup>m</sup>
<b>Attended pré-vestibular</b>	Yes	0.147 <sup>M</sup>	0.148 <sup>M</sup>	0.116 <sup>M</sup>	0.138 <sup>M</sup>	0.124 <sup>M</sup>
	No	-0.162 <sup>m</sup>	-0.169 <sup>m</sup>	-0.152 <sup>m</sup>	-0.171 <sup>m</sup>	-0.152 <sup>m</sup>
<b>Read foreign languages</b>	No	-0.559 <sup>M4</sup>	-0.517 <sup>M4</sup>	-0.535 <sup>M4</sup>	-0.605 <sup>M4</sup>	-0.622 <sup>M4</sup>
	Only Spanish	-0.261 <sup>M3</sup>	-0.042 <sup>M3</sup>	-0.270 <sup>M3</sup>	-0.304 <sup>M3</sup>	-0.331 <sup>M3</sup>
	Another language	0.321 <sup>M2</sup>	0.161 <sup>M2</sup>	0.274 <sup>M2</sup>	0.281 <sup>M2</sup>	0.270 <sup>M2</sup>
	Two or more languages	0.476 <sup>M1</sup>	0.448 <sup>M1</sup>	0.457 <sup>M1</sup>	0.487 <sup>M1</sup>	0.478 <sup>M1</sup>

<b>Place of residence</b>	Belo Horizonte	0.058 <sup>M2</sup>	0.086 <sup>M2</sup>	-0.095 <sup>M2</sup>	-0.056 <sup>M2</sup>	-0.034 <sup>M2</sup>
	Outskirts of RMBH	-0.288 <sup>M4</sup>	-0.260 <sup>M4</sup>	-0.352 <sup>M4</sup>	-0.333 <sup>M4</sup>	-0.322 <sup>M4</sup>
	Interior of MG	-0.081 <sup>M3</sup>	-0.101 <sup>M3</sup>	-0.062 <sup>M3</sup>	-0.096 <sup>M3</sup>	-0.114 <sup>M3</sup>
	Other state or country	0.377 <sup>M1</sup>	0.252 <sup>M1</sup>	0.434 <sup>M1</sup>	0.397 <sup>M1</sup>	0.379 <sup>M1</sup>
<b>Father's schooling level</b>	Don't know/did not answer	-0.374 <sup>M4</sup>	-0.329 <sup>M4</sup>	-0.405 <sup>M4</sup>	-0.476 <sup>M4</sup>	-0.474 <sup>M4</sup>
	Less than elementary	-0.492 <sup>M5</sup>	-0.442 <sup>M5</sup>	-0.515 <sup>M5</sup>	-0.546 <sup>M5</sup>	-0.578 <sup>M5</sup>
	Elementary	-0.259 <sup>M3</sup>	-0.230 <sup>M3</sup>	-0.280 <sup>M3</sup>	-0.299 <sup>M3</sup>	-0.287 <sup>M3</sup>
	Secondary	0.010 <sup>M2</sup>	-0.012 <sup>M2</sup>	-0.005 <sup>M2</sup>	-0.008 <sup>M2</sup>	-0.019 <sup>M2</sup>
	Tertiary	0.474 <sup>M1</sup>	0.420 <sup>M1</sup>	0.437 <sup>M1</sup>	0.463 <sup>M1</sup>	0.460 <sup>M1</sup>
<b>Mother's schooling level</b>	Don't know/did not answer	-0.407 <sup>M4</sup>	-0.328 <sup>M3</sup>	-0.380 <sup>M3</sup>	-0.455 <sup>M3</sup>	-0.473 <sup>M3</sup>
	Less than elementary	-0.546 <sup>M5</sup>	-0.498 <sup>M4</sup>	-0.590 <sup>M4</sup>	-0.646 <sup>M4</sup>	-0.672 <sup>M4</sup>
	Elementary	-0.318 <sup>M3</sup>	-0.313 <sup>M3</sup>	-0.366 <sup>M3</sup>	-0.401 <sup>M3</sup>	-0.418 <sup>M3</sup>
	Secondary	-0.006 <sup>M2</sup>	-0.035 <sup>M2</sup>	-0.040 <sup>M2</sup>	-0.047 <sup>M2</sup>	-0.067 <sup>M2</sup>
	Tertiary	0.393 <sup>M1</sup>	0.341 <sup>M1</sup>	0.360 <sup>M1</sup>	0.365 <sup>M1</sup>	0.367 <sup>M1</sup>
<b>Household income</b>	Less than 2 minimum wages	-0.642 <sup>M5</sup>	-0.601 <sup>M5</sup>	-0.661 <sup>M5</sup>	-0.729 <sup>M5</sup>	-0.743 <sup>M5</sup>
	Between 2 and 5 minimum wages	-0.219 <sup>M4</sup>	-0.211 <sup>M4</sup>	-0.187 <sup>M4</sup>	-0.221 <sup>M4</sup>	-0.196 <sup>M4</sup>
	Between 5 and 10 minimum wages	0.188 <sup>M3</sup>	0.186 <sup>M3</sup>	0.250 <sup>M3</sup>	0.269 <sup>M3</sup>	0.296 <sup>M3</sup>
	Between 10 and 20 minimum wages	0.502 <sup>M2</sup>	0.477 <sup>M2</sup>	0.522 <sup>M2</sup>	0.546 <sup>M2</sup>	0.551 <sup>M2</sup>
	More than 20	0.742 <sup>M1</sup>	0.683 <sup>M1</sup>	0.669 <sup>M1</sup>	0.740 <sup>M1</sup>	0.734 <sup>M1</sup>
<b>Father's occupation</b>	Owners	0.057 <sup>M3</sup>	0.092 <sup>M2</sup>	0.101 <sup>M2</sup>	0.137 <sup>M2</sup>	0.170 <sup>M2</sup>
	Highly skilled	0.472 <sup>M1</sup>	0.425 <sup>M1</sup>	0.422 <sup>M1</sup>	0.480 <sup>M1</sup>	0.474 <sup>M1</sup>
	Skilled	0.150 <sup>M2</sup>	0.148 <sup>M2</sup>	0.167 <sup>M2</sup>	0.175 <sup>M2</sup>	0.176 <sup>M2</sup>
	Little skilled	-0.241 <sup>M4</sup>	-0.237 <sup>M3</sup>	-0.245 <sup>M3</sup>	-0.266 <sup>M3</sup>	-0.256 <sup>M3</sup>
	Unskilled	-0.572 <sup>M6</sup>	-0.513 <sup>M6</sup>	-0.570 <sup>M5</sup>	-0.612 <sup>M5</sup>	-0.669 <sup>M5</sup>
	Househusband	-0.357 <sup>M5</sup>	-0.274 <sup>M3</sup>	-0.286 <sup>M4</sup>	-0.402 <sup>M4</sup>	-0.228 <sup>M3</sup>
	Not known	-0.336 <sup>M5</sup>	-0.299 <sup>M5</sup>	-0.369 <sup>M4</sup>	-0.435 <sup>M4</sup>	-0.435 <sup>M4</sup>
<b>Mother's occupation</b>	Owners	-0.135 <sup>M3</sup>	-0.068 <sup>M3</sup>	-0.012 <sup>M3</sup>	-0.019 <sup>M3</sup>	0.004 <sup>M3</sup>
	Highly skilled	0.503 <sup>M1</sup>	0.466 <sup>M1</sup>	0.464 <sup>M1</sup>	0.492 <sup>M1</sup>	0.486 <sup>M1</sup>
	Skilled	0.186 <sup>M2</sup>	0.162 <sup>M2</sup>	0.181 <sup>M2</sup>	0.174 <sup>M2</sup>	0.180 <sup>M2</sup>
	Little skilled	-0.179 <sup>M3</sup>	-0.179 <sup>M4</sup>	-0.175 <sup>M4</sup>	-0.195 <sup>M4</sup>	-0.212 <sup>M4</sup>
	Unskilled	-0.572 <sup>M5</sup>	-0.512 <sup>M5</sup>	-0.593 <sup>M6</sup>	-0.663 <sup>M6</sup>	-0.712 <sup>M6</sup>
	Househusband	-0.166 <sup>M3</sup>	-0.168 <sup>M4</sup>	-0.187 <sup>M4</sup>	-0.189 <sup>M4</sup>	-0.139 <sup>M4</sup>
<b>Years since high school graduation</b>	Four or more	-0.026 <sup>M2</sup>	0.007 <sup>M2</sup>	-0.078 <sup>M2</sup>	-0.034 <sup>M2</sup>	-0.046 <sup>M2</sup>
	From two to three	0.098 <sup>M1</sup>	0.098 <sup>M1</sup>	0.080 <sup>M1</sup>	0.104 <sup>M1</sup>	0.100 <sup>M1</sup>
	Less than two	-0.049 <sup>M2</sup>	-0.063 <sup>M2</sup>	-0.023 <sup>M2</sup>	-0.057 <sup>M2</sup>	-0.046 <sup>M2</sup>
<b>Regime of the secondary school</b>	Regular	0.022 <sup>M1</sup>	0.023 <sup>M1</sup>	0.030 <sup>M1</sup>	0.027 <sup>M1</sup>	0.028 <sup>M1</sup>
	Vocational	0.017 <sup>M1</sup>	0.003 <sup>M1</sup>	-0.032 <sup>M2</sup>	-0.010 <sup>M2</sup>	-0.006 <sup>M2</sup>
	Other	-0.484 <sup>M2</sup>	-0.468 <sup>M2</sup>	-0.566 <sup>M3</sup>	-0.569 <sup>M3</sup>	-0.585 <sup>M3</sup>
<b>Type of the secondary school</b>	Private	0.344 <sup>M2</sup>	0.337 <sup>M2</sup>	0.367 <sup>M2</sup>	0.386 <sup>M2</sup>	0.383 <sup>M2</sup>
	State	-0.500 <sup>M3</sup>	-0.500 <sup>M3</sup>	-0.539 <sup>M3</sup>	-0.584 <sup>M3</sup>	-0.585 <sup>M3</sup>
	Municipal	-0.468 <sup>M3</sup>	-0.461 <sup>M3</sup>	-0.544 <sup>M3</sup>	-0.568 <sup>M3</sup>	-0.558 <sup>M3</sup>
	Federal	0.564 <sup>M1</sup>	0.538 <sup>M1</sup>	0.422 <sup>M1</sup>	0.459 <sup>M1</sup>	0.506 <sup>M1</sup>
<b>Domestic servant</b>	No	-0.128 <sup>M3</sup>	-0.113 <sup>M3</sup>	-0.120 <sup>M3</sup>	-0.125 <sup>M3</sup>	-0.117 <sup>M3</sup>
	One	0.431 <sup>M1</sup>	0.402 <sup>M1</sup>	0.423 <sup>M1</sup>	0.470 <sup>M1</sup>	0.476 <sup>M1</sup>
	Two or more	0.131 <sup>M2</sup>	0.071 <sup>M2</sup>	0.155 <sup>M2</sup>	0.192 <sup>M2</sup>	0.217 <sup>M2</sup>
<b>Fridge</b>	Yes	0.008 <sup>M</sup>	0.008 <sup>M</sup>	0.008 <sup>M</sup>	0.009 <sup>M</sup>	0.009 <sup>M</sup>
	No	-0.364 <sup>m</sup>	-0.404 <sup>m</sup>	-0.391 <sup>m</sup>	-0.446 <sup>m</sup>	-0.497 <sup>m</sup>
<b>Car</b>	No	-0.362 <sup>M3</sup>	-0.332 <sup>M3</sup>	-0.403 <sup>M3</sup>	-0.449 <sup>M3</sup>	-0.461 <sup>M3</sup>
	One	0.050 <sup>M2</sup>	0.019 <sup>M2</sup>	0.012 <sup>M2</sup>	0.010 <sup>M2</sup>	0.001 <sup>M2</sup>
	Two or more	0.424 <sup>M1</sup>	0.357 <sup>M1</sup>	0.374 <sup>M1</sup>	0.406 <sup>M1</sup>	0.384 <sup>M1</sup>
<b>Computer</b>	No	-0.478 <sup>M3</sup>	-0.419 <sup>M3</sup>	-0.497 <sup>M3</sup>	-0.559 <sup>M3</sup>	-0.541 <sup>M3</sup>
	One	0.001 <sup>M2</sup>	-0.041 <sup>M2</sup>	-0.082 <sup>M2</sup>	-0.119 <sup>M2</sup>	-0.146 <sup>M2</sup>
	Two or more	0.476 <sup>M3</sup>	0.395 <sup>M3</sup>	0.418 <sup>M3</sup>	0.424 <sup>M3</sup>	0.391 <sup>M3</sup>

That is, the changes in the number of slots and in the affirmative action policy seems not to have a decisive qualitatively affect the applicant's pool. The use of the ENEM in the selection process changed remarkably only the student's place of residence. Thus, the results observed in table three were not a result of qualitative changes besides place of residence. Note that those who lived in another state or country had a better performance than others had and, as the profile did not change for the other variables, they may have a similar profile regarding the other variables.

## **4.2 Econometric models**

This section presents the results of the econometric models. The objective is twofold: to address the determinants of performance in the selectin process at UFMG in a more controlled analysis; and to analyze whether temporal trends exist. Notice that all the models were estimated by the same technique and have the same set of explanatory variables. Besides, the dependent variables were all expressed as a normal distribution with mean zero and variance one. That is, the results are comparable between years.

Some trends were very stable between 2009 and 2013. Males, singles, individuals who did not work, who had already graduated and who read foreign languages had higher performances. This same stable trend was observed for the school's regime, with higher performances for regular schools and lower for the other category, and for the type of secondary school, with higher performances for federal schools and worst for municipal and state schools. All these trends corroborate the specialized literature or the previously expected.

After controlling for the parent's education and household income, one of the assets, having a car in the household, did not show any significant result. However, the others assets showed significant results. Individuals that had a fridge in the household had a better performance than those who did not. As mentioned, this variable compares the poor with the very poor. Thus, even after considering the other SES variables, very high deprivation levels is negatively associated with performance. Those who lived with domestic servants had a worst performance and the contrary was observed for those with computers. This suggests that different perspectives of how to spend money and how to allocate time in the household may have an impact on performance. After controlling for the other SES variables, having a domestic servant may represent a perspective of life negatively associated with performance. Conversely, having a computer represent not only higher SES level, but also a focus on learning.

Concerning the parent's education, the mother's seems to be more decisive. For the father's, most positive and significant coefficients were observed for the tertiary level, although, for the two last years, the coefficients for secondary level were also positive and significant. For the mother's educational level, even lower levels of formal education apparently affected performance, even though the coefficients for less than elementary level and for elementary level became non-significant in the last years. These results suggest a slight convergence of gender roles in the household between fathers and mothers between 2009 and 2013.

Regarding the parent's occupation, the father seems to be more decisive. Besides, after controlling for the other variables in the models, most coefficients for the father and many for the mother were positive and significant, and magnitudes did not show any clear tendency. These results indicate that students with fathers and/or mothers that were owners had worst performances, but that differences among the other types of occupation were small. That is, occupation mostly matters because of other factors, such as household income, parent's education or assets in the household and not due to idiosyncrasies of the type of occupation.

All the other variables deserve commentaries that are more specific. For race, trends are stable in the period. Blacks/Pardos/Indigenous had the worst performances, but differences when comparing to Whites/Asians were small. When the UFMG exam was used as the first stage in the selection process, the coefficients differed around 0.01 and with the ENEM they differed approximately 0.05. Only to illustrate, the coefficients for household income differ 0.5 between the extreme categories, and for type of secondary school they differ 0.4 when comparing state and municipal schools with private ones. These results suggest that, after controlling for the other variables in the model, the differences for skin color are dwarfed by other inequalities, such as the household income, the parent's educational level or the type of the secondary school. In addition, those who did not declare their race had the best performance. They are a minority, as showed in table 2, but do have some particularities. However, a detailed analysis of this group is beyond the scope of this paper.

Those who attended *pré-vestibular* had a better performance in all years, but differences decreased with the use of the ENEM. Concerning household income, students from richer household had a better performance and differences increased with the use of ENEM when those with household income less than two MW are compared to the other households. Those who lived in the interior of MG or in another state or country had better performances and, as before, differences increased with the use of ENEM. The students that had finished the secondary school four or more years before had a better performance, but differences decreased

with the use of ENEM. The use of the ENEM as part of the selection process apparently penalized older, local and lower income strata individuals.

**Table 4** – Performance in the entrance exam in UFMG between 2009 and 2013 analyzed with OLS models

VARIABLES	UFMG – 1 <sup>a</sup> stage			ENEM	
	2009	2010	2011	2012	2013
Sex: male	0.205*** (0.00714)	0.203*** (0.00716)	0.212*** (0.00648)	0.235*** (0.00658)	0.237*** (0.00659)
<b>Race</b>					
Did not declare	Ref.	Ref.	Ref.	Ref.	Ref.
White/Asian	-0.251*** (0.0161)	-0.208*** (0.0157)	-0.209*** (0.0155)	-0.205*** (0.0162)	-0.210*** (0.0163)
Black/Pardo/Indigenous	-0.263*** (0.0164)	-0.215*** (0.0161)	-0.257*** (0.0158)	-0.254*** (0.0165)	-0.264*** (0.0166)
Civil status: single	0.135*** (0.0176)	0.0857*** (0.0184)	0.0848*** (0.0181)	0.0666*** (0.0188)	0.133*** (0.0191)
<b>Work</b>					
Do not work	Ref.	Ref.	Ref.	Ref.	Ref.
Up to 20 hours weekly	-0.168*** (0.0158)	-0.231*** (0.0157)	-0.157*** (0.0146)	-0.144*** (0.0145)	-0.157*** (0.0144)
More than 20 hours weekly	-0.253*** (0.0110)	-0.263*** (0.0115)	-0.218*** (0.0105)	-0.247*** (0.0109)	-0.267*** (0.0109)
Already graduated: yes	0.191*** (0.0216)	0.156*** (0.0208)	0.197*** (0.0191)	0.169*** (0.0187)	0.178*** (0.0187)
Attended <i>pré-vestibular</i> : yes	0.181*** (0.00761)	0.214*** (0.00755)	0.130*** (0.00702)	0.132*** (0.00706)	0.132*** (0.00709)
<b>Read foreign languages</b>					
No	Ref.	Ref.	Ref.	Ref.	Ref.
Only Spanish	0.0597*** (0.0105)	0.230*** (0.0108)	0.0306*** (0.00978)	0.0311*** (0.0102)	0.0253** (0.0104)
Another language	0.402*** (0.00990)	0.215*** (0.00978)	0.299*** (0.00893)	0.339*** (0.00911)	0.336*** (0.00922)
Two or more languages	0.425*** (0.0125)	0.338*** (0.0123)	0.371*** (0.0111)	0.407*** (0.0113)	0.412*** (0.0113)
<b>Place of residence</b>					
Belo Horizonte	Ref.	Ref.	Ref.	Ref.	Ref.
Outskirts of RMBH	-0.0293*** (0.0103)	-0.0492*** (0.0106)	0.0162 (0.0103)	0.00897 (0.0105)	-0.0105 (0.0104)
Interior of MG	-0.0569*** (0.00889)	-0.0971*** (0.00869)	0.0786*** (0.00825)	0.0445*** (0.00834)	0.0179** (0.00843)
Other state or country	0.00353 (0.0127)	-0.0846*** (0.0124)	0.190*** (0.00885)	0.126*** (0.00888)	0.0959*** (0.00888)
<b>Father's schooling level</b>					
Don't know/did not answer	Ref.	Ref.	Ref.	Ref.	Ref.
Less than elementary	-0.0376* (0.0210)	-0.000191 (0.0202)	-0.0375** (0.0190)	0.00560 (0.0193)	-0.0164 (0.0195)
Elementary	-0.0172 (0.0217)	0.0164 (0.0208)	-0.0240 (0.0197)	0.0144 (0.0200)	0.0315 (0.0201)
Secondary	0.0179 (0.0206)	0.0256 (0.0195)	0.0174 (0.0185)	0.0536*** (0.0188)	0.0510*** (0.0189)
Tertiary	0.113*** (0.0221)	0.123*** (0.0209)	0.0873*** (0.0197)	0.129*** (0.0199)	0.132*** (0.0200)
<b>Mother's schooling level</b>					
Don't know/did not answer	Ref.	Ref.	Ref.	Ref.	Ref.
Less than elementary	0.0969*** (0.0321)	0.0588* (0.0324)	0.0587* (0.0301)	0.0379 (0.0315)	0.0181 (0.0328)

Elementary	0.123*** (0.0323)	0.0590* (0.0327)	0.0780*** (0.0303)	0.0515 (0.0317)	0.0175 (0.0329)
Secondary	0.155*** (0.0314)	0.106*** (0.0315)	0.119*** (0.0293)	0.125*** (0.0307)	0.0940*** (0.0319)
Tertiary	0.229*** (0.0322)	0.174*** (0.0321)	0.180*** (0.0298)	0.176*** (0.0312)	0.155*** (0.0324)
<b>Household income</b>					
Less than 2 minimum wages	Ref.	Ref.	Ref.	Ref.	Ref.
Between 2 and 5 minimum wages	0.130*** (0.0114)	0.137*** (0.0115)	0.181*** (0.0101)	0.203*** (0.0103)	0.224*** (0.0102)
Between 5 and 10 minimum wages	0.228*** (0.0141)	0.251*** (0.0140)	0.301*** (0.0124)	0.347*** (0.0127)	0.364*** (0.0127)
Between 10 and 20 minimum wages	0.351*** (0.0163)	0.393*** (0.0164)	0.405*** (0.0147)	0.437*** (0.0150)	0.452*** (0.0149)
More than 20	0.518*** (0.0213)	0.541*** (0.0210)	0.499*** (0.0190)	0.577*** (0.0192)	0.578*** (0.0195)
<b>Father's occupation</b>					
Owner	Ref.	Ref.	Ref.	Ref.	Ref.
Highly skilled	0.153*** (0.0238)	0.103*** (0.0247)	0.110*** (0.0217)	0.103*** (0.0222)	0.0653*** (0.0226)
Skilled	0.149*** (0.0244)	0.123*** (0.0253)	0.136*** (0.0222)	0.121*** (0.0227)	0.0779*** (0.0232)
Little skilled	0.157*** (0.0252)	0.100*** (0.0261)	0.131*** (0.0229)	0.114*** (0.0234)	0.0933*** (0.0238)
Unskilled	0.123*** (0.0272)	0.108*** (0.0282)	0.124*** (0.0249)	0.106*** (0.0255)	0.0514** (0.0260)
Househusband	0.101*** (0.0355)	0.0866** (0.0354)	0.0577* (0.0323)	0.0278 (0.0329)	0.105*** (0.0360)
Not known	0.0862*** (0.0286)	0.0849*** (0.0289)	0.0735*** (0.0255)	0.0577** (0.0262)	0.0281 (0.0264)
<b>Mother's occupation</b>					
Owner	Ref.	Ref.	Ref.	Ref.	Ref.
Highly skilled	0.119*** (0.0303)	0.111*** (0.0315)	0.0718*** (0.0272)	0.0918*** (0.0279)	0.125*** (0.0287)
Skilled	0.0770*** (0.0299)	0.0675** (0.0312)	0.0589** (0.0271)	0.0656** (0.0278)	0.119*** (0.0285)
Little skilled	0.0653** (0.0310)	0.0581* (0.0323)	0.0593** (0.0281)	0.0746*** (0.0288)	0.115*** (0.0294)
Unskilled	0.0346 (0.0324)	0.0293 (0.0339)	0.0148 (0.0296)	0.0283 (0.0304)	0.0561* (0.0308)
Housewife	0.0660** (0.0298)	0.0396 (0.0312)	0.0249 (0.0272)	0.0511* (0.0279)	0.127*** (0.0287)
Not known	-0.0173 (0.0370)	-0.0332 (0.0381)	-0.0275 (0.0339)	-0.00485 (0.0346)	-0.0648* (0.0343)
<b>Years since high school graduation</b>					
Four or more	Ref.	Ref.	Ref.	Ref.	Ref.
From two to three	-0.179*** (0.0107)	-0.174*** (0.0109)	-0.116*** (0.00944)	-0.130*** (0.00978)	-0.124*** (0.00986)
Less than two	-0.385*** (0.0110)	-0.379*** (0.0110)	-0.239*** (0.00990)	-0.322*** (0.0101)	-0.306*** (0.0100)
<b>Type of regime</b>					
Regular	Ref.	Ref.	Ref.	Ref.	Ref.
Vocational	-0.191*** (0.0137)	-0.247*** (0.0139)	-0.203*** (0.0127)	-0.214*** (0.0125)	-0.236*** (0.0126)
Other	-0.373*** (0.0181)	-0.436*** (0.0178)	-0.429*** (0.0163)	-0.435*** (0.0168)	-0.458*** (0.0167)
<b>Type of secondary school</b>					
Private	Ref.	Ref.	Ref.	Ref.	Ref.
State	-0.378***	-0.466***	-0.425***	-0.449***	-0.443***

	(0.0101)	(0.00990)	(0.00899)	(0.00912)	(0.00911)
Municipal	-0.355***	-0.438***	-0.401***	-0.423***	-0.409***
	(0.0168)	(0.0174)	(0.0169)	(0.0178)	(0.0190)
Federal	0.468***	0.478***	0.373***	0.409***	0.448***
	(0.0185)	(0.0188)	(0.0172)	(0.0167)	(0.0167)
<b>Domestic servant</b>					
No	Ref.	Ref.	Ref.	Ref.	Ref.
One	-0.0315***	-0.0294***	-0.0593***	-0.0422***	-0.0309***
	(0.0105)	(0.0105)	(0.00942)	(0.00966)	(0.00987)
Two or more	-0.246***	-0.269***	-0.240***	-0.245***	-0.211***
	(0.0170)	(0.0161)	(0.0150)	(0.0167)	(0.0179)
<b>Fridge: yes</b>					
	0.0520**	0.139***	0.0994***	0.109***	0.144***
	(0.0241)	(0.0250)	(0.0226)	(0.0234)	(0.0243)
<b>Car</b>					
No	Ref.	Ref.	Ref.	Ref.	Ref.
One	-0.0104	-0.00919	-0.0156*	-0.00786	-0.00612
	(0.00921)	(0.00927)	(0.00851)	(0.00873)	(0.00885)
Two or more	0.0203	0.00202	-0.0168	0.00538	-0.0131
	(0.0124)	(0.0122)	(0.0109)	(0.0111)	(0.0111)
<b>Computer</b>					
No	Ref.	Ref.	Ref.	Ref.	Ref.
One	0.0189*	0.0391***	0.0883***	0.0878***	0.104***
	(0.0104)	(0.0110)	(0.0103)	(0.0109)	(0.0114)
Two or more	0.0495***	0.0407***	0.121***	0.120***	0.139***
	(0.0143)	(0.0141)	(0.0125)	(0.0128)	(0.0130)
Constant	-0.488***	-0.420***	-0.600***	-0.640***	-0.745***
	(0.0508)	(0.0526)	(0.0487)	(0.0511)	(0.0523)
Observations	55,034	57,911	68,812	61,181	59,887
R-squared	0.349	0.314	0.337	0.393	0.400

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## 5 Conclusion

Tertiary education attendance in Brazil varies remarkably among different population groups. In order to decrease inequalities, many public institutions in Brazil implemented affirmative action policies in the last decades (PEDROSA *et al.*, 2007; TELLES; PAIXÃO, 2013). In particular, a bonus policy was implemented in UFMG in the entrance exam of 2009, which was replaced by the law of quotas in 2012. Besides, other policies were also recently implemented in UFMG and other federal universities, such as the Reuni policy and the use of the ENEM exam as part or as the main exam for tertiary education students selection (LIMA; MACHADO, 2016; NOGUEIRA *et al.*, 2017; SILVEIRA *et al.*, 2015).

All these policy changes might have changed qualitatively and quantitatively the UFMG's applicant pool and the factors that may affect the student's performance in the selection process. The main objective of the paper was to analyze the determinants of the performance in the entrance exam of UFMG between the years of 2009 and 2013, period when these changes in the selection process took place.

Many findings of the paper corroborated the results of other studies, such as males, singles, individuals who did not work and who had already graduated had higher performances. However, the focus of the paper were the differences in these determinants due to the above-mentioned policies and also related to the minorities' attendance at higher education institutions.

The bonus, quota and Reuni policies were effective to promote an increase in the proportion of minorities attending Brazilian Federal universities. The presence of more minority students on campus may cause positive externalities to the minority students themselves or to their peers, in particular through mentoring or role model effects on future minority students (HOLZER; NEUMARK, 2006).

Nevertheless, the point addressed here is whether the performance of minorities varied with the implementation of these policies and due to the introduction of the ENEM as a tool for student's selection. Affirmative action and Reuni policies did not affect remarkably the performance of minorities at the UFMG's selection process. However, the use of ENEM as the first stage in this process relatively decreased the performance of minorities. That is, due to this last change, minorities became less competitive vis-à-vis non-minorities. Some factors that can be related to this finding are described below.

Moeto *et al.* (2017) discuss that the entrance exams of the selection process of higher education institutions are the main guidance to define the content of secondary level disciplines. The ENEM was created in 1998 to evaluate abilities and competences of students ending their secondary education. However, the exam also began to be used to select students at the tertiary level. Thus, the use of ENEM as a tool to select students for tertiary level institutions implicated that the secondary level adapted to its demands. In this vein, Santos (2011) argue that the implementation of the ENEM, since its beginning, had as one of its objective to be an instrument to promote changes in the secondary level, incorporating new abilities and competences to students of this educational level. Hence, consequently, secondary schools, in particular private ones, adapted their curriculum and changed their forms of teaching to increase their students' performance. Moreover, many extra courses were created to ameliorate the student's preparation to the ENEM (SANTOS, 2011; SANTOS; CORTELAZZO, 2013).

Associating these points to our empirical findings, private schools might have adapted more effectively to changes in the selection process at UFMG, increasing the gap between minorities and non-minorities. Moreover, minorities may not have the resources to further pursue extra preparation for the ENEM exam.

In addition, the ENEM exam address basic competences, articulating conceptual contents of different disciplines and contents from everyday life. These competences are: language expertise, phenomena comprehension, the resolution of applied problems, and the facility to build arguments and proposals intervening in real problems (SANTOS, 2011; SANTOS; CORTELAZZO, 2013). Besides, the ENEM exam is considered a more interesting exam than traditional selection process exams at the tertiary level, with less emphasis to memorized aspects of learning, and a focus on competences (SANTOS, 2011; SANTOS; CORTELAZZO, 2013). Moeto *et al.* (2017) argue that there are more conceptual and contextualized questions in the ENEM when compared to the traditional selection process. For instance, Santos and Cortelazzo (2013) argue that the ENEM emphasizes reading comprehension instead of explicit grammar questions. However, although these points may represent an advance, the questions still require memorization and contribute only slightly to the development of abilities that require interdisciplinarity and scientific thinking (MOETO *et al.*, 2017). Nonetheless, it incentives a more active attitude of the students toward leaning, giving less weight to the passive mindset of a simple receptor of content (SANTOS; CORTELAZZO, 2013).

These topics described in the last paragraph can be related to our empirical findings. Individuals with a more precarious educational background may have relatively more difficulty to have an active attitude towards learning in order to acquire abilities and competences to deal with conceptual and problem solving questions. Moreover, it might be more difficult to access different concepts of different disciplines to build arguments and proposals intervening in real problems for someone with lack of basic knowledge in most disciplines of secondary school.

Barros (2014) argue that some researchers advocate that the ENEM promotes the democratization of tertiary education. However, the author adds that reality continues to be highly unequal concerning educational opportunities and that not much has changed with the implementation of ENEM as a tool for students selection. Following our findings, the use of ENEM actually increased inequality in attendance at higher education institution.

According to Cunha and Heckman (2007), ability gaps across children with different backgrounds open up at early ages. Thus, they argue that early childhood investments should be distinguished from later investments, and that interventions targeting adolescents may be less effective. That is, changes in tertiary education, as described in this paper, are a second best solution for the education problem. For instance, SES levels and the type of secondary school attended were particular decisive and stable to determine performance, hence future labor market outcomes and competitiveness further in life.

## References

ARANHA, Antônia *et al.* Programas de inclusão na UFMG: o efeito do bônus e do reuni nos quatro primeiros anos de vigência – um estudo sobre acesso e permanência. **Educação em Revista**, Belo Horizonte, MG, v. 28, n. 04, p. 317-345, 2012. Available at:

<https://www.scielo.br/j/edur/a/BRCSC8y6dhMpQLwjVXgyskw/?lang=pt>. Access at: 05 jan. 2021.

ARAÚJO, Fernando; SIQUEIRA, Liedge. Determinantes do desempenho escolar dos alunos da 4ª. série do ensino fundamental no Brasil. **Economia e Desenvolvimento**, João Pessoa, PB, v. 9, n. 1, 2010.

BAI, Chong-en; CHI, Wei. Determinants of undergraduate GPAs in China: college entrance examination scores, high school achievement, and admission route. **MPRA paper**, 31240, 2011. Available at: [https://mpra.ub.uni-muenchen.de/31240/1/MPRA\\_paper\\_31240.pdf](https://mpra.ub.uni-muenchen.de/31240/1/MPRA_paper_31240.pdf). Access at: 05 jan. 2021.

BARROS, Ricardo *et al.* Determinantes do desempenho educacional do Brasil. **Pesquisa e Planejamento Econômico**, Rio de Janeiro, RJ, v. 31, n. 1, p. 1-42, 2001.

BARROS, Aparecida. Vestibular e ENEM: um debate contemporâneo. **Ensaio: Avaliação e políticas públicas em Educação**, Rio de Janeiro, RJ, v. 22, n. 85, p. 1057-1090, 2014.

BEHRENDT, Amy *et al.* Selectivity bias and the determinants of SAT scores. **Economics of Education Review**, Tennessee, USA, v. 5, n. 4, p. 363-371, 1986.

CUNHA, Flávio; HECKMAN, James. The Technology of Skill Formation. **American Economic Review**, Pittsburg, USA, v. 97, n. 2, p. 31-47, 2007.

FRANCIS, Andrew; TANNURI-PIANTO, Maria. The redistributive equity of affirmative action: Exploring the role of race, socioeconomic status, and gender in college admissions. **Economics of Education Review**, Tennessee, USA, v. 31, p. 45– 55, 2012a.

FRANCIS, Andrew; TANNURI-PIANTO, Maria. Using Brazil's racial continuum to examine the short-term effects of affirmative action in higher education. **Journal of Human Resources**, Madison, USA, v. 47, n. 3, p. 754-784, 2012b.

FRYER JR, Roland *et al.* An Economic Analysis of Color-Blind Affirmative Action. **The Journal of Law, Economics, and Organization**, Oxford, UK, v. 24, n. 2, p. 319-355, 2008.

GOLGHER, André *et al.* Avaliação de impacto do bônus sociorracial da UFMG no desempenho acadêmico dos estudantes. **Mediações - Revista de Ciências Sociais**, Londrina, PR, v. 19, n. 1, 2014.

GOLGHER, André *et al.* Desempenho acadêmico dos estudantes da UFMG: uma análise da política de bônus sociorracial. **Ciências Sociais em Perspectiva**, Cascável, PR, v. 14, p. 120-145, 2015.

HOLZER, Harry; NEUMARK, David. Affirmative action: What do we know? **Journal of Policy Analysis and Management**, New York, USA, v. 25, n. 2, p. 463–490, 2006.

LIMA, Edileusa; MACHADO, Lucília. Reuni e Expansão universitária na UFMG de 2008 a 2012. **Educação e realidade**, Porto Alegre, RS, v. 41, n. 2, p. 383-406, 2016.

MACHADO, Ana *et al.* Qualidade do ensino em matemática: determinantes do desempenho de alunos em escolas públicas estaduais mineiras. **EconomiA**, Brasília, DF, v. 9, n. 1, p. 23-45, 2008.

MOETO, Cecília *et al.* A influência dos processos seletivos das universidades sobre os currículos de física da escola básica: estudo comparativo entre questões de física do ENEM e de um programa de ingresso em universidade pública. *In*: ENCONTRO NACIONAL DE PESQUISA EM EDUCAÇÃO EM CIÊNCIAS, 11, 2017, Florianópolis, SC. **Resumos** [...]. Florianópolis, 2017. Available at: <http://www.abrapecnet.org.br/enpec/xi-enpec/anais/resumos/R0649-1.pdf> Access in: 5 jan. 2021.

NOGUEIRA, Claudio *et al.* Promessas e limites: o Sisu e sua implementação na Universidade Federal de Minas Gerais. **Educação em Revista**, Belo Horizonte, MG, v. 33, e161036, 2017.

PEDROSA, Renato *et al.* Academic performance, students' background and affirmative action at a Brazilian university. **Higher education management and policy**, Paris, France, v. 19, n. 3, p. 1 – 20, 2007.

ROTHSTEIN, Jesse. College performance predictions and the SAT. **Journal of Econometrics**, Amsterdam, Netherlands, v. 121, n. 1-2, p. 297-317, 2004.

SANTOS, Mac. Exame Nacional do Ensino Médio: entre a regulação da qualidade do Ensino Médio e o vestibular. **Educação em Revista**, Belo Horizonte, MG, v. 40, p. 195-205, 2011.

SANTOS, Julio; CORLELAZZO, Ângelo. Os conteúdos de biologia celular no Exame Nacional do Ensino Médio – ENEM. **Avaliação**, Campinas; Sorocaba, SP, v. 18, n. 3, p. 591-612, 2013.

SILVA, Nelson; HASENBALG, Carlos. Recursos familiares e transições educacionais. **Cadernos de Saúde Pública**, Rio de Janeiro, RJ, v. 18 (suplemento), p. 67-76, 2002.

SILVEIRA, Fernando *et al.* Exame Nacional do Ensino Médio (ENEM): uma análise crítica. **Revista Brasileira de Ensino de Física**, São Paulo, SP, v. 37, n. 1, 2015.

SOARES, José; ALVES, Maria. Effects of schools and municipalities in the quality of basic education. **Caderno de Pesquisa**, São Paulo, SP, v. 43, n. 119, p. 492-517, 2013.

TELLES, Edward; PAIXÃO, Marcelo. Affirmative action in Brazil. **Latim American Studies Association – FORUM**, Pittsburgh, USA, v. 14, n. 2, 2013.