# Academic Cheating in Austria, Portugal, Romania and Spain: a comparative analysis

**AURORA A.C. TEIXEIRA**
*University of Porto, Portugal*
**MARIA FÁTIMA ROCHA**
*University of Porto and University Fernando Pessoa, Portugal*

ABSTRACT The empirical evaluation of academic cheating has been almost exclusively focused on the US context. Little is known about cheating in European universities. This article aims to contribute further evidence on this highly relevant phenomenon afflicting higher education throughout Europe. Based on a large sample of undergraduate students of Economics and Management in Austria, Portugal, Romania and Spain, the authors estimated an econometric model and controlled for a variety of factors most likely to influence the probability of cheating (e.g. student characteristics, location, grades). It was found that (1) the likelihood of copying increases when the expected benefit from copying is positive; (2) in copying-favourable environments, the students' propensity to copy tends to be higher; (3) the greater and more serious the perceived sanctions, the fewer the incentives students have to perpetrate dishonest behaviours; (4) in schools where 'codes of honour' exist, the propensity to copy among students is lower; and (5) the propensity to copy seems to be influenced by the countries' education systems and social factors – for instance, Portuguese students are less prone to fraudulent behaviour, whereas Spanish students are more likely to cheat than their Austrian counterparts; no significant difference was found between Austrian and Romanian students.

## Introduction

Through its effect on the quality of the education system, cheating influences the assessment of the stock of human capital, since it is usually based on the 'quantity' and 'quality' of education (Barro & Lee, 2000; Hanushek & Kimbo, 2000; Teixeira, 2005). Cheating tends to reduce the efficiency of a country's education system by distorting honest competition among students (Magnus et al, 2002). Noah & Eckstein (2001, p. 17) noted that cheating in examinations became a 'global phenomenon', increasing in frequency and becoming increasingly sophisticated during the 1990s. Today's pressures are associated to the 'competitive economy, where success and job security can't be taken for granted, [and] it's increasingly tempting to leave your ethics at home every morning' (Callahan, 2004, p. 20). Callahan (2004) further recognises that students are cheating more now rather than getting a 'good education'. In a different, though related domain, Theodore's (2004) book, *Scandals and Scoundrels: seven cases that shook the academy*, reflects on wrongdoing (e.g. plagiarism, embellishments) by 'luminaries', renowned academics. He argues that more pessimistic views on the issue tend to underline that '[s]ingular acts of wrongdoing are constructed as symptomatic of a larger problem, a virus, passing from one infected individual to another' (Theodore, 2004, p. 225).

Cheating among academics is of overwhelming importance as, in all likelihood, the students involved will not have acquired the required skills for their future professional life, and awarding them a degree can lead to various levels of damage. Indeed, the production of unfit professionals

can lead to a number of 'social ills', since they are more likely to fail in their chosen careers, possibly resulting in harm to human life and damage both to colleagues in the same line of work and to the institution that trained them. Furthermore, the educational environment as a whole can also be affected, as the importance of cheating means that more effort has to be spent controlling it, and this effort could be better applied to learning (Dick et al, 2003).

Cheating is a concept that is hard to define. Dick et al (2003) mention a wide range of possible types of cheating, deciding that, in broad terms, cheating results in the breach of defined and accepted rules and standards. Copying in examinations is one form of cheating widely alluded to in studies dealing with cheating (e.g. Bunn et al, 1992; McCabe & Trevino, 1997; Tibbetts, 1999; Sheard & Dick, 2003; Hrabak et al, 2004).

Despite its recognized importance, empirical evaluation of the cheating phenomenon among university students has almost exclusively focused on the US setting, embracing usually a few universities in a given region. Non-US related studies usually involve a narrow range of countries/regions, particularly Australia, Japan, Israel and Russia, and in Europe, the Netherlands and Croatia. Thus, it is fair to say that little is known about cheating in European countries. In this article we aim to fill part of this gap by exploring different aspects of dishonest academic behaviour in four European countries which, to our knowledge, have not yet been studied: Austria, Portugal, Romania and Spain.

Apart from the determinants of copying normally focused on in the literature, we propose a new, broader, econometric specification that includes a variable which quantifies the relevance and magnitude of the 'benefits' that students perceive they will gain by cheating, namely, a better grade than if they do not cheat. Moreover, another 'contextual' determinant of the probability of copying is also suggested – whether or not the educational establishments have a code of honour.

The article is organized as follows. The next section surveys existing studies on the topic of cheating. We then describe the methodology used in gathering the data and present the econometric specification used to evaluate the phenomenon and the results. The last section concludes by discussing the main results of the study.

### On the Determinants of Cheating Behaviour: a review

With Becker's seminal study (1968) the economics of crime gained renewed importance. Formalizing illegal behaviours in terms of a cost–benefit analysis, Becker (1968) defends the economic rationality of people committing criminal acts. He believes that criminal behaviour results from the maximization of an individual utility function in certain risk situations. Crimes are thus only committed if the resulting gains outweigh the expected punishment (Garoupa, 2001). There are other complementary forms of theorizing illegal conduct, as described by Ehrlich (1973) and Wolpin (1978), for example. The first study can be viewed as a model for making individual decisions related to the time allocation variable, consisting of an analysis that follows the same line of reasoning as Becker's (1968) model (decisions weighted for costs and benefits), while further improving some aspects associated with the model by exploring not only the question of costs, but of benefits, too. In addition, Ehrlich's (1973) model makes it possible to predict the direction of changes between legal versus illegal activities, as well as the magnitude of each of these activities (Horvath & Kolomaznikova, 2002). The studies by Becker, Ehrlich and Wolpin are among the more formal approaches, regarded as pioneering, in the analysis of the economics of crime.

More recent studies on cheating (e.g. Bunn et al, 1992; Kerkvliet & Sigmund, 1999) are of an essentially empirical nature. They are based on econometric specifications consistent with the assumption of a relation between fraudulent behaviour and the notion of costs and benefits resulting from it. So these studies are adaptations of Becker's crime model to academic dishonesty.[1]

Most of the studies that examine the importance, in quantitative terms, of cheating in academia (see Table I) show that the dimension of cheating is considerable – involving more than one-third of students. In one of the pioneering studies by Bunn et al (1992), involving an analysis of two higher education courses in Microeconomics in Alabama, USA, the authors found that half the students surveyed admitted to having copied. They also found that cheating was 'normal' among students: 80% admitted that they had seen a colleague copying and half said that they had seen a

colleague being caught copying. Apart from the magnitude of the phenomenon, unlawful conduct seems to be a widely 'assimilated' fact in the student community, with 28% of students admitting to knowing colleagues who copy regularly. The high incidence of dishonest behaviour seems to be justified by the fact that most students (70%) do not see copying as a serious offence.

| Studies/authors | Level of education | Courses (*n*) | Countries (*n* universities/ country) | Number of students | Magnitude of 'cheating' % |
|---|---|---|---|---|---|
| Bunn et al (1992) | University – undergraduate | Microeconometrics (2) | USA (1) (Alabama) | 476 | 50.0 |
| Kerkvliet (1994) | University – undergraduate | Economics (6) | USA (2) | 363 | 42.2 |
| Nowell & Laufer (1997) | University – undergraduate | Economics and Accounting (2) | USA (2) | 311 | 27.0 |
| McCabe & Trevino (1997) | University – undergraduate | - | USA (9) | 1793 | 30.0 |
| Diekhoff et al (1999) | University – undergraduate | Sociology and Psychology related courses (6) | USA (1) Japan (3) | 392 276 | 20.0 (USA) 55.4 (Japan) |
| Pulvers & Diekhoff (1999) | University – undergraduate | Behavioural and Social Sciences, Criminal Justice, Economics and Physical Education (18) | USA (2) (Midwest) | 280 | 11.6 |
| Kerkvliet & Sigmund (1999) | University – undergraduate | Economics (12) | USA (2) | 597 | 12.8 |
| Tibbetts (1999) | University – undergraduate | Introductory Behavioural Science (6) | USA (1) (Mid-Atlantic) | 598 | 39.0 |
| Magnus et al (2002) | Secondary, University – undergraduate and postgraduate | Economics | Russia (Moscow and provincial Russia), USA; Netherlands; Israel | 885 | - |
| Sheard & Dick (2003) | University – postgraduate | Information Technologies | Australia (1) (Melbourne) | 112 | 9.0-38.0 |
| Bernardi et al (2004) | University – postgraduate | Psychology and Management (2) | Netherlands (3) | 220 | 66.4 |
| Hrabak et al (2004) | University – undergraduate | Medical Sciences | Croatia (1) (Zagreb) | 827 | 34.6-52.2 |
| Rettinger et al (2004) | University – undergraduate | Arts (4) | USA (1) (North-eastern) | 103 | 53.0-83.0 |

Table I. Magnitude of academic dishonesty among students.

In another setting (two public universities in the USA) and looking at more courses (six Economics classes), Kerkvliet (1994) collected data in two different ways (direct response and randomized response methods), and found that in the randomized response survey (which he felt guaranteed greater confidentiality and thus more honest answers), 42% of the students indicated they had copied at least once in an examination.

In a later study, covering 12 classes in the two universities, Kerkvliet & Sigmund (1999) estimated that an average of 12.8% of the students surveyed had copied at least once. But there was considerable disparity among the groups, ranging from 0.2% in the least 'deceitful' class, and 32% in the one where cheating was most common. The authors say this disparity is due to the different measures of 'intimidation' used in the various classes (number of test proctors per student in the universities; space per student in the classroom; number of test versions used by the instructor; kind of examination).

Taking a larger population than that in the Bunn et al (1992) study, Nowell & Laufer (1997) looked at two undergraduate courses in the USA (Economics and Accounting) and concluded that the average propensity for dishonesty was around 27%.

More recently, and with reference to other scientific areas, findings by Sheard & Dick (2003) in a study on postgraduate students in Information Technology at a university in Melbourne, Australia showed that 9% of students admitted to being involved in serious forms of cheating in examinations. In another study on misconduct among students from the second to the sixth year of Medicine in a Croatian university, Hrabak et al (2004) found that 94% admitted to having committed some kind of deceit at least once during their studies. When it came to copying answers or using 'cheat sheets', the percentages were 52.2% and 34.6%, respectively. A considerable percentage (66.4%) of Psychology and Management students in three Dutch universities admitted to having cheated (Bernardi et al, 2004).

Different studies (including those cited above) systematically indicate a range of determinants for academic dishonesty. These may be grouped into factors associated with student characteristics, factors related to the institution, variables influencing the likelihood of misconduct being detected and the respective cost of being caught, and also causes associated with the benefits of copying (when they are not caught) and the benefits of not copying. Table II gives an overview of the different factors, by group, mentioned in the literature.

The overall grade point average is a cheating determinant used in most of the studies – Bunn et al (1992), Kerkvliet (1994), Nowell & Laufer (1997), Kerkvliet & Sigmund (1999) and Hrabak et al (2004) – even though its (statistical) significance is seldom found. A negative relation is usually expected between this variable and copying in an examination, as it is reckoned that students with a high grade point average would have less to gain from copying than those with a lower average. Although Bunn at al's results confirm this expectation, most of the authors (Kerkvliet, 1994; Nowell & Laufer, 1997; Kerkvliet & Sigmund, 1999) did not find the grade point average statistically significant. Notwithstanding, Hrabak et al (2004) argue that it could be relevant in explaining attitudes to cheating. They take the view that students with a higher average have a more negative attitude to copying than those with a lower one, and further disapprove of swapping questions by phone during an examination, and using personal connections to pass an examination.

| Groups of determinants | Determinants | Studies |
|---|---|---|
| Student characteristics | Gender | Kerkvliet (1994) |
| | Overall grade point average | Nowell & Laufer (1997) |
| | Consumption of alcohol | Whitey (1998) |
| | Academic year of studies | Kerkvliet & Sigmund (1999) |
| | Religious orientation | Tibbetts (1999) |
| | Student status | Bernardi et al (2004) |
| | Have failed at least a year | Hrabak et al (2004) |
| | Moral factors and kind of personality | Rettinger et al (2004) |
| | Motivation and competence | |
| Factors related with the education institution | Size and level of class | Nowell & Laufer (1997) |
| | Category of teachers | Whitey (1998) |
| | Existence of 'honour code' | Pulvers & Diekhoff (1999) |
| | Classroom environment | Kerkvliet & Sigmund (1999) |
| | | McCabe et al (2003) |
| Cost of detecting academic dishonesty | Teacher's academic category | Bunn et al (1992) |
| | Existence of verbal warnings regarding the consequences of copying in examinations | Kerkvliet & Sigmund (1999) |
| Probability of detecting copy | Number of tests by students with the goal of maintaining good performance | Kerkvliet & Sigmund (1999) |
| | Space per student in class | |
| | Number of examination versions utilized by instructor | |
| | Type of examinations | |

| Benefits from copying (when not caught) | Expected grade | Whitey (1998) |
| --- | --- | --- |
| | Number of student 'free' hours in the term | Kerkvliet & Sigmund (1999) |
| | Type of courses | |
| Benefits of not copying | Average number of weekly hours of study | Kerkvliet (1994) |
| | | Kerkvliet & Sigmund (1999) |
| Others factors | Students' opinion of those who copy or commit other types of academic dishonesty | Bunn et al (1992) |
| | | Kerkvliet (1994) |
| | | McCabe & Trevino (1997) |
| | Students' perception of the percentage of students who copy and of rival group behaviours | Nowell & Laufer (1997) |
| | | Whitey (1998) |
| | | Diekhoff et al (1999) |
| | Intensity of work ('Workload') | Magnus et al (2002) |
| | Pressure not to fail | Sheard & Dick (2003) |
| | Type of courses | Hrabak et al (2004) |
| | Country/region | |
| | Student background | |
| | Student origin | |

Table II. Factors influencing the propensity to cheat, by group.

Linked to the cost–benefit idea, we put forward here that, perhaps more importantly than the students' grade point average, a critical determinant of the propensity to cheat is the students' perceived 'benefits', in terms of the higher grade they expect if they copy successfully. Thus, we aim to test the following hypotheses:

*Hypothesis 1*: The likelihood of copying increases when the difference between the mark/grade the students expect if they copy compared with the mark/grade expected if they do not copy is positive.
*Hypothesis 2*: The probability of copying is higher the greater the difference between the mark/grade the students say they expect if they copy and the mark/grade if no copying takes place.

Contextual factors, peer pressure and attitudes towards academic dishonesty are also determining factors in the development of dishonest academic conduct. In fact, Bunn et al (1992) found that the likelihood of copying is directly related to observing others doing so, and the perception of the number of students who routinely copy. In other words, the probability of students having already copied is determined by their opinion of other students who copy. Furthermore, these authors used measures to assess the perception of students regarding the severity of the punishment for copying, as well as indicators of the climate of cheating perceived by students, to evaluate their perception of the percentage who copy. They found evidence for the belief among students that, given the negligible effect of intimidation attached to expected punishments, they are very unlikely to be caught copying. They also concluded that students do not think copying is a serious crime, which could contribute to a greater incidence of academic misconduct.

*Hypothesis 3*: In copying-favourable environments where permissibility and permeability towards copying is high, the students' propensity to copy tends to be higher.
*Hypothesis 4*: The higher and more serious the perceived sanctions, the fewer the incentives students have to perpetrate dishonest behaviours.

Although McCabe et al (2003) do not directly analyse the influence of codes of honour on the probability of copying, they examine whether this variable has an effect on the academic integrity of university staff in terms of their attitudes and behaviours. The analysis is based on universities with and without codes of honour. The authors found that universities which have a code of honour have more positive attitudes towards policies of academic integrity and are more willing to allow the system to take measures to warn and discipline. Furthermore, they confirmed that, in the absence of a code of honour, university faculty members with this experience believe in students

being responsible for monitoring their colleagues, recognizing the fairness and efficiency of their institutions' policies of academic integrity. Following this line of argument, we hypothesize here that:

*Hypothesis 5*: In universities where 'codes of honour' exist, the propensity to copy among students is lower.

Differences in the countries' education systems and social factors are likely to comprise an important factor in explaining the students' propensity to cheat. For instance, Diekhoff et al (1999) detect differences and similarities in American and Japanese students copying in examinations. Weighting the limitation associated with the distinct composition of the two samples (both in terms of size and associated with various demographic characteristics, such as gender, age and school year), the data show that in comparison with the Americans, the Japanese students are more prone to copying in examinations. They further say that the Japanese system, which assesses academic success/performance with one or very few examination periods, exerts greater pressure on the Japanese, thus encouraging copying. Moreover, and in terms of social involvement, Diekhoff et al (1999) consider that if copying is viewed as widespread, it is harder for Japanese students to resist to the pressure of copying or to help their colleagues to copy, given the group and team orientation among Japanese students. Following similar lines, Magnus et al (2002) conducted an experiment on students in secondary, higher and postgraduate education, in five different regions – Moscow, Russia (province), the Netherlands, the USA and Israel – and showed that both the level of teaching and the zone led to students having distinct opinions of academic dishonesty. On average, Russian students are against denouncers, contrary to the views held by the American students on the same behaviour. The authors also found that, on average, and except for Russia, secondary school pupils are less tolerant of denouncing when compared to students in higher education, and higher education students are less tolerant than postgraduates.

To the best of our knowledge, no European cross-country study has so far been conducted on academic dishonesty. Thus, little is known about this behaviour among European university students. We put forward that:

*Hypothesis 6*: The propensity to copy is influenced by the country's education systems and social factors.

It should be pointed out that there are other factors mentioned in the literature that may influence dishonest behaviour by students, such as gender (Kerkvliet, 1994; Nowell & Laufer, 1997; Kerkvliet & Sigmund, 1999; Tibbets, 1999; Hrabak et al, 2004), year of study (Nowell & Laufer, 1997; Kerkvliet & Sigmund, 1999; Hrabak et al, 2004), and student status (Nowell & Laufer, 1997). However, the sign and the strength of these variables are not consensual or clear cut.

### Methodology for Quantifying the Phenomenon of Academic Dishonesty

The main problem encountered when analyzing cheating in academia is that it is difficult to measure, and researchers have generally used their own information to assess this type of behaviour (Nowell & Laufer, 1997). There are four ways of gathering data on academic dishonesty (Kerkvliet & Sigmund, 1999): direct but surreptitious observation (DSO) of the data; the error overlap (EO) method; the randomized response (RR) survey method and the direct response (DR) method.

We have applied the last method in this study. Although this method takes no account of problems associated with sensitivity to the kind of questions asked (like the randomized response method), meaning that it can induce deviation of the estimates for academic dishonesty (Kerkvliet & Sigmund, 1999), it does have simplicity of implementation in its favour, and a wealth of output for analysis. This is why it is often the procedure used (Bunn et al, 1992; Magnus et al, 2002; Sheard & Dick, 2003; Hrabak et al, 2004).[2]

We devised a one-page inquiry, following Bunn et al (1992), embracing a range of questions focusing on the main determinants associated with academic fraudulent behaviour, adding new variables/questions which in our view are likely to influence the propensity to copy.

The survey was conducted only in Economics and Management courses. In the case of Portugal, six public universities took part in the survey, comprising a sample of 2059 students. As for the other European countries, we sent questionnaires to 27 universities with whom our school had Erasmus agreements, in seven countries (Austria, France, Germany, Italy, Romania, Spain and Turkey). Contacts were easily and rapidly established as a result of this 'convenient' sampling procedure (as they were channelled through the corresponding university's Erasmus coordinator) and guaranteed a certain degree of comparability between the different courses, since universities have to comply with a number of minimum academic requirements to participate in the Erasmus Mobility Programme. We received a total of 758 valid questionnaires from students in Austria (530), Romania (50) and Spain (178).

**Assessing the Determinants of Academic Cheating: model specification and results**

The aim here is to examine which are the main determinants of the propensity to cheat among university students. The nature of the data observed relative to the dependent variable (Have you ever copied in an exam? (1) Yes; (0) No) dictates the choice of the estimation model. Conventional estimation techniques (e.g. multiple regression analysis), in the context of a discrete dependent variable, are not a valid option. Firstly, the assumptions needed for hypothesis testing in a conventional regression analysis are necessarily violated – it is unreasonable to assume, for instance, that the distribution of errors is normal. Secondly, in a multiple regression analysis, predicted values cannot be interpreted as probabilities – they are not constrained to fall in the interval between 0 and 1.[3] The approach used, therefore, is based on an analysis of each situation in the general framework of probabilistic models.

Prob (event j occurs) = Prob (Y = j) = F.[relevant effects: parameters]

When modelling the likelihood of cheating, it is believed that a set of factors, such as the students' expected benefits/costs from copying, contextual factors, and the country of origin, among other variables, gathered in a vector $X$, explain the outcome, so that

$$\Pr ob(Y = 1) = F(X, \beta) \quad and \quad \Pr ob(Y = 0) = 1 - F(X, \beta).$$

The set of $\beta$ parameters reflects the impact of changes in $X$ on the likelihood of 'copying'. The problem at this point is to devise a suitable model for the right-hand side of the equation. The requirement is for a model that will produce predictions consistent with the underlying theory. For a given vector of regressors, we would expect:

$$\lim_{\beta'X \to +\infty} \Pr ob(Y = 1) = 1 \quad and \quad \lim_{\beta'X \to -\infty} \Pr ob(Y = 1) = 0.$$

Partly because of its mathematical convenience, the logistic distribution,

$$\Pr ob(Y = 1) = \frac{1}{1 + e^{-\beta'X}},$$

has been used in many applications (Greene, 2003). Rearranged in terms of the log odds [4], this expression is the so-called *logit* model.[5]

The probability model is a regression of the following kind: regardless of the distribution used, it is important to note that the model's parameters, like those of any non-linear regression model, are not necessarily the marginal effects. In general,

$$\frac{\partial E(Y \setminus X)}{\partial X} = \frac{dF(\beta'X)}{d(\beta'X)}\beta = f(\beta'X)\beta \,,$$

where $f(.)$ is the density function that corresponds to the cumulative distribution, $F(.)$. As for the logistic distribution,

$$\frac{d\Lambda(\beta'X)}{d(\beta'X)} = \frac{e^{\beta'X}}{(1+e^{\beta'X})^2} = \Lambda(\beta'X)[1-\Lambda(\beta'X)].$$

Thus, in the following *logit* model is obtained,

$$\frac{\partial E[Y \setminus X]}{\partial X} = \Lambda(\beta'X)[1-\Lambda(\beta'X)]\beta \,.$$

It is obvious that these values will vary with the values of $X$. In interpreting the estimated model, it would be useful to calculate this value at, say, the means of the regressors and, where necessary, other relevant values. In the logistic regression, the parameters of the model are estimated using the maximum-likelihood method (ML). That is, the coefficients that make observed results most 'likely' are selected, given the assumptions made about the error distribution.

The empirical assessment of the propensity to copy is based on the estimation of the following general logistic regression:

$$P(copy) = \frac{1}{1+e^{-Z}}; \; with \; Z = \beta_0 + \beta_1 \Delta GainCopy + \beta_2 D\Delta GainCopy + \beta_3 Grade + \beta_4 Contextual + \beta_5 Sanctions + \\ + \beta_6 HCode + \beta_7 Country + \beta_8 StudentCharact + \varepsilon_i$$

In order to obtain a more straightforward interpretation of the logistic coefficients, it is convenient to consider a rearrangement of the equation in the logistic model, such that the logistic model is rewritten in terms of the odds of an event occurring.

Writing the logistic model in terms of the odds, we obtain the following *logit* model:

$$\log\left(\frac{Prob(copy)}{Prob(not\;copy)}\right) = \beta_0 + \beta_1 \Delta GainCopy + \beta_2 D\Delta GainCopy + \beta_3 Grade + \beta_4 Contextual + \beta_5 Sanctions + \\ + \beta_6 HCode + \beta_7 Country + \beta_8 StudentCharact + \varepsilon_i$$

The logistic coefficient can be interpreted as the change in the log odds associated with a one-unit change in the independent variable. Then $e$ raised to the power $\beta_i$ is the factor by which the odds change when the $i^{th}$ independent variable increases by one unit. If $\beta_i$ is positive, this factor will be greater than 1, which means that the odds are increased; if $\beta_i$ is negative, the factor will be less than one, which means that the odds are decreased. When $\beta_i$ is 0, the factor equals 1, which leaves the odds unchanged. If the data corroborates Hypothesis 1, *The likelihood of copying increases when the difference between the grade the students expect if they copy compared with the grade expected if they do not copy is positive*, the estimate of $\beta_1$ should appear as positive and significant for the conventional levels of statistical significance (that is, 1%, 5% or 10%). The estimates of the $\beta_s$ are given in Table AI in the appendix, related with two alternative models, one (Model I) which does not include the honour code variable and Model II which does. Table III presents a summary of the main results.

### Main Results

According to Hosmer & Lemeshow's test, Model I reveals a better fit.[6] Notwithstanding, in both models the expected gain in terms of a higher grade in cases where copying is successful is statistically significant and the corresponding coefficient has the expected (positive) sign, thus corroborating Hypothesis 1. According to our results, the odds ratio changes by a factor of 1.8

when the difference between the grade the students expect if they copy compared with the grade expected if they do not copy is positive. However, a higher difference between expected grades (between copying and not copying) does not lead to higher odds of copying. This means that Hypothesis 2 is not corroborated by our data.

| Factors influencing the probability of cheating in examinations | | Estimated impact |
|---|---|---|
| Expected benefits | (1) Expectations of a positive gain (in terms of grade) from copying | + |
| | (2) Amount of expected gain (in terms of grade) from copying | 0 |
| Opportunity cost | (3) Average point grade | - |
| Context – permissibility and permeability | (4) Frequency with which copying is observed | + |
| | (5) Familiarity with someone who copies regularly | + |
| | (6) Opinion regarding copying (no problem … serious problem) | - |
| Sanctions | (7) See others being caught copying | + |
| | (8) Amount of study (how much less the student would study if no vigilance in examinations or sanctions for copying) | + |
| | (9) Expected sanction for copying (nothing more than a reprimand … suspension) | - |
| Honour code | (10) Existence of honour code in school | - |
| Countries | (11) Austria (0) versus Portugal (1) | - |
| | (12) Austria (0) versus Spain (1) | + |
| | (13) Austria (0) versus Romania (1) | 0 |
| Student characteristics | (14) Male students (0) versus Female (1) | - |
| | (15) Age | - |
| | (16) School year | + |
| | (17) Ordinary students (0) versus Associative (1) | 0 |
| | (18) Ordinary students (0) versus Worker (1) | 0 |

+ positive and significant impact; – negative and significant impact; 0 no significant impact.

Note: Table AI in the appendix details the magnitude of the effects/impacts and the goodness of fit of the estimated models which constitute the basis for the summary table presented here.

Table III. Estimated impact of selected factors on the probability of cheating in examinations.

Copying-favourable environments – proxied by the frequency with which students observe the act of copying, familiarity with someone who copies regularly and student opinion regarding copying – is associated with a higher propensity for the presence of this academic misconduct. The negative and significant sign of the coefficient associated to the last variable indicates that the more serious copying is regarded, the lower the propensity of students to commit this act. In summary, Hypothesis 3 is therefore confirmed. Those students who admit to studying less when they know vigilance is low reveal a higher propensity to copy in examinationss. Additionally, the negative sign obtained in the severity of sanctions estimate confirms Hypothesis 4, as the higher and more serious the perceived sanctions, the fewer the incentives students have to perpetrate dishonest behaviours. Although having already seen others being caught copying has a positive influence on the probability of copying, this outcome, combined with previous results, leads to the conclusion that existing sanctions have no truly efficient effects. Despite the poor adjustment quality of Model II, the existence of 'codes of honour' reveals a lower propensity to copy, confirming, therefore, Hypothesis 5. Portuguese students seem to be less prone to fraudulent behaviour when compared to their Austrian counterparts, whereas Spanish students seem more likely (at the 10% significance level in Model II) to commit fraud than Austrian ones. No significant difference exists between Austrian and Romanian students with regard to copying. Thus, Hypothesis 6 seems to be proven, reflecting that the propensity to copy is influenced by the countries' education systems and social factors.

## Notes

[1] Brandão & Teixeira (2005) account for the distinct forms of theorizing illegal behaviours and adapt Becker's crime model (1968) to cheating.

[2] In Brandão & Teixeira (2005) a detailed description of the different methods is provided, presenting their relative strengths and weaknesses.

[3] The logistic regression model is also preferred over another conventional estimation technique, discriminant analysis. According to Hosmer & Lemeshow (1989), even when the assumptions required for discriminant analysis are satisfied, logistic regression still performs well.

[4] The odds of an event occurring are defined as the ratio of the probability that it will occur to the probability that it will not.

[5] In the Categorical Dependent Variable Models, the left-hand side variable or dependent variable is neither interval nor ratio, but, rather, categorical. The level of measurement and data generation process of a dependent variable determines the proper type of Categorical Dependent Variable Models. Thus, binary responses are modelled with the binary logit and probit regressions. The Categorical Dependent Variable Models adopt the Maximum Likelihood estimation method. The Maximum Likelihood method requires assumptions about probability distribution functions, such as the logistic function and the complementary log-log function. Logit models use the standard logistic probability distribution, while probit models assume the standard normal distribution.

[6] This test null hypothesis reveals that the values predicted by the model are not significantly different from the observed values. Given that the *p*-value is not significant for standard values, this hypothesis is not rejected, leading us to the conclusion that the first model predicts reality reasonably well.

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## APPENDIX

| | | Model I | | Model II | |
|---|---|---|---|---|---|
| | | $\beta$ | $\text{Exp}(\beta)$ | $\beta$ | $\text{Exp}(\beta)$ |
| Expected benefits | (1) ΔGainCopy | 0.575[***] | 1.778 | 0.561[***] | 1.753 |
| | (2) DΔGainCopy | -0.015 | 0.985 | -0.013 | 0.987 |
| Opportunity cost | (3) Grade | -0.260[***] | 0.771 | -0.237[***] | 0.789 |
| Context – permissibility and permeability | (4) Frequency with which copying is observed | 0.628[***] | 1.873 | 0.584[***] | 1.793 |
| | (5) Familiarity with someone that copies regularly | 0.407[***] | 1.502 | 0.341[***] | 1.406 |
| | (6) Opinion regarding copying | -0.208[***] | 0.812 | -0.206[***] | 0.814 |
| Sanctions | (7) See others being caught copying | 0.469[***] | 1.598 | 0.429[***] | 1.536 |
| | (8) Vigilantes' influence in amount of study | 0.418[***] | 1.520 | 0.420[***] | 1.521 |
| | (9) Expected sanction for copying | -0.293[***] | 0.746 | -0.222[***] | 0.801 |

| | | | | | |
|---|---|---|---|---|---|
| Honour code | (10) HCode (Yes = 1) | | | -0.447*** | 0.639 |
| Countries | (11) Portugal (Yes = 1) | -1.200*** | 0.301 | -0.856*** | 0.425 |
| | (12) Spain (Yes = 1) | 0.850 | 2.339 | 0.890* | 2.435 |
| | (13) Romania (Yes = 1) | 0.194 | 1.214 | 0.279 | 1.322 |
| Student characteristics | (14) Gender (Fem = 1) | -0.155 | 0.856 | -0.191* | 0.826 |
| | (15) Age | -0.034* | 0.967 | -0.053*** | 0.949 |
| | (16) School year | 0.249*** | 1.283 | 0.249*** | 1.283 |
| | (17) Status_Assoc | 0.415 | 1.515 | 0.372 | 1.451 |
| | (18) Status_worker | -0.144 | 0.866 | -0.178 | 0.837 |
| Constant | | 1,168** | 3.215 | 1,480*** | 4.392 |
| *n* | | 2325 | | 2325 | |
| Copied | | 1568 | | 1568 | |
| Not copied | | 757 | | 757 | |
| % corrected | | 74.5 | | 74.6 | |
| Nagelkerke R Square | | 0.276 | | 0.290 | |
| Hosmer and Lemeshow Test | | 13.10 | | 17.64** | |

Significant at * 10%, ** 5% and *** 1%.

Table AI. Determinants of academic dishonesty among university students (ML estimation).

**AURORA A.C. TEIXEIRA** is Assistant Professor in the Faculty of Economics, University of Porto and researcher at CEMPRE (Centre for Macroeconomic and Forecasting Studies, University of Porto, Portugal) and CTMR (Centre for Trans-National Management Research, École de Management de Normandie, France). *Correspondence*: Aurora Teixeira, Faculdade de Economia Porto, Rua Dr Roberto Frias, P-4200-464 Porto, Portugal (ateixeira@fep.up.pt).

**MARIA FÁTIMA ROCHA** is a lecturer at Universidade Fernando Pessoa and DPhil in the Faculty of Economics, University of Porto. *Correspondence*: Maria Fátima Rocha, Faculdade de Economia Porto, Rua Dr Roberto Frias, P-4200-464 Porto, Portugal (frocha@ufp.pt).