

## Crime without punishment: an update review of the determinants of cheating among university students

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# **Crime without punishment: an update review of the determinants of cheating among university students**

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## **Abstract**

The issue of cheating is a serious problem since it can call the efficiency of an education system into question. Furthermore, it is a devaluing factor in the country's stock of human capital. A student who copies is a free-rider, in the sense that he/she gains a higher grade than that merited by the actual amount of effort expended on study. In addition, it makes it impossible for teachers to fully achieve the goal of effective dissemination to, and acquisition of knowledge by, students.

This paper conceptually and methodologically systematizes the phenomenon of academic fraud. Distinct forms of theorizing illegal behaviours are examined, adapting Becker's crime model (1968) to cheating. A systematic review of the literature has allowed certain *direct* determinants of the probability of "copying", not yet investigated, to be identified, viz: 1) the 'advantages', in terms of a higher grade, that students see themselves as gaining from fraudulent behaviour in comparison with not indulging in it; 2) the breakdown of students' grades by nature of subject - "reasoning" versus "cramming"; and 3) the existence or otherwise of a code of honour in universities. As a result, this paper proposes a new, 'expanded', econometric specification for estimating cheating (i.e., the probability of "copying") based on an analysis of the expected cost-benefit, according to Becker's model.

**Keywords:** Crime, cheating, university, human capital

**JEL-Codes:** I21; I23; J24

*“Cheating is the academic equivalent of urban crime.”* (Alschuler and Blimling, 1995).

## **1. Introduction**

Through its effect on the quality of the education system cheating influences the assessment of the stock of human capital, since this is usually achieved on the basis of the "quantity" and "quality" of education (Barro and Lee, 2000; Hanushek and 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).

The phenomenon of cheating among academics is of overwhelming importance in that the students engaging in it are most unlikely to have the skills necessary for their future professional life, and the award of a degree to such individuals leads to various levels of damage. Indeed, the production of unfit professionals leads to "social ills", since these future professionals will not be able to perform properly, possibly resulting in harm to human life and damage both to other professionals in the same area and to the institution that trained them. What is more, the whole educational environment can also be affected, since the importance of cheating means that more effort has to be spent controlling it, and this effort could be better applied more positively to learning (Dick et al., 2003).

Cheating is a concept that is hard to define. Dick et al. (2003) mentions a wide range of possible kinds of cheating, deciding that, on the whole, 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 and Trevino, 1997; Tibbetts, 1999; Sheard and Dick, 2003; Hrabak et al., 2004).

The main determining factors of cheating, especially copying, proposed in the literature fall into distinct categories, and range from student's characteristics to factors related to the educational establishment, costs of discovering cheats, likelihood of discovery, and so forth. Many variables have been tested for the different categories to explain the phenomenon, among which are: gender, course average, year (student-related characteristics); class size, teaching style and existence of a code of honour (educational establishment-related factors); academic rank of teacher, existence or otherwise of verbal warnings about the consequences of being caught cheating, number of versions of the exam, kind of exam, space per student in the classroom (detection costs). Furthermore, factors linked to the views of the students in relation to the seriousness of the phenomenon and to their perception with respect to its frequency and the current punishment practice, are also held to be relevant aspects, according to the economic literature on the topic.

In addition to providing a comprehensive, structured review of the literature, this article also makes a methodological contribution to the area, plugging a few gaps in the studies reviewed. Some

potentially critical dimensions in the behaviour of copying are thus introduced, in line with the costs/benefits associated with Becker's crime model (1968). In relation to this, added to 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 see themselves as gaining by cheating, in terms of a better grade in comparison with not cheating. In addition, it has been felt pertinent to adapt the analysis by McCabe and Trevino (2003) relative to the effect of having a code of honour in Universities. Another, 'contextual', determinant is also suggested, of the probability of copying - whether or not the educational establishments have a code of honour.

This paper is organized as follows. The next section explores the different forms of theorization of illegal behaviours, describing these forms and adjusting Becker's model (1968) to the issue of cheating. Section 3 then systematically analyzes existing studies on the topic of cheating, while Section 4 describes the methodology for quantifying the phenomenon. The last section discusses the main contributions of this paper.

## **2. Theorization of illegal behaviours. Becker's model adapted to the issue of cheating**

The first attempts to study crime from an economic viewpoint date back to the 18<sup>th</sup> and 19<sup>th</sup> centuries (Eide, 1994 *in* Horvath and Kolomaznikova, 2002). Chadwick's study (1829) is an example of an examination of unlawful behaviours, in which criminals act as individuals exhibiting rational behaviours, to the extent that their actions are considered in the light of gains and costs.

It was with Becker's seminal study (1968) that 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 individual utility function in certain risk situations. Crimes are thus only committed if the resulting gains outweigh the expected punishment (Garoupa, 2001).

Although the analysis focuses on individual decision-taking, Becker is primarily interested in minimizing social loss of income from the crime (Horvath and Kolomaznikova, 2002). Becker's study (1968) aims to be sufficiently general to cover all kinds of breaches of the law (murder, theft, tax evasion and others, which we can hold to embrace cheating), and crime is viewed as an important economic or industrial activity. The author measures the social loss derived from "criminal offences/acts" through loss of social function which ought, he believes, to incorporate the criteria of revenge, compensation, rehabilitation and intimidation. The methodology is expressed in the minimization of this function, taking the resources spent in tackling the crime and the associated punishments as instrumental variables.

The main aim of Becker's work was to find the optimum level of constraint (resulting in the number of "offences" permitted) that is found to be a function of, among other factors, the cost of detaining and trying criminals, the nature of the punishment and the response of offenders in the light of changes to the constraints.

The aim of the Becker model adjusted to the issue of cheating is expressed in the determination of the optimum level of punishment to apply to students who copy, and this is assumed to be a function of the costs associated with the discovery of a student copying (also incorporating possible costs related to the confirmation of the act), the nature of the punishment and how the students react to the severity of the punishments.

In formal terms the social loss function ( $L$ ) depends on the damage that the "offences" cause to society ( $D$ ). In the case of cheating, the outcomes are *externalities* linked to copying. It also depends on the costs of imprisonment and the trial ( $C$ ), which, for cheating, are equivalent to the expenditure required to enable the discovery of copying, and on the costs to the offenders/criminals ( $b.f$ ), which, by analogy, are taken to be the punishments suffered by students caught cheating and the number of offences committed ( $O$ ) or the number of copying situations:

$$L=f(D, C, b.f, O) \tag{1}$$

The aim is to choose  $C$  (prevention and detection costs of copying) and  $f$  (penalties), and perhaps  $b$  (coefficient that transforms offenders' costs in terms of social cost, and whose size varies according to the kind of punishment) so as to minimize  $L$ . To achieve the proposed goal, Becker (1968) discusses the various functions of behaviour associated to the variables making up the argument of the social loss function. It is thus considered that the net cost or damage to society ( $D$ ) can be found from the difference between the amount of damage ( $H(O)$ ) and the social value of the gain to the offenders ( $G(O)$ ), which both depend on the number of offences committed (way of measuring the number of criminal acts):

$$D(O)=H(O)-G(O) \tag{2}$$

From the standpoint of students who copy, social damage could be reflected in the future labour force being of poorer quality, and gains to students could be that they get better jobs (Bunn et al., 1992).

Becker (1968) believes that a plausible assumption is that the second derivative (2) is positive in terms of  $H$  and negative in terms of  $G$ , which is due to criminals usually obtaining decreasing marginal gains and causing increasing marginal damage with further offences. As the sign of the first derivative of the same functions is positive (either the amount of damage -  $H$  - or the social value of the gain for the offenders -  $G$  - varies positively with the number of offences), the sign of

the first derivative of function  $D$  depends on the relative magnitude of the previous derivatives (first derivatives of  $H$  and  $G$ ), the cancellation of the “activity” is justified if the social damage varies positively with the number of “activities” ( $D' > 0$ ).

Detention/imprisonment costs ( $C$ ) embrace the costs of policing, court and specialist teams designed to make it easier to find and convict criminals. When it comes to unlawful academic acts, costs of this kind become the charges associated with a higher number of invigilators in exams, the use of experienced full-time teachers, who can prevent such acts, among other expenses (Kerkvliet and Sigmund, 1999). Becker (1968) assumes that these costs are a function of police “output” and court “activities” ( $A$ ). Knowing the function of production linked to these activities ( $A$ ) and the price of the respective inputs (materials, labour and capital), it is assumed that the increase in activity will be more expensive ( $C'(A) > 0$ ). Becker (1968) suggests two empirical measures for this kind of activity: 1)  $A = p \cdot O$  - where  $p$  represents the probability that “offences” will be resolved by conviction (probability that students who copy will be punished, in the academic analogy), on the assumption that an increase in either the likelihood of conviction ( $p$ ) or in the number of offences ( $O$ ) raises the total costs; 2)  $A = h(p, O, a)$  - where  $a$  represents other determinants of “activity”  $A$ , on the assumption of equal elasticity of  $h$  with respect to  $p$ ,  $O$ ,  $h_p$ ,  $h_o$  and  $h_a$  being positive, which implies that  $C_p$ ,  $C_o$  and  $C_a$  also have positive values.

In relation to the cost of different penalties ( $b, f$ ), Becker (1968) proposes a conversion of its monetary equivalent, given that this type of cost is only measurable in the case of fines. The author mentions the example of the cost linked to prison, whose equivalent monetary value is reflected in the sum of updated “lost gains” and constraints on consumption and freedom. In terms of cheating, too, the associated penalties are not measured directly in terms of money. The kind of punishment it is possible to impose includes (among others) reprimand, cancellation of the exam, prevention from taking other exams in the subject, and suspension (Bunn et al., 1992). It should also be noted that the components of the cost of different penalties vary from student to student, which means that there is no single figure: the highest figure is for the students who profit most from copying, who, from the start, are those who do the least work (Kerkvliet, 1994, and Kerkvliet and Sigmund, 1999).

Becker (1968) holds that the punishments affect both criminals and other members of society. The effect may be positive (for instance, the fines paid by the criminals are income for someone else), or negative (there are costs involved in imprisoning an offender). The same applies with the positive and negative impact of penalties imposed on students who copy, since, although punishments may serve as an example to other students, discouraging them from behaving in the same way, taking the decision to impose a penalty entails costs (at the very least the cost of the time spent by those responsible for ensuring compliance with the rules in achieving this objective). In this respect, the

associated social cost ( $f' = b \cdot f$ ) will depend on the size of parameter  $b$ . For fines, it can be taken that  $b=0$  (assuming the transfer of payment and the absence of costs for non-criminals) if the fine imposed on criminals equals the gain accruing to others. For harsher punishments, it may be expected that parameter  $b$  will take a value above the unit, and so a more severe punishment imposed on students could also determine a higher value for parameter  $b$ .

In relation to the behavioural function of the range of “offences”, the determining variables considered by Becker (1968) are the probability of conviction for offence ( $p_j$ ), punishments for an offence ( $f_j$ ), and a set of other influences, such as profit available in legal and illegal activities, the harm caused by imprisonment and an individual’s disinclination to commit unlawful acts, which the author puts together under variable  $u_j$ :

$O_j = O_j(p_j, f_j, u_j)$  represents the number of offences committed by person  $j$  in a particular period.

The function  $O_j$  in the academic situation corresponds to the number of copying incidents perpetrated by student  $j$  whose determinants are the likelihood of being punished for copying, the associated punishments and a set of other influences, like the additional benefit that the student hopes to gain in terms of a better grade in the exam (in the case of successful copying) and that he/she fails to achieve without copying (Bunn et al., 1992 and Kerkvliet and Sigmund, 1999).

Becker (1968) believes that “price discrimination” and uncertainty exist, since only those convicted (corresponding to students caught copying) are punished (if convicted, offenders pay  $f_j$  per offence, and pay nothing if not convicted). The author assumes, too, that there is a negative relation between the probability of conviction and the penalties per offence, in view of the number of offences committed, since he considers that an increased probability of conviction and penalties per offence reduces the expected utility of each offence to the potential criminals. This helps to reduce the supply of “offences” (this relation may also be assumed in the case of cheating, given that the greater probability of discovering a student copying and the greater severity of the associated punishment mean that the expected utility of copying is less, thus discouraging this kind of behaviour). He also says that the generalization assumed by people with legal experience, is that detection is more effective than harshness of the penalty in the drive to reduce the supply of “offences”, which is translated into an elasticity of supply of “offences” in light of the greater probability of conviction compared with the values assumed for elasticity of the supply of “offences” in light of the penalties.

Despite the negative relation expected by the author, between the likelihood of conviction ( $p_j$ ) and punishments per offence ( $f_j$ ) relative to the number of offences committed ( $O_j$ ), the magnitude of the effects associated with each of the two variables is determined by the reaction of the criminal, which Becker (1968) believes depends on the attitude he/she takes to the risk. So it is only in a

situation of neutral risk for the student that an increase in  $p_j$  offset by an equal percentage fall in  $f_j$  changes neither the expected gain from copying nor the respective expected utility.

For Garoupa (2001), the substitution of probability of punishment by punishment only occurs if the expected punishment is close to the gain resulting from the crime, otherwise the relation should be regarded as complementary. But in a situation of risk propensity and aversion, the magnitude of the effects associated with these two determinants is, according to Becker (1968), different: an increase in  $p_j$  offset by an equal percentage reduction in  $f_j$ , despite not changing the expected profit, will change the expected utility and thus will influence the supply of unlawful cheating. The values taken by the variables, evidence of the supply function of “offences”, for the different individuals have a wide range. They take into account aspects associated with each, including intelligence, age, education, wealth, family background, etc.. Garoupa (2001) chose to work with the average values of the variables, specifically the average values for  $p_j$ ,  $f_j$  and  $u_j$ , as evidence of the “offence” function of the market, assuming the same kind of properties and relations relative to the individual functions and starting from the assumption that, on average, the individuals (specifically, students) react more to a change in the likelihood of detection than to a changed penalty. This is the same as assuming that, on average, criminals/cheating students are risk-prone. Note that the previous assumption was supported by the empirical evidence of the later study by Ehrlich (1977).

After discussing and analyzing the behaviour functions associated with the variables that comprise the evidence of the social loss function, Becker (1968) proposes to determine the value of social loss ( $L$ ), after indirectly defining the probability of being detained ( $p$ ), the number of offences ( $O$ ) and associated damage ( $D$ ), which arise from the values taken by the amount spent on combating "offences" ( $C$ ), the punishment per punishable offence ( $f$ ) and the form of punishment ( $b$ ), which are chosen on the basis of the damage ( $D$ ), costs ( $C$ ) and offences ( $O$ ) functions.

Becker (1968) bears in mind the “contradictory” consequences resulting from the values taken by the instrumental variables which, he says, are the punishment for punishable offence ( $f_j$ ) and the expenditure allocated to combating the “offences” ( $C$ ) (which, for empirical convenience, is replaced by  $p_j$ , with the form of punishment  $b$  taken as a positive constant). Regarding this, note that, even though the increase in variables  $p$  and  $f$  operate as a greater “intimidation”, helping to reduce the number of offences ( $O$ ), and their increase can equally increase the social cost of the "offences" due to the expenses associated with combating them ( $C$ ) and the social cost of punishments ( $f'=b.f>0$ , given  $b>0$ ), thereby contributing to the growth in the supply of “offences” ( $O$ ). If the two kinds of effect occur, the pivotal question must be that of managing to determine the values of  $p$  and  $f$ , whose effect associated with the rise in social costs does not exceed the social



gain arising from the “intimidation” effect, making it possible to minimize the social loss since, in this situation, the number of “offences” cannot be cut to what is desirable (Becker, 1968).

The optimization conditions are used in a social loss function, whose function is identical to the total social loss defined in terms of the real profit from the “offences” (damage -  $D$ ), the conviction costs ( $C$ ) and the punishments ( $p, f$ ):

$$L=D(O)+C(p,O)+b.p.f.O, \tag{3}$$

where the last term ( $b.p.f.O$ ) represents the total social loss of the punishments.

On the basis of the first order conditions that result from minimizing the social loss function in order to  $p$  and  $f$ , Becker (1968) concluded that offenders are risk-prone (and thus that crime does not pay). This means that losses derived from “offences” are minimized if the decision variables ( $p$  and  $f$ ) are chosen from regions where criminals are, on average, risk-prone, concluding that only criminals’ attitudes to risk can determine when crime pays and that rational public policy merely guarantees, indirectly, that it does not pay if the choice is  $p$  and  $f$ . The lessening of  $p$  is not obvious in a situation where criminals are not risk-prone, since the minimization of loss of profit that results from the “offences” generally comes for positive finite values of  $p$  and  $f$  (Becker, 1968).

But in a situation where criminals are risk-neutral or risk-averse, Becker (1968) says it is feasible to achieve the “optimum” number of “offences” by minimizing the social loss with the arbitrary reduction of  $p$  to values approaching zero. In a risk-neutral situation, the reduction of  $p$  cuts social losses in that imprisonment and conviction costs are lower ( $C$  reduces). In a risk-averse situation, the decrease in  $p$  not only reduces  $C$ , but also causes a drop in the number of “offences” ( $O$ ), in damage ( $D$ ) and in the social loss of the punishments ( $b.p.f.O$ ). Furthermore, Becker (1968) finds that risk aversion is consistent with the “optimum” behaviour detected in a risk-prone situation if the loss function is not simply equal to the profit loss, but also depends on changes in the “discriminatory price” between “offences” that are and are not resolved with punishment. In this case, the reduction of  $p$  implies an increase in this “discriminatory price”, and so there is an increase in the social loss that cannot be offset by the reduction that occurs in  $C$ ,  $D$  and  $b.p.f.O$ .

For Becker, crime is socially undesirable because the potential offenders “waste” their time planning and executing a crime that is regarded as a non-productive activity. The only consequence of this inefficient way of spending time is a strong redistribution of income that is extremely injurious in social terms (Horvath and Kolomaznikova, 2002).

There are other complementary forms of theorizing illegal behaviour, as described by Ehrlich (1973) and Wolpin (1978), for example. The first study can be viewed as a model for taking individual decisions relating to the time allocation variable, consisting of an analysis that follows

the same line of reasoning as Becker's model (1968) (decisions weighted for costs and benefits), improving some aspects associated with the model through their exploration not only of the question of costs, but of benefits, too. In addition, Ehrlich's model (1973) makes it possible to forecast the direction of changes between legal *versus* illegal activities, as well as the magnitude of each of these activities (Horvath and Kolomaznikova, 2002). As Ehrlich's model (1973) assumes, the total time is fixed and is divided between carrying out legal and illegal activities, and so the more time given to one activity means that less time is available for another kind of activity. The author considers that the wealth of a person depends on how successful the illegal activities are and is composed of the initial wealth (exogenous), the benefits and costs of the time spent on legal activities and the profits accruing from the illegal activities, if they are successful; and has the same components, minus the penalties associated with illegal activities, if they are discovered. The model's logic is based on the "optimum" allocation of time, and it is formally expressed in the maximization of the expected utility function in order to the time devoted to illegal activities (held to be the model's instrumental variable).<sup>1</sup> Ehrlich considers that an individual will only choose to carry out illegal activities if their expected utility increases and if the marginal differential gain exceeds the expected penalty.

Adapting Becker's model to crime statistics in England in the period 1894-1967, Wolpin's 1978 study represents an attempt to distinguish the degree of agreement between the empirical data and the theoretical model. The pivotal aspect of Wolpin's study (1978) was that it measured the change in expected utility for potential criminals relative to the imposition of harsher punishments and the increased risk of being caught and convicted. The author argues that the evidence of criminal activity in the period studied is essentially the manifestation of changes in "intimidation" variables. This last aspect was also analyzed by Ehrlich (1973), as mentioned earlier, and he found a negative relation between rates of "offences" and sanctions. However, from Wolpin's (1978) angle, this negative relation could have been due not only to the "intimidation" effect, but also to the "incapacity" effect, inherent to certain kinds of sanction, like imprisonment. Wolpin (1978), in fact, considers that imprisoning criminals, who will tend to carry out unlawful acts after their release, will not lead to a long-term reduction in the crime rate (that is to say, imprisonment is not a sufficient deterrent to the commission of unlawful acts). Wolpin argues that, to assess the effect of a sanction's "incapacity", the elasticity of the supply of "offences" must be taken into account (the

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<sup>1</sup> The expected utility function depends, with probability  $p$ , on the wealth of the individual when illegal acts are carried out successfully, and with probability  $(1-p)$ , on the wealth of the individual when the illegal activities are not successful. The "optimum" is defined from the first order condition in a situation where the individual is risk-neutral, due to the interception of the individual's indifference curve and the marginal substitution rate between wealth obtained from successful illegal activities by wealth obtained from unsuccessful illegal practices (which defines what is called the "transformation curve"). The author also feels that a risk-prone individual chooses a point more to the left of the "transformation curve" and that a risk-averse individual would choose a point further to the right of it.

criminal's return response in relation to crime), rather than departing from Ehrlich's assumption of perfect inelasticity (1973). Wolpin (1978) thus not only calculates the relation between the rates of specific crimes and expected sanctions (applied to the English data) but complements that analysis by paying special heed to the distinct effects ("incapacity" and "intimidation" of the sanction), proposing several independent estimations in an effort to assess these two effects separately. This contribution by Wolpin is relevant to the study of cheating as a central facet of it concerns kinds of sanctions and, more particularly, the respective "capacity" or "incapacity" to limit, or at least reduce, the "supply" of offences: i.e., of copying.

The studies by Becker, Ehrlich and Wolpin are among the more formal approaches, regarded as pioneering, in the analysis of the economics of crime. Becker's model, especially, is a very important landmark in the area of formalizing the economics of crime as it is the working basis of a number of later studies (Horvath and Kolomaznikova, 2002).

More recent studies on cheating (e.g. Bunn, Caudill and Gropper, 1992; Kerkvliet and 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.

It is interesting to note that the extensions to the initial models of cheating, which include measures taken by teachers to influence deceitful behaviour, lead to a set of expectations. In particular, it is expected that a rise in the benefit associated with undetected "cheating" increases the likelihood of copying; that harsher penalties imposed on students caught copying reduces cheating; and that all measures that increase the probability of being discovered discourage any kind of deceit. Kerkvliet and Sigmund (1999) believe that these predictions imply the inclusion, as determinants of cheating, of the characteristics of the students (such as gender, course average and year of study) and their choices (time spent studying). But even more important, they hold that the choice of the teachers which affects the benefits and costs of copying should be considered, and also the probability of detection. The next section will analyze in greater detail a wider body of studies devoted to the scale and determinants of the phenomenon of cheating, and try to identify possible gaps in the literature.

### **3. Scale and determinants of the cheating phenomenon. An overview of the literature**

There is huge number of studies that examine the importance (in quantitative terms) of cheating in academia: Bunn et al., 1992; Kerkvliet, 1994; Nowell and Laufer, 1997; Diekhoff et al., 1999; Kerkvliet and Sigmund, 1999; Pulvers and Diekhoff, 1999; Sheard and Dick, 2003; Bernardi et al.,

2004; Hrabak et al., 2004; Rettinger, 2004. Most of these comprise empirical evidence for the considerable dimension of cheating.

One of the pioneering studies, in fact, by Bunn et al. (1992), concerns an analysis of two higher education courses in Macroeconomics in Alabama, USA. The authors found that half the students surveyed admitted to having copied. They also found that cheating was 'normal' among students, with 80% of them saying that they had seen a colleague copying and half of them said that they had seen a colleague being caught copying. Apart from the magnitude of the phenomenon, unlawful behaviour seems to be quite well 'interiorized' in the student community, with 28% of students admitting to knowing colleagues who regularly copy. The vast incidence of the phenomenon seems to be justified by the fact that most students (70%) do not see copying as a serious offence.

In another context (two public universities in the US) and looking at more courses (six Economics classes), Kerkvliet (1994) also carried out a quantitative analysis of cheating. He collected data in two different ways (direct response and random response questionnaires), and found that in the random response questionnaire (which he felt guaranteed greater confidentiality and thus more honest answers), 42% of students indicated they had copied at least once in an exam.<sup>2</sup>

In a later study, covering 12 classes in the two universities, Kerkvliet and 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 tests per student that watch out for discipline in the universities; space per student in the classroom; number of test versions used by the teacher; kind of exam).

Taking a larger population than that in the Bunn et al. (1992) study, Nowell and Laufer (1997) looked at three higher courses in the USA (Economics, Management and Accounting) and decided that the average propensity for dishonesty was around 27%.<sup>3</sup>

More recently, findings by Sheard and 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 exams. Fourteen percent said they had engaged in major plagiarism, 37% had done small-scale plagiarism and 38% had been helped improperly. In their study on unlawful behaviour among students from the 2<sup>nd</sup> to the 6<sup>th</sup> year of Medicine, in a Croatian university, Hrabak et al. (2004) found that 94% admitted to having

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<sup>2</sup> Section 4.1 explains the difference between these two forms of data collection in greater detail.

<sup>3</sup> Note that propensity for dishonesty in this study was not analyzed by copying, as in Bunn et al. (1992), but in terms of "dishonest behaviour of the student" by gaining a grade in the exam other than the right one.

committed some kind of deceit at least once during their studies. The commonest (89.1%) was to sign the attendance register for an absent colleague, and the rarest (0.7%) was paying someone to do the exam for them. When it came to copying answers or using 'cheat sheets', the percentages were 52.2% and 34.6%, respectively.

With reference to other scientific areas (Psychology and Management), in three Dutch universities, Bernardi et al. (2004) showed that 66.4% of the students asked said they had cheated (involving practices other than straightforward copying in exams) in higher education and/or university courses.

Separate studies (including those cited above) systematically indicate a series 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 the phenomenon being detected and the respective cost of detection, and also causes associated with the benefits of copying (when they are not caught) and the benefits of not copying. Table 1 gives an overview of the different factors, by group, mentioned in the literature.

Factors like gender, course average and year of study are widely used as **student characteristic** identifiers that can influence a kind of dishonest behaviour perpetrated.

Gender is a factor in cheating tested by Kerkvliet (1994), Nowell and Laufer (1997), Kerkvliet and Sigmund (1999), Tibbets (1999) and Hrabak et al. (2004). However, in the studies by Nowell and Laufer (1997) and Kerkvliet and Sigmund (1999) the gender factor was found to be statistically insignificant in terms of explaining student cheating. Tibbets (1999) used data on 598 university students and found empirical evidence for considering that gender is a determinant of different behaviour between men and women in terms of intentions of copying in an exam. He thus believes that intent to copy on the part of the two sexes is influenced by distinct factors, having found that marks and moral impact are the most important factors in predicting the intention of women to copy, while men's intentions are more conditioned by having copied previously, and by the thrill they get from copying. Tibbetts (1998) further believes that the differences in the intent to cheat between men and women also stem from shame, in the case of women, and lack of self-control for men.

**Table 1: Factors influencing the inclination to cheat, by group**

Groups of determinants	Determinants	Studies		
Students characteristics	<ul style="list-style-type: none"> <li>▪ Gender</li> <li>▪ GPA</li> <li>▪ Consumption of alcohol</li> <li>▪ Academic Year of studies</li> <li>▪ Religious preference</li> <li>▪ Student Status</li> <li>▪ Have failed at least a year</li> <li>▪ Moral factors and kind of personality</li> <li>▪ Motivation and Competence</li> </ul>	Kerkvliet (1994)		
		Nowell and Laufer (1997)		
		Whitey (1998)		
		Kerkvliet and Sigmund (1999)		
		Tibbetts (1999)		
		Bernardi et al. (2004)		
		Hrabak et al. (2004)		
		Rettinger et al. (2004)		
Factors related with the education institution	<ul style="list-style-type: none"> <li>▪ Dimension and level of Class</li> <li>▪ Category of teachers</li> <li>▪ Existence of “honor code”</li> <li>▪ Classroom environment</li> </ul>	Nowell and Laufer (1997)		
		Whitey (1998)		
		Pulvers and Diekhoff (1999)		
		Kerkvliet and Sigmund (1999)		
Cost of detect academic dishonesty	<ul style="list-style-type: none"> <li>▪ Teacher academic category</li> <li>▪ Existence of verbal warnings regarding the resultant consequences of copying in exams</li> </ul>	Bunn et al. (1992)		
		Kerkvliet and Sigmund (1999)		
Probability of detect copy	<ul style="list-style-type: none"> <li>▪ Number of tests by studants with the goal of mantain a good behavior</li> <li>▪ Geographic class occupation by student</li> <li>▪ Number of exams versions utilized by instructor</li> <li>▪ Type of exams</li> </ul>	Kerkvliet and Sigmund (1999)		
		Benefits of copy (in case of not be catch)	<ul style="list-style-type: none"> <li>▪ Expected classification</li> <li>▪ Number of hours “free” by the student in the quarter</li> <li>▪ Type of Courses</li> </ul>	Whitey (1998)
				Kerkvliet and Sigmund (1999)
Benefits of do not copy	<ul style="list-style-type: none"> <li>▪ Average number of weekly hours of study</li> </ul>	Kerkvliet (1994)		
		Kerkvliet and Sigmund (1999)		
Others factors	<ul style="list-style-type: none"> <li>▪ Students opinion related to those that copy or comete another kind of academic dishonesty</li> <li>▪ Students perception face to the percentage of students that copy and to rival group behaviors</li> <li>▪ Intensity of Work (“Workload”)</li> <li>▪ Pressure for do not fail</li> <li>▪ Type of courses</li> <li>▪ Country /region</li> <li>▪ Student bakground</li> <li>▪ Student origin</li> </ul>	Bunn et al. (1992)		
		Kerkvliet (1994)		
		McCabe and Trevino (1997)		
		Nowell and Laufer (1997)		
		Whitey (1998)		
		Diekhoff et al. (1999)		
		Magnus et al. (2002)		
		Sheard and Dick (2003)		
Hrabak et al. (2004)				

Kerkvliet (1994) concludes that copying is less likely among male students. For Hrabak et al. (2004) gender is also an important determinant in academic dishonesty. But their results show distinct effects associated with this variable, depending on the kind of cheating considered. And so they hold that the statistical relevance of this factor relates to the use of “cheat sheets” in exams (in this case, the greater probability lies with women), the use of mobile phones to swap answers during

the exam and the use of personal relations to try and pass a subject (the latter two, mostly men). Gender, according to Hrabak et al. (2004), is also a factor that influences whether students are liable to report cheating and the perception of the prevalence of cheating. The authors thus confirmed that men are more willing to report any kind of dishonest behaviour, apart from two of the situations they examined (signing the attendance register for a colleague and swapping answers by mobile phone, during an exam). They considered that women are more likely to feel that all cheating behaviour is more common, apart from: forging a teacher's signature, and handing in someone else's work as their own.

The course average was a cheating factor used by Bunn et al. (1992), Kerkvliet (1994), Nowell and Laufer (1997), Kerkvliet and Sigmund (1999) and Hrabak et al. (2004). Bunn et al. (1992) expected a negative relation between this variable and copying in an exam as they felt that a student with a high course average would gain less from copying than one with a lower average. Their results confirm this expectation and exhibit the usual statistical significance (5%). But most of the authors (Kerkvliet, 1994; Nowell and Laufer, 1997; and Kerkvliet and Sigmund, 1999) did not find the course average statistically significant. Hrabak et al. (2004) thought that the course average could be relevant in explaining attitudes to cheating. They take the view, therefore, 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 exam, and using personal relations to pass an exam.

The course year was also regarded as a determinant by Nowell and Laufer (1997), Kerkvliet and Sigmund (1999) and Hrabak et al. (2004). The first two groups of authors had no expectation in relation to the sign associated with this variable, given the existence of contradictory studies in this respect. Kerkvliet and Sigmund (1999) refer to Kerkvliet's 1994 findings, which concluded that the variable did have an influence, but that it depended on how the data were gathered (in the case of direct response questionnaires, the year of study had a direct relation with the dependent variable, as opposed to the data yielded by random response questionnaires, where a negative relation was found between the two variables). Despite there being no previous assumption regarding the effect of this variable, Kerkvliet and Sigmund's (1999) results indicate a positive effect: they suggest that the further away a student is from the start of his/her academic life, the greater the likelihood of him/her copying. In Nowell and Laufer's (1997) study, the variable has no statistical significance. Bunn et al. (1992) do not use the year of study variable, since there were no students from the last years of the course in their sample, making their sample more homogeneous in relation to the time spent in university and thus to opportunities for copying. Hrabak et al. (2004) considered that the year of study was a significant factor in the explanation of items of cheating composing clusters A

(evidence of reporting cheating), and B (perception of prevalence of cheating), which include the following behaviours: asking a colleague to sign attendance registers; altering the register; using “cheat sheets” in an exam; getting someone in the administration to allocate a less demanding examiner, and copying answers in an exam, regarded as the commonest acts of cheating practised by older students.

Drinking, being of a certain religious persuasion and “student status” (e.g. worker-student) are also student characteristics that may influence unlawful behaviour.<sup>4</sup> The first variable was held by Kerkvliet (1994) and Kerkvliet and Sigmund (1999) as being directly related to ‘Bohemian’ behaviour, and inversely related to diligent study, and their results confirmed the expected sign, despite it having very little effect in the latter study. Religion and “student status” were considered by Nowell and Laufer (1997), who expected a positive associated effect, but they actually concluded that the religious persuasion variable was statistically irrelevant. The results for the influence of a student being a worker-student (measured by a dummy variable identifying the hours worked by the student) are consistent with the expectation that an increase in the hours worked would be positively related to the likelihood of this kind of student resorting to cheating.

Other student characteristics also examined in the studies reviewed are passing or failing a year, self-esteem, personality type (Whitey, 1998; Hrabak et al., 2004) and the moral aspect (Bernardi et al., 2004). The studies suggest that the first determinant is positively related to the inclination to cheat, while the last ('moral') tends to dissuade students from committing dishonest acts.

Students’ motivation and competence can also be significant characteristics, and were regarded by Rettinger et al. (2004) as potential determinants in students’ perception of cheating in relation to their colleagues. In this study, the students report their intrinsic motivations (educational material that allows skills to be improved, comprising a body of information) and extrinsic motivations (interests beyond the actual material, like the demonstration of their competence and concealment of lack of competence, which includes getting good marks, high salaries and a better career) for academic work. Rettinger et al. (2004), consider that these two types of motivation affect behaviour relative to copying in opposite ways, even though the direction of the relation between motivation and the likelihood of copying is not clear. It is thus expected that students with high extrinsic motivation copy more and that students with high intrinsic motivation are less prone to do so. These authors also hold that the direction of the relation between ability and cheating is ambiguous: is it that cheating will reduce ability, or will those with less ability choose to engage in dishonest

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<sup>4</sup> Nowell and Laufer (1997) consider student status as *dummies* in relation to ‘working hours’ – part-time and 40 hours (default: 0 hours).



practices? The underlying hypothesis says that only those students who need to copy (with poor perceived ability) will be influenced by the motivation to get a better mark.

Considering the factors related to **educational establishments** as potential sources for explaining academic dishonesty, Nowell and Laufer (1997) suggest the use of variables that allow evaluation of the effect of the type of teacher (permanent or assistant) and class size, expecting that cheating would be more prevalent in classes taught by assistant teachers and in larger classes (due to decreased likelihood of being caught, in the students' perception). To control the differences between the various classes considered, they additionally suggest binary explanatory variables to separate the effects arising from classes, the course associated with each class (Economics *versus* Accounting), and the number of oral examinations given to each class. Similarly, Kerkvliet and Sigmund (1999) accept that the more space a student has in the classroom, the easier it is to detecting cheating among students, thereby producing a negative impact on such behaviour. Regarding the type of teacher, they draw a distinction between graduate assistants and "more experienced" teachers (tenure-track faculty member), and they think that this variable could be used to measure the cost of detecting cheating. Basically, they expect students in classes run by assistants to copy more since the expected cost of detection is lower, thanks to a set of factors, such as their lower ability, the fact that they are closer to the students in age (which might make them more likely to accept casual attitudes of academic dishonesty), and because they are generally more reluctant to instigate a process to investigate cheating, due to associated complications and difficulties. Class size confirms the expected sign in both studies, despite it being statistically insignificant in Kerkvliet and Sigmund's 1999 study. In terms of the type of teaching, the expected signs and statistical significance of the variable are confirmed in both studies.

"Codes of honour" are another institutional factor mentioned by Whitey (1998) and was also analyzed by McCabe et al. (2003). This latter study, while it did not analyze directly the influence of codes of honour on the probability of copying, it did 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.

The classroom environment was the institutional facet examined by Pulvers and Diekhoff (1999) in the justification of academic dishonesty, and they concluded that this determinant of cheating is a

significant situational variable to the extent that the behaviours and attitudes related to cheating are related to the perceived atmosphere in the classroom. The authors used seven scales to rate classrooms. They found that three of the scales (personalization, satisfaction and task guidance) are related and justify cheating for students who copy, and for those who do not.

Kerkvliet and Sigmund (1999) also mention the type of teaching, verbal warnings (a prior warning not to copy, given by the teacher) as another way of increasing the **costs of detecting cheating** by copying, and thus of reducing the likelihood of this phenomenon occurring. The authors actually expected an inverse relation between a prior warning and the probability of copying. The expected sign is in agreement with that expected and the variable was statistically relevant. Kerkvliet and Sigmund (1999), considered that even where the type of teaching was found to have a greater effect on reducing academic dishonesty, it is one of the more costly ways of solving the problem, whereas verbal warnings are a cheaper alternative.

Hand in hand with class size, other ways of influencing the **likelihood of detecting cheating** include the number of test versions used by the instructor, the type of test (multiple choice or other) and the measures used on students to keep discipline in universities, according to Kerkvliet and Sigmund (1999).

They say, therefore, that the more versions of a test there are, the easier it is to detect copied answers, that multiple choice questions facilitate copying and that more measures applied to students to maintain discipline in universities all help to increase the probability of detection. The first and last measure suggested have a negative influence on academic dishonesty, contrary to test type, which like the associated dummy variable is defined (1, for multiple choice tests and 0 for others) positively influence cheating by copying. The results confirm the expectation relative to the negative effect of the number of test versions and measures on students with respect to keeping discipline, but they show a sign contrary to that expected for the influence of the type of test, although the estimate obtained for the coefficient associated with this variable is statistically insignificant.

The mark hoped for, the number of “free” hours available to the student in a term and the type of course are the variables associated with the **benefits of copying** (if successful) that Kerkvliet and Sigmund (1999) also considered. Bunn et al. (1992) believe that the benefit to the student who copies lies in a better grade or average or in the possibility of a better job offer after graduation. Whitey (1998) proposes a prediction model for cheating and examines the implications of this model for identifying the students at risk and in control of these situations. He considers, among other factors, the student’s anticipation of a high reward for success (which, for copying successfully, could be a higher grade). For Kerkvliet and Sigmund (1999), students with a lower

mark have more to gain from successful copying (expecting a negative effect); the number of “free” hours not affected by studying are seen as a way of reducing opportunity costs and thus of increasing the benefits of undetected cheating (here expecting a positive effect), and courses that require lower qualifications at the outset do not encourage as much cheating. Only the number of “free” hours available to the student in the term variable is found to be statistically significant, for a significance level of just 6%, confirming the positive sign expected. The same authors also suggest the number of hours used for studying per week as an indicator of the **benefit of not copying**, with a positive relation being taken between this variable and the benefits gained by not copying, which is expressed in a negative relation between the number of hours overall variable and the likelihood of copying. But the results show that the variable is statistically insignificant, confirming the results of Kerkvliet’s 1994 study.

Apart from the categories of academic dishonesty already mentioned, there are also **other conditioning factors** for the development of unlawful academic practices. These include students’ opinions of those who copy (Bunn et al., 1992; Magnus et al., 2002), and what they think about people who cheat in any other way (Hrabak et al., 1999; Magnus et al., 2002). 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 a student having already copied is conditioned by his/her beliefs in relation to other students who copy. Furthermore, these authors assess the perception of students relative to the severity of the punishment for copying and use this and indicators of the climate of cheating perceived by students to evaluate their perception of the percentage who copy, and they find 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. In addition they find that students do not think copying is a serious crime, which could contribute to a greater incidence of this phenomenon.

Magnus et al. (2002) also think it is fundamental to assess the opinion of students on academic dishonesty. To this end, they conducted an experiment on students in secondary, higher and postgraduate education, in 5 different regions: Moscow, Russia - province, the Netherlands, the USA and Israel). Their results show that both the level of teaching and the zone lead to students having distinct opinions relative to the three situations concerning academic dishonesty, since, on average, Russian students are against denouncers, contrary to the views held by the American students on the same behaviour. It was also found, on average, and except for Russia, that secondary school pupils are less tolerant of denouncing when compared with students in higher education, and these are less tolerant than postgraduates.

Cross-country differences in the phenomenon under consideration are also studied by Diekhoff et al. (1999), who detect differences and similarities in American students (1 university and 392 observations) and Japanese students (3 universities and 276 observations) copying in exams. 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 copy in exams. The authors explain this in terms of differences in the two countries' education systems and social factors. Regarding the first conditioning factor, they say that the Japanese system, which assesses academic success/performance with one or very few assessments, creates greater pressure on the Japanese, encouraging copying. With respect to 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.

In line with Magnus et al. (2002), Hrabak et al. (2004) are of the same view regarding the importance of the students' attitude to the different kinds of cheating. The authors see this factor as the most determining "predictor" of the set of dishonest behaviours. Along the same lines, McCabe and Trevino (1997) think that context factors are the most relevant factors in cheating, in particular the "condemnation" from colleagues for engaging in unlawful practices. These authors effectively admit, in their study of 9 medium- to large-sized state universities, that, of the two categories of factors determining such practices (individual factors like age, gender and course average, and context factors like perceived scale of the phenomenon, "condemnation" from colleagues around them and the perception of the severity of punishments), it is the context factors that most influence academic dishonesty.

The positive attitude to cheating, the perception of social norms that "sustain" such situations, poor studying conditions and the fact that a student has copied before are all determining contextual factors, according to Whitey (1998).

Among other factors that also determine academic dishonesty, Sheard and Dick (2003) found that workload and pressure not to fail are also associated with the use of "cheat sheets" in exams. Similar factors analyzed in the studies reviewed were parents' education (Kerkvliet, 1994) and if there was a doctor in the family (Hrabak et al., 2004). Kerkvliet (1994) finds evidence, though scanty, linking students' parents' education and cheating, suggesting that students with graduate parents copy more. Hrabak et al. (2004) look at the aspect of a student having doctors in the family as a factor that positively determines two of the cheating types analyzed among medical students,

and these concern changing the attendance register (from absent to present) and using “cheat sheets” in exams.

Bearing in mind the extensive literature review, three gaps can be identified that require plugging. First, linked to the cost/benefit idea, it is suggested that variables are used that make it possible to perceive the ‘benefits’, in terms of a higher grade, expected by students if they copy successfully. The respective applicability could involve a dummy variable to express a positive benefit in terms of the final mark for the exam and a continuous variable for this different grade relative to the copying and non-copying situation.

The literature tends to focus on the student’s *average* mark, taking no account of the fact that the likelihood of copying may depend, at least in part, on the nature of the subjects, with respect to whether they are 'easy' or permissiveness of cheating. It is suggested here that this second gap could be plugged by breaking down students’ grades by the nature of the subject - “reasoning” *versus* “cramming”.

Finally, and taking a different angle from McCabe and Trevino’s 2003 study, the inclusion of a variable indicating whether or not there is a code of honour in the universities as a *direct* determinant of the likelihood of copying.

#### **4. Methodology for quantifying the phenomenon of academic dishonesty and assessing the respective determinants**

##### **4.1. The problematical issue of measuring academic dishonesty**

The main problem linked to the analysis of cheating in academia lies in it being hard to measure, and researchers have generally used their own information to assess this type of behaviour (Nowell and Laufer, 1997).

According to Kerkvliet and Sigmund (1999), there are four ways of getting data on academic dishonesty: direct but discrete observation of data (DDO); the “overlapping error” method (OE); the random answer questions method (RA), and the inspection via direct questions (DRQ) method. The first method (DDO) consists of assessing the cheating by means of tests done by students who can evaluate their own tests the next day. Under this method, the observation of the failure to mark answers as wrong reveals deceitful behaviour. The advantage of this method is that it allows the assessment of a kind of cheating specific to a particular class and means that the quality of the data is dependent on the integrity of the students. But the students can see this procedure as a trap. Moreover, this method can place the students in a contrived situation completely removed from the typical examination environment, and it can only be used for objective classification tests (Kerkvliet and Sigmund, 1999).

The second procedure for obtaining data, the “overlapping error” method (OE) (Kerkvliet and Sigmund, 1999) aims to detect cheating by a statistical comparison of wrong answers by students just before they sit an exam and by students a long way from taking an exam (chosen at random). The authors find that this method allows the assessment of a specific kind of cheating in a particular class, capable of being adapted to an examination environment, while the quality of information does not depend on the integrity of the students. Drawbacks noted by the authors include the fact that this kind of action is only useful for objective tests and a specific kind of cheating (copying from the neighbouring person).

The random answer (RA) method is meant to reduce missing and distorted answers for more sensitive questions. This method allows more anonymity since, in the more problematic questions, the possibilities allowed by the answer do not disclose the true position of the respondents relative to a particular problem that may be regarded as more delicate. It is hoped that such anonymity will result in more honest answers, as the students need not fear any reprisals from their teachers (Kerkvliet and Sigmund, 1999). Despite this advantage, this method is hard to apply, and the link of uncertainty between the answers given and the respective behaviour (inherent to this method of data collection) reduces the size of the sample and inflates the variance of the statistics estimated (Kerkvliet, 1994). In the random answer questionnaire on cheating used by Kerkvliet and Sigmund (1999), each student must give the sum of the last four digits of his/her social security number. This was the random number used to decide which students would give an arbitrary answer (0 with probability  $p_1$  or 1 with probability  $p_2$ ). It is known that with probability  $(1-p_1-p_2)$  the students were told to give a response 1, if in fact they had ever copied in an exam and 0 if they had never copied in the classroom. Nowell and Laufer (1997) add that this method has other important drawbacks: they say that it requires large initial samples, and the associated methodology implies a considerable loss in degree of freedom.

The inspection method via direct questions (DRQ), although it takes no account of problems associated with sensitivity to the kind of questions asked (like the RA method), meaning that it can induce deviation of the estimates for academic dishonesty (Kerkvliet and Sigmund, 1999), 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 and Dick, 2003; Hrabak et al., 2004).

#### **4.2. Alternative econometric specifications for assessing academic dishonesty**

The models on academic dishonesty developed by the authors mentioned above, are applied to quite distinct realities (different countries and different courses) and use distinct specifications for quantifying the phenomenon and its determinants. In fact, the studies analyzed are concerned with

Japan (Diekhoff et al., 1999), Australia (Sheard and Dick, 2003), Croatia (Hrabak et al., 2004) and, despite most studies applying to the situation in the USA, they are about different regions. The courses examined are equally diverse: Economics; Accounting; Management; Sociology; Psychology; Law; Physical Education; Behavioural Sciences; Computer Technology, and Medicine. Table 2 summarizes the information on these models, showing the method of estimation, the variables used, the way the sample was selected and its size, countries and courses studied, and the results obtained that allowed the scale of the phenomenon to be assessed.

Table 2 shows that the likelihood of academic dishonesty fluctuates between 10% (Sheard and Dick, 2003) and 94% (Hrabak et al., 2004). One reason for this disparity is the fact that the cheating estimated in the various studies does not cover the same items of academic dishonesty.

In fact, if we look specifically at copying in exams, taking the data obtained from direct response questionnaires, we find that the estimates show more agreement, at 50% for Bunn et al. (1992), 53% in Rettinger (2004) and 55.4% and 20% in Diekhoff et al. (1999), for America and Japan, respectively.

**Table 2:** Summary of studies on academic dishonesty

<b>Authors (date)</b>	Bunn et al. (1992)	Nowell and Laufer (1997)	McCabe and Trevino (1997)	Diekhoff et al. (1999)	Pulvers and Diekhoff (1999)	Kerkvliet and Sigmund (1999)	Tibbetts (1999)	Magnus et al. (2001)	Sheard and Dick (2003)	Hrabak et al. (2004)	Rettinger (2004)
<b>Model</b>	Logit	Logit	Multiple Regression and Descriptive Analysis	Factorial Descriptive Analysis	Correlation and Descriptive Analysis	Logit	OLS	Ordered Probit (Maximum Likelihood Estimation)	Principal Component Analysis	Logit	Correlation
<b>Dependent Variable</b>	(1a)	(2), (3)	(6b) (7a, 7b) (8)			(2)	(1b)	(4)	(5)	(6a)	
<b>Independent Variable:</b>	(8) (29) (30) (31a) (32)-(35)	(7a), (8), (9), (10), (11) (13)-(16) (27)	(10b) (31b) (49) (50) (51) (52)			(7a), (8), (9), (10a) (17)-(20) (21)-(23) (24) (25), (26) (28)	(7 a, 7 b) (8) (31 c) (33) (53)-(57)	(36), (37), (38)	(39)-(48)	(7a), (9), (33), (34)	
<b>Sample dimension</b>	332	234 (RA), 209 (ODD)	1793	392 (american) 276 (japanese)	277	393	598	885	112	827	103



(...) **Table 2:** Summary of studies on academic dishonesty

<b>Authors (date)</b>	Bunn et al. (1992)	Nowell and Laufer (1997)	McCabe and Trevino (1997)	Diekhoff et al. (1999)	Pulvers and Diekhoff (1999)	Kerkvliet and Sigmund (1999)	Tibbetts (1999)	Magnus et al. (2001)	Sheard and Dick (2003)	Hrabak et al. (2004)	Rettinger (2004)
<b>Courses</b>	2 courses of Principals of Microeconomics	Economics, Management and Accounting	-	Introduction to Sociology and Psychology	Behavioral and Social Sciences, Criminal Justice, Economics and Physical Education	Economics	Introductory Behavioral Science		Information Technologies	Medical Sciences	-
<b>Level of education</b>	Undergraduate	Undergraduate	Undergraduate (9 Public Universities)	Undergraduate (1 american university and 3 japanese universities)	Undergraduate (2 universities)	Superior (2 Public Universities)	Undergraduate	Secondary, Undergraduate, Pós-graduation	Pós-graduation	Undergraduate	Undergraduate
<b>Countries</b>	USA (Alabama)	USA	USA	USA Japan	USA (Midwest)	USA	USA (Mid-Atlantic)	Moscow, Russia (Regions), USA; Netherlands; Israel	Australia (Melbourne)	Croacia (Zagreb)	USA (Northeastern)
<b>Magnitude of academic dishonesty</b>	50%	27% (ODD)	30%	55,4% (japoneses) 20% (americanos)	11,6%	13%	39%	-	10%	94%	83% <sup>(I)</sup> 53% <sup>(II)</sup>
<b>Forms of obtain data</b>	QRD	RA, ODD	Anonyme Answers obtained by e-mail	QRD	QRD	RA	QRD	QRD	QRD	QRD	QRD

### *Legend:*

(I): dishonest activities in general; (II): copy in exams

#### **Dependents Variables:**

- (1a) UCHEAT: unobserved discrete variable (equals 1 if copies, 0 otherwise)
- (1b) CHEATING INTEND: intend of academic dishonesty estimative (variable measured in a 11 points scale: 0 means no academic dishonesty and 10 means 100% of chance to commit academic dishonesty)
- (2) CHEAT: binary discrete variable, if data is obtain by RA (equals 1 if copies, 0 otherwise)
- (3) CHEAT: cathegoric discrete variable, if data is obtain by ODD (equals 1 if student atributts a mark different from the correct one; 2 if no dishonestic behavior and 3 if observed an inadequated mark)
- (4) y\*: Unobserved Latent Variable related to different opinions about three types os behavior (copy, alow copy and report)
- (5) Dishonesty in exams, plagiarism and not allowed help
- (6a) Item of academic dishonesty  $i$  ( $i=1, \dots, 11$ ): discrete variable (equals 1 if item  $i$  is committed and 0 if not)
- (6b) Compositive measure of some *items*  $i$ 's of academic dishonesty ( $i=1, \dots, 12$ ): discrete variable in a five points sacale (equals 1 if never commit *item*  $i$  and 5 if item  $i$  was commit many times)

#### **Independent sVariables:**

##### *Students characteristics:*

- (7a) Gender: *dummy* variable related to student gender
- (7b) Student age
- (8) GPA: student average classification – *proxy* of student *performance*.
- (9) Year: year of studies or 3 *dummies* that reveal if student is SENIOR, JUNIOR or SOPH.
- (10a) Student Status: *dummies* W1e W2, that report if students work 40 hours or more by week, or if students work in *parttime*, respectively.
- (10b) Mesure that reveal student participation (1) or none participation (0) in students association.
- (11): RELIGN: *dummy* which report students religion preference (1 if existe, 0, if not).
- (12): Alcohol: Alcohol average consumption by week.

##### *Factors related with the education institution:*

- (13) ADJUNT: *Dummy* Variable related to different types of teachers (0, permanent teacher, 1, if adjunct instructor).
- (14) SIZE: Classroom size.
- (15) LEVEL: *Dummy* Variable that control the class level ( 0, classes level 100, 1, for level 200 classes).
- (16) NQUIZ: *Dummy* Variable to control the number of oral test by class (0, for class with 2 oral tests, 1, for those that made 3).

##### *Probability of detect copy:*

- (17) PROCTOR: Number of tests by studants with the goal of mantain a good behavior.
- (18) SQFOOT: measure of student área in class.
- (19) MULTICH: *Dummy* Variable (1, if multiple choice, 0, if not).
- (20) VERSIONS: Number of exams versions utilized by instructor

##### *Benefits of copy (in case of not be catch):*

- (21) GRADE: student expected final classification; (22) Credithr: Number of hours “free” by the student in the quarter; (23) CLA: *Dummy* Variable (1, if student frequents a free art course, 0, if not).

*Benefits for not copying:*

(24) STUDY: Average number of weekly hours of study.

*Detecting cost:*

(25) WARNING: *Dummy* Variable that reveal the existence of verbal warnings regarding the resultant consequences of copying in exams (1, if exist, 0, if not)

(26) GTA: *Dummy* Variable, that measure teachers experience (1, if graduated assistant, 0, if an academic member with less experience).

*Others factors (Students Opinion, Country, Student Bakground, Level of education, Courses,...):*

(27) Set of *dummies* variables that reveal student formation, assuming by reference students with no bussiness formation: *ECON* (Economics), *ACCT* (Accounting), *BA* (Bussiness Administration) e *CIS* (Information System by Computers).

(28) NTEST: Numbers of tests made in each class.

(29) SEEC: *Dummy* Variable, interaction with SEECHEAT e CCAUGHT variables, which gives information about the probability of beeing catch.

(30) SEECHEAT: *Dummy* Variable (1, if observed other copying, 0, if not).

(31a) SEVERE: *Dummy* Variable that gives the (1, serious consequences, 0, otherwise).

(31b) Variable measure the students perception related with the consequences of beeing catch copying (in a four points scale, 1 very soft consequence and 4 severe consequence).

(31c) Perceived severity of each specified sanction if it was to occur (in a 11 points scale, 0 if the sanction cause no problem for him or her and 10 if it causes a very big problem).

(32) CCAUGHT: *Dummy* Variable measuring the intimation effect (1, if observed other student beeing catched copying, 0, if not).

(33) PERCENT: Students perception regarding to the percentage of students that copy or commit other type of dishonest act.

(34) OPINION: *Dummy* Variable concerning the students opinion related with the importance of the illicit act – “copy” or other kind of dishonet pratice (1, if the illicit act is not a serious problem, 0, otherwise).

(35) ROUTINE: *Dummy* Variable indicating other students *characteristics* (1, if the student knows others that regularly copy, 0, if not).

(36)  $x_1, x_2, x_3, x_4, x_5$ : *Dummy* Variables for geographic regions.

(37)  $x_6, x_7$ : *Dummy* Variables for identification of 3 different education levels (secondary as reference).

(38)  $x_8$ : *Dummy* Variable, interaction between the geographic region and the education level.

(39) Intensity of Work (“Workload”)

(40) Pressure for do not fail

(41) Lazyness

(42) To help a friend

(44) Do not have time

(45) Need to obtain a bettter classification

(46) Award

(47) Parents pressure

(48) Miss classes for beeing ill

(49) Measure of parents’ education level

(50) Measure of the participation level in extra-curricular activities

(51) Students perceptions of how frequently (never to very often on a five point scale) either plagiarism or test cheating occurs at their school and a more objective measure of the actual number of times (never to many times on a five point scale) the respondents have observed another student cheating on a test or exam.

(52) Faculty Understanding/Acceptance of Academic Integrity Policy

(53) Academic Dishonesty Bakground

(54) Moral beliefs concernig “copy in exams”

(55) Self-control; (56) Shame and pleasure of commit dishonest acts; (57) Composite measure of perceived formal and informal external sanction concernig “copy in exams”.

### 4.3. Proposal for a new ‘expanded’ econometric specification to assess academic dishonesty

Taking Becker’s 1968 model and applying it to cheating (cf. Section 2), the aim is now not to estimate the costs and benefits associated with cheating in academia, but to use an ‘expanded’ econometric specification that will allow the estimation of the magnitude of the likelihood of copying and the analysis of the respective determinants that obviously result from the expected costs and benefits.

The intention is thus to describe an econometric specification, in reduced form, that allows the significance of the determinants of cheating to be assessed by using some of the variables indicated in previous studies (cf. point 4.2.) and adding three dimensions not yet dealt with in the literature.

It is thus proposed to introduce a variable to measure the ‘benefits’ that students feel they will obtain, in terms of a better grade, if they cheat compared with if they do not cheat.

It is also proposed to break down the students’ grade by subject - “reasoning” versus “cramming”. The literature tends, in effect, to focus on a student’s *average* grade, disregarding the fact that the likelihood of copying may depend, at least in part, on the kind of subjects involved, in terms of whether they are ‘easy’ or permissiveness in relation to cheating.

Finally, it is suggested that, in an adaptation of McCabe and Trevino’s 2003 contribution, a variable indicating whether or not a university code of honour is in place should be added, as a *direct* determinant of the probability of copying.

In more methodological terms, it is considered that it would be relevant to establish an econometric model whose dependent variable allowed the likelihood of copying in an exam to be assessed more fully. The dependent variable proposed is discrete and not dichotomous, unlike most of the studies reviewed, assuming an ordered set of values that are a function of the frequency of copying as perceived by students. The intention is to get around any bias in the sense of non-admission by the student of cheating which is inherent to the formulation of ‘Yes’ and ‘No’ type questions (dichotomous variables).

Given the nature of the variable described (0: never copies; 1: copies rarely, or only a few times; 2: always or often copies), the estimation of the ordered logit model is therefore proposed. In formal terms:

$$p_i = \alpha \cdot D\Delta CopyingGain + \lambda \cdot \Delta CopyingGain + \gamma \cdot Re asSubj + \nu \cdot CramSubj + \delta \cdot GPA + \beta \cdot \mathbf{X} + \varepsilon_i, \quad (3)$$

where  $p_i$  is the likelihood of student  $i$  copying and  $GPA$  student average classification – proxy of student performance.

The variables related to the variations in benefits with copying, in terms of grade ( $D\Delta CopyingGain$  and  $\Delta CopyingGain$ ) are included – by analogy with the determinant gain available in lawful and unlawful activities of the behavioural function of the supply of “offences” (cf. Becker’s model, 1968). This allows for the estimation of both the impact of the admission of a positive effect in terms of grade through copying and the magnitude of the “net” effect of separate expected gains. Thus  $a$  is the coefficient associated with the first effect. In fact, it is expected that  $a$  will be positive, that is, if the difference between the mark that the student says he/she expects if he/she copies and the mark if he/she does not copy is positive ( $D\Delta CopyingGain=1$  if  $\Delta CopyingGain>0$ ), it is expected that, on average, *ceteris paribus*, the likelihood of copying is increased. With respect to the second effect, it is likewise expected that the sign of coefficient  $\lambda$  will be positive, reflecting the fact that the probability of copying is greater the greater the difference between the mark the student says he/she expects if he/she copies and the mark if no copying takes place.

Introducing variables that reveal the mark obtained by the student in two ‘kinds’ of subject - reasoning and ‘cramming’ - is justified by the possible relation between the nature of the subject and the respective induction of benefits associated with copying. In this regard, it is felt that copying in “reasoning” subjects implies less expected benefit as compared with copying in “cramming” subjects, where a negative sign is expected for the coefficient associated with the *ReasSubj* variable and a positive sign for the coefficient associated with the *CramSubj* variable.

Further control variables are proposed in vector  $\mathbf{X}$ , which is made up of a set of determinants such as gender (dummy showing student gender), year of study (telling us whether the student is in the 2<sup>nd</sup>, 3<sup>rd</sup> or 4<sup>th</sup> year) and the "Student status" variable (dummies that indicate whether the student is a regular student, a member of an organization, a worker-student or has some other status). This set of variables comprises the identifying factors for the characteristics of the students that could influence a kind of cheating behaviour among them. In addition, vector  $\mathbf{X}$  should include determinants that assess students' perception relative to the harshness of the punishment (considered as the cost of being detected cheating), factors that assess the likelihood of copying being detected (taking the nature of the exam into account), indicators that reveal the views of the students on people who copy (regularity and associated motives), the perception of students in relation to the percentage of students who copy and the kind of course. The inclusion, in this control variables vector, of a dummy that evaluates the direct influence of the existence of a university code of honour on the likelihood of copying in an exam is also considered relevant.

## 5. Conclusion

This paper has analyzed different ways of applying Becker's crime model to the issue of academic dishonesty. A model for assessing the importance of this phenomenon is proposed: a model that can both consider the determinants mentioned by other studies on this topic and add certain dimensions that the literature reviewed has not focused on.

The additional determinants included in the econometric specification are the 'benefits' or 'gains' that students perceive will be obtained, in terms of a better grade, if they engage in cheating; the effect derived from the grade obtained by the student in two distinct 'kinds' of subject ("reasoning" and "cramming" subjects); and the presence of codes of honour in the institutions used in the study.

It is thus hoped that applying the conceptual analysis and the methodology developed here will prove to be a more appropriate way of assessing the magnitude of the likelihood of copying, and the respective effects associated with its determinants.

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