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USING DIGITAL FREQUENCIES TO DETECT ANOMALIES IN RECEIVABLES AND PAYABLES: AN ANALYSIS OF THE ITALIAN UNIVERSITIES

Abstract

Motivation: The research aims at evaluating the anomalies and unusual patterns of accounting numbers reported by Italian universities.

Prior literature and evidence on local authorities suggest that failing institutions may engage in fraudulent financial reporting to conceal their distress and avoid regulatory intervention. They manipulate accounting values within the scope of the generally accepted accounting principles, using estimates and adjustments for achieving a desired result. Often, they overestimate the receivables and underestimate the payables in order to present a higher level of surplus or a minor deficit.

Therefore, the research examines the receivables and payables values contained in the financial reports of Italian universities during the years 2004-2012, hypothesizing that a gradual reduction of the ordinary funding from the Ministry, and the difficulty of attracting private resources, caused financial stress and led management to accounting manipulations.

Object and methodology: We apply a mathematical law, known as Benford's Law, to the receivables and payables reported values, obtained from the Statistical Office of the Ministry of Higher Education, for identifying the existence of manipulated numbers.

Benford's Law implies that, in a naturally occurring set of numbers, the leading digits of the numbers are discrete exponentially distributed rather than uniformly distributed, meaning that the numbers 1 through 9 do not have equal probability of occurring. In particular, the number 1 occurs as the leading digit about 30% of the time, while the number 9 occurs as the first digit less than 5% of the time. As Benford's Law shows that there is some predictability in the distribution of the first digit in a series of data, it can be used to indicate the presence of fictitious or artificially manipulated numbers.

Results: Surprisingly, the statistical tests show a large degree of compliance between the observed and the expected distributions. The conformity is clear and persistent over all the 9 years.

Keywords

Benford's Law, Italian univerisities, receivables and payables manipulations

1. The institutional context of Italian universities

The art. 33 of the Italian Constitution entrusts to the law the power to lay down the general rules for education and to establish public schools for all orders and degrees. The same article recognizes the private's right to establish schools and educational institutions, and states that they can adopt their own regulations within the limits set by the laws. Therefore, Italian education is a public good and a public responsibility, and universities, state and non-

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state they are, develop a public function serving the community. They are endowed with legal status and they have greater teaching, scientific, organizational, financial and accounting autonomy. In accordance to the New Public Management move, the conditions they have to respect derive from the role of the Ministry of Higher Education (MIUR) as a monitor of the universities' efficiency and effectiveness as well as the functionality of the whole higher education sector (Mandanici, 2011, pp. 5-30).

The expansion of university autonomy has been taking place since the Law n. 168/1989. The major change refers on the amount and modalities by which resources flow from national government to universities. Particularly, the Law n. 537/1993 provided a new funding formula, partially associated with results: each university receives a global lump-sum budget (called Fondo di Finanziamento Ordinario, briefly FFO), without previous stringent restrictions on internal allocations, shaped in accordance to both the educational and research performance. During the years, this system has been reinforced by the Law n. 244/2007 and the Legislative Decree n. 19/2012, according to which MIUR selects and rewards with additional funds those universities that had the ability to achieve their planned objectives.

The rise of public debt and the general crisis have contributed to accelerate the implementation of the financial autonomy. This phenomenon is common to other EU and OECD countries. Italy was among the countries that have set the main cut to the university sector: about 20% of the FFO from 2008 to 2013. This choice has appeared critical for the following reasons.

First, public funding represents, on average, close to 75% and 84% of, respectively, EU and OECD universities' financial structures (EUA 2011, p. 80; OECD 2013, p. 200), and in Italy the percentage rises to 90%.

Second, Italy traditionally invests in tertiary education a value consistently lower than the average of other countries. For example, in 2010 Italy has invested 1% of its GDP, while the EU and the OECD, respectively, 1,4% and 1,6%. Splitting the percentage between public and private funding, it appears more difficult for Italian universities to attract private resources than other countries: expenditure covered by individuals and business, in percentage of GDP, ranges from an average of 0,2% in Italy to 0,3% in EU and 0,5% in OECD countries.

Third, students contributions, or fees, potentially constitute the most directly available financial source. The amount of fees charged to students is however a choice that pertains to the national government, being related to the design of the fiscal policy of each country. In Italy, universities determine the level of tuition fees under a strait ceiling set by law: the art. 5 of the Decree of the President of the Republic n. 306/1997 states that the students contributions cannot exceed 20% of the annual FFO. Consequently, the cut in the public funding will also have the effect of diminishing the universities income from tuition fees.

These considerations show that Italian universities rely heavily on public funding. This means that any change can potentially have the highest impact on their stability and durability.

In the same period, the massification of higher education and the new societal demands on universities have increased costs they are confronted with.

The widening funding gap has put universities finances and financial reports even more under pressure. In order to conceal distress and avoid regulatory intervention, university managers may have been engaged in accounting manipulations. Therefore, this study aims at evaluating the anomalies and unusual patterns of accounting numbers reported by Italian universities in their financial reports.

The next section presents the characteristics of the financial report made by Italian universities, and explains why we chose to analyze the receivables and payables accounting numbers. The section 3 describes the methodology and introduces the mathematics relating to the Benford's Law used for the empirical investigation. Results are presented in the section 4, and the section 5 provides the conclusions.

2. The accounting system of Italian universities

The current accounting system of Italian universities is a cash accounting system, intended to register and control the revenues and expenses, measuring the change of the financial wealth over time.

Management operations are authorized through the budget approved by the Board of Directors. On the revenue side, the accounting records verify the right to collect the money, and the time of the money collection. On the expenditure side, the accounting entries verify the occurrence of the debt, then its liquidation, which certifies the execution of the service, and, finally, the payment. At the end of the year, the receivables are all the rights expected to collect in cash from third entities during next years, while the payables are obligations not paid yet to creditors. In one year, therefore, revenues may refer to the right to collect money verified in the current year, and to the right of the previous one or more years, that is receivables. Similarly, in the same year, payments can be linked to the debt occurred in the current year, and to the debt of the previous one or more years, that is the payables.

The financial report derives from the sequence of these operations, highlighting the balance between revenues and expenditures. If the result is positive, the surplus can be used during the next years to cover new spending and to make new investments; if negative, the deficit will have to be repaid with a policy aimed at reducing expenditures or increase revenues. The remedies have to be made within a time limit related to the amount of monetary stock: when it runs out, there will be a lack of liquidity, which will lead to financial crisis.

It might seem that a university whose report shows a surplus should not face a financial risk. However, the literature and empirical studies on the failure of local authorities (Gori et al., 2013; Manes Rossi, 2010; Cimbolini and Moriconi, 2009; Tenuta, 2008) demonstrate that the surplus does not always indicate the good performance of the institution. Particularly, the Italian Court of Auditors (2012) noted that, in the year preceding the declaration of insolvency, only a minority of the failed local authorities recorded a deficit. Obviously, these

institutions reached a surplus thanks to the manipulation of receivables and payables accounting numbers.

In a survey carried out by the Italian Ministry of Economy and Finance (MEF) (2009, p. 55), the receivables are considered among the most critical factors influencing the financial risk of the local authorities. Even the Court (2011, p. 412) indicates the presence of receivables as one of the most common causes of financial distress. Specially, the Court says that it is dangerous to keep in the financial report all the receivables overvalued, antiquated and bad, or at least those of difficult and doubtful collectability.

Indeed, according to the art. 228 of the Legislative Decree n. 267/2000 (known briefly as TUEL), the local authority has to review the reasons for maintaining all or part of the receivables in the financial report: it is not allowed to keep receivables that are difficult to turn into cash resources, since it involves an undue expansion of the surplus, or an erroneous deficit reduction. Similarly, it is necessary to eliminate payables related to debts taken out to finance works that have proved to be successful. This would free up resources no longer needed to fund expenses, transferring economies to the surplus.

The opposite behavior creates an accounting irregularity, and it hinders the clear and accurate representation of management operations.

However, the number of declarations of insolvency has decreased over time (Gori and Fissi, 2013, pp. 328-329), and it is less than the number of local authorities in financial distress (MEF, 2008, p. 60). This means that many administrators hide the deficit with unreal receivables, condemning their institution to remain or even increase the instability.

Many authors observe that public managers may engage in accounting manipulations to avoid the declaration of insolvency and the external compulsory administration. The current legislation states that local authorities should provide independently to its rehabilitation, without any financial help from the central government. This can lead the managers to dislike the declaration of insolvency, since the reorganization affects directly and totally on the local community. According to the previous regulation (the Legislative Decree n. 166/1989), the national government contributed to the financing of past debts of the local authorities. After the Constitutional Law n. 3/2001, the State can no longer help any entities with extraordinary contributions: all financial resources must be found through the sale of real estate assets, the cost savings, the services reduction, and the taxation. Therefore, today the local authority uses the declaration of insolvency only when management is undermined by the executive actions of creditors, and when, especially after inspections, there is a need to bring the budgets within the limits of the accounting and financial legitimacy, damaged by accounting manipulation.

Even university managers may engage in accounting manipulations to avoid the declaration of insolvency and the external compulsory administration. These tools are introduced by the Legislative Decree n. 199/2011, and they are in line with the current legislation on local authorities. Further, the decree defines a set of parameters that the board of auditors of each university has to apply to the financial report for assessing the state of insolvency (Villa,

2012). The subsequent Legislative Decree n. 49/2012 indicates the red flag level of these parameters and the conditions leading to the external compulsory administration.

We might assume that the university managers use estimates and adjustments to avoid the red flag level of the parameters. Specifically, they may overestimate the receivables and underestimate the payables in order to report a higher amount of surplus or a minor deficit, influencing the level of financial performance. Consequently, in the next section we examine the receivables and payables numbers contained in the financial reports of Italian universities, after a brief discussion on the meaning of accounting manipulation in a cash-based accounting system.

2.1. The accounting manipulations in a cash based accounting system

The concept of accounting manipulation arises in the private sector, and has become an issue of critical importance when the Enron, WorldCom and Tyco financial statement frauds rocked the financial community. Despite the growing literature on the subject, there is no common definition of the phenomenon, either it has been applied to the public sector.

In most cases, researchers argue that accounting manipulation tied to a profit aim, being a technique or a set of actions deliberately employed by managers to achieve a desired level of reported earning. Healy and Wahlen (1999, p. 368) consider it occurs «when managers use judgment in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the company or to influence contractual outcomes that depend on the reported accounting numbers».

There are many ways that managers can exercise judgments in financial reporting, and the range of manipulation can vary within the context of legal and illegal actions. In Italy, the law and the accepted accounting principles allow for a certain degree of interpretation and choices. To be legal, the interpretation has to be in keeping with their spirit. In general, accounting manipulation refers to a deliberated action that operates within the letter of the law and the accounting standards, but it is clearly against their spirit.

Practically, profit oriented entities may engage in accounting manipulations through, for example, the extension of the useful life of a depreciable asset or the change of inventory evaluation method from FIFO to LIFO.

Universities are public entities, and they do not have a profit aim. Consequently, they cannot manage the earning, but the financial aspect of their operations, determining the surplus or the deficit in the financial report. Therefore, on the revenue side, they can anticipate the accounting entries, or they can overvalue the receivables, or maintain those receivables which are difficult and doubtful to collect. On the expenditure side, they can postpone an accounting entries or a liquidation of a service already received.

Alternatively, managers may engage in fraudulent financial reporting techniques, such as falsification of documents and alteration of accounting records. These are clearly not within the standards.

Whatever is the technique, the intensity and the motivation for accounting manipulations, two research designs are commonly used in the literature to detect frauds and irregularities. The first approach uses the existence and amount of accruals as a proxy of earning management, hypothesizing that increased discretionary accruals indicate the opportunistic manipulations of financial reporting numbers. This approach can be used in the private sector, where the accounting system is accrual-based (Jones, 1991; Beneish, 1999).

The second approach tests the presence of accounting manipulation by examining the distributions of numbers in large sample of data. The abnormal digit frequencies indicate a manipulation of data sets. This approach is known as digit analysis, and we apply it because universities have used so far a cash accounting system.

3. Methodology

In an article published in the American Journal of Mathematics in 1881, the astronomer Simon Newcomb described a pattern, which was seemingly inexplicable, regarding the numbers. He (1881) observed: «That the ten digits do not occur with equal frequency must be evident to any one making much use of logarithmic tables, and noticing how much faster the first pages wear out than the last ones. The first significant figure is oftener 1 than any other digit, and the frequency diminishes up to 9».

Based on the above observation, Newcomb came to the conclusion that if we consider a sequence of positive real numbers and assuming that the mantissas of their logarithms are equally probable, then it is possible to determine the percentage of the numbers whose first digit is 1 up to 9. Similarly, it is possible to determine the percentages of the second digit (from 0 to 9), and so on up to n-th digit. He went so far as to sketch out the formula he expected the first digit to follow.

In particular, the probability of observing the digit d1 as the first significant digit (D1) of the number is computed as follows [1]:

$$Prob(D_1 = d_1) = \log_{10}\left(1 + \frac{1}{d_1}\right) \qquad d_1 \in \{1, 2, \dots 9\} \qquad [1]$$

The probability of the digit d2 appearing as the second significant digit (D2) is given by [2]:

$$Prob(D_2 = d_2) = \sum_{d_1=1}^{9} \log_{10}\left(1 + \frac{1}{d_1 d_2}\right) \qquad d_2 \in \{0, 1, \dots 9\} \qquad [2]$$

The table 1 shows the expected frequencies for the first digit (D1) and the second digit (D2) of a number. The frequencies of the first digits are heavily skewed with a probability of 30,1% for the digit 1, and only 4,58% for the digit 9. This is more evident in the Figure 1,

which graphically shows the expected frequencies for the first digit (D1). The second digit frequencies are less skewed, with a probability of 11,97% for the digit 0, and 8,50% for the digit 9 (Figure 2).

d1/d2	0	1	2	3	4	5	6	7	8	9	p(d1)
1	0,0414	0,0378	0,0348	0,0322	0,0300	0,0280	0,0263	0,0248	0,0235	0,0223	**0,3010**
2	0,0212	0,0202	0,0193	0,0185	0,0177	0,0170	0,0164	0,0158	0,0152	0,0147	**0,1761**
3	0,0142	0,0138	0,0134	0,0130	0,0126	0,0122	0,0119	0,0116	0,0113	0,0110	**0,1249**
4	0,0107	0,0105	0,0102	0,0100	0,0098	0,0095	0,0093	0,0091	0,0090	0,0088	**0,0969**
5	0,0086	0,0084	0,0083	0,0081	0,0080	0,0078	0,0077	0,0076	0,0074	0,0073	**0,0792**
6	0,0072	0,0071	0,0069	0,0068	0,0067	0,0066	0,0065	0,0064	0,0063	0,0062	**0,0669**
7	0,0062	0,0061	0,0060	0,0059	0,0058	0,0058	0,0057	0,0056	0,0055	0,0055	**0,0580**
8	0,0054	0,0053	0,0053	0,0052	0,0051	0,0051	0,0050	0,0050	0,0049	0,0049	**0,0512**
9	0,0048	0,0047	0,0047	0,0046	0,0046	0,0045	0,0045	0,0045	0,0044	0,0044	**0,0458**
p(d2)	**0,1197**	**0,1139**	**0,1088**	**0,1043**	**0,1003**	**0,0967**	**0,0934**	**0,0904**	**0,0876**	**0,0850**	**1,0000**

Table 1: Expected digital frequencies D_1 and D_2
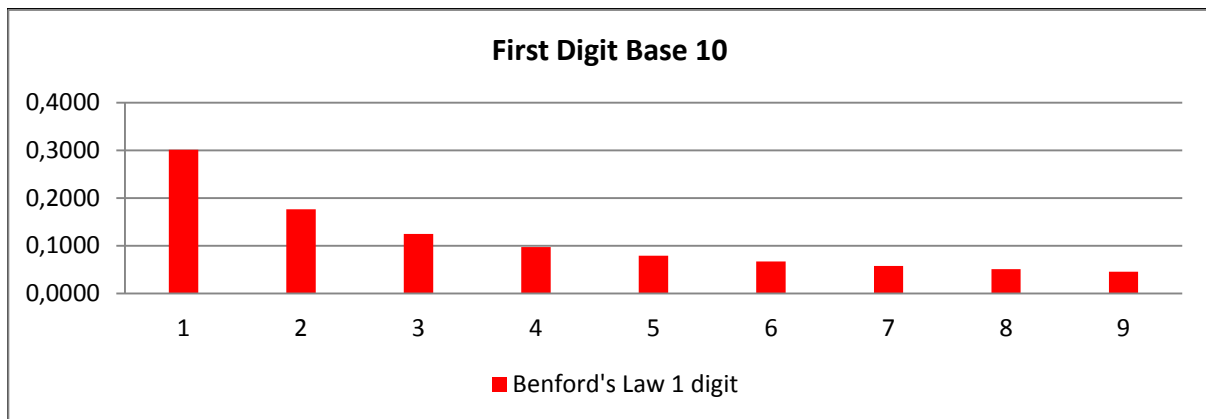

Figure 1: Expected frequencies for the first digit D_1
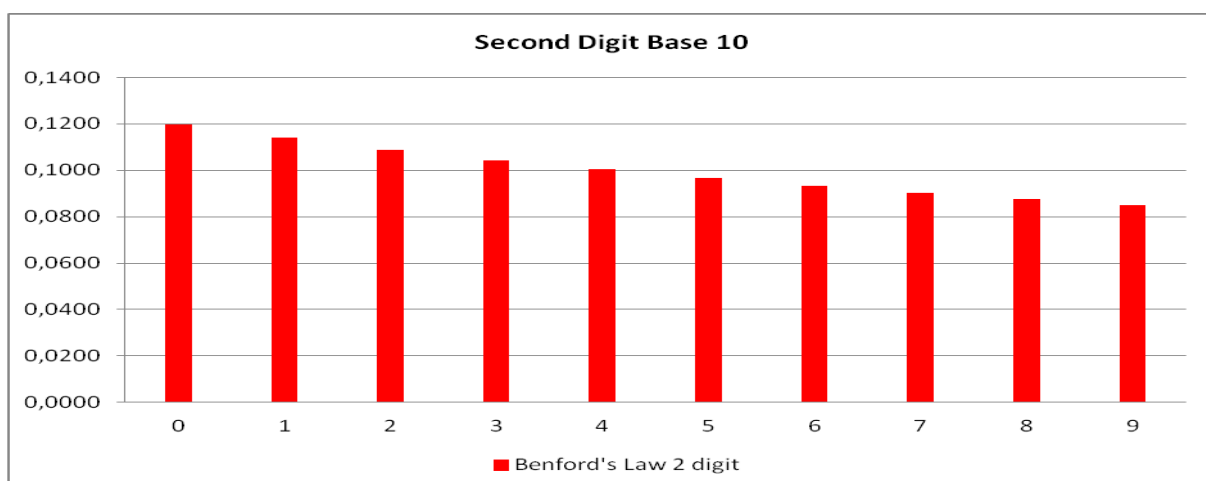
Figure 2: Expected frequencies for the second digits D_2

Many years later, the physicist at General Electric laboratories, Frank Benford, presented in a publication (1938) various numerical sequences (length of the rivers, populations sizes,

physical constants, etc...) that showed a surprisingly great adaptation to this logarithmic law. Since then, the law has been referred to as Benford's Law.

The fact that a series of random numbers respected Benford's Law has suggested using it to detect fraudulent data in applications as diverse as election campaign finance (Tam Cho and Gaines, 2007) and toxic gas emission (De Marchi and Hamilton, 2006). Among the fields of Benford's Law application, there are also accounting and financial statements (Ciaponi and Mandanici, 2014; Quick and Wolz, 2005; Durtschi et al., 2004; Skousen et al., 2004; Van Caneghem, 2002; Burgstahler and Dichev, 1997; Thomas, 1989; Carslaw, 1988), tax auditing (Watrin et al., 2008; Niskanen and Keloharju, 2000; Nigrini, 1996), and auditing procedures (Guan et al., 2006; Jackson and Pitman, 2001; Nigrini and Mittermainer, 1997). Generally, many studies addressed the earnings management issues through the use of Benford distribution. This is the first time it is applied to the cash-based accounting system adopted by universities.

Specifically, the research hypothesis are as follows:
H1: the observed distribution of receivables and payables numbers does not conform to the expected Benford's Law distribution, evidencing intentional manipulations.
H2: the degree of accounting manipulation grows when the ministerial funding decreases.

We expect that the result is consistent with the results of a recent survey conducted on the financial risk of the Italian state universities. Mandanici and Pace (2014) define and translate the financial risk factors in a series of 12 warning indicators of crisis, and they calculate a synthetic financial risk indicator as the sum of the scores recorded by each of them, for the years from 2009 to 2012. They found that the medium sized universities are riskier than small, large and very large universities. For many universities defined riskier, the results are matching to the facts reported in the major national newspapers, as for the University of Siena and the University of Pesaro-Urbino.

We can hypothesize that the riskier universities manipulate their reported values more frequently than the other universities. Therefore, in order to allow comparison, we can operate a stratification of the data in 4 macro classes, following the same dimensional criteria adopted in the cited survey.

3.1. Data collection

The analysis was conducted on the financial reports of the Italian universities provided by the Statistical Office of the MIUR. This ensures the consistency of the data collected. We excluded universities that have adopted the accrual-based accounting as well as universities whose data are lacking in one or more years from 2004 to 2012. The first column of the tables in the Appendix lists all the 61 analysed universities.

We can apply the Benford's Law to their receivables and payables reported numbers because they satisfy the following conditions (Nigrini, 2012):
- all the numbers are recorded in the same unit of measurement;
- the numbers do not have an arbitrary maximum and/or minimum cut-off point;

- the numbers are not assigned, such as personal identification numbers, invoice numbers and postal codes;
- the numbers are not influenced by human thought, such as psychological supermarket prices (which often have 9 as a last digit, like 1,99 €);
- the numbers do not have a wide dispersion (Raimi, 1976).

3.2. Testing methodology

We identify receivables and payables manipulations by searching for abnormal first digits and second digits frequencies in numbers recorded by each university in their 2004-2012 financial report. The degree of deviation from the Benford distribution is assessed by the Chi-squared test.

The most common tests are the Z-statistic and the Chi-square. The first test measures the significance of the deviation from the expected digit distribution for each digit separately. It is a digit-by-digit analysis that shows whether a single digit occurs more or less often than it is expected according to Benford's Law.

Our objective is to signal suspicious of receivables and payables manipulation during the years, and not what figures in the number are more or less frequently used.

Consequently, this research uses the Chi-square test, a test-by-test analysis, which compares the expected distribution over all digits with the observed distribution, indicating whether the observed distribution significantly differs from the expected one. The literature (Cleary and Thibodeau, 2005) also suggests the use of test-by-test analysis to catch data sets, which are under suspicion of having been manipulated, and the use of digit-by-digit analysis for an in-depth investigation regarding the causes behind the abnormality.

The Chi-square test is determined through the following equation [3]:

$$Chi - square = \sum_{i=1}^{K} \frac{(AC - EC)^2}{EC}$$
[3]

where AC is the observed digit frequency, EC is the expected digit frequency according to Benford's Law, and K is the number of possible digits I in the first position in numbers (K = 9). The numerator is the residual of the compared distributions, squared in order to get rid of negative values. It is divided by the expected observations, to normalize bigger and smaller counts.

The conformity of the whole distribution is tested choosing an alpha level of significance. Generally, the alpha level varies according to the size of the sample observed from 0,05 to 0,01 or 0,001. We choose the level 0,05.

The appendix provides the results of the computed Chi-squared test of the first and the second digit of receivables and payables numbers. The test shows that the observed data are clearly correspondent with the Benford's distribution, during all the years 2004-2012. In other word, there is statistically no difference between the distribution of receivables and

payables numbers and the distribution expected from Benford's Law. The conformity is clear and persistent over all the 9 years. Therefore, the two hypothesis are rejected, and any dimensional stratification does not involve changes to the results.

4. Results and findings

The results provide empirical evidence that:
- the receivables and payables values conform to Benford's Law;
- during financial distress, universities did not carry out intentional manipulations.

The first result was expected, not the second. We tried the reasons and we have identified the following:
- the lack of legislation on financial distress of universities during the analysed years 2004-2011;
- the freedom to allocate public funding and private resources to different budget lines, independently from the MIUR.
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The declaration of insolvency was introduced in the Italian universities only with the mentioned decrees in 2011 and 2012. Clearly, they can have a negative impact on key stakeholders, penalizing the financial and organizational autonomy, as well as the credibility of both the training and research conducted by the university. During the investigated period, universities have not been forced to heavy accounting manipulations by such a punitive legislation. Manipulations could be undertaken to achieve a balance between revenues and expenditure in financial reporting. Probably, universities will engage more frequently in accounting manipulations when this legislation comes into force. Such a behavior would be in line with that taken by local authorities as a result of the Constitutional Law n. 3/2001. In the absence of a state extraordinary contributions, all financial resources must be found within the university. Consequently, we expect that universities will resort to receivables and payables manipulation in order to avoid the declaration of insolvency.

We also expect a greater use of manipulations into the universities which cannot allocate their funds, independently from the MIUR, to the different budget lines. Therefore, the line-item funding systems may represent an incitement to manipulations in respect to the block-grant systems. The majority of the EU countries uses the block grant formula. The sum is split into broad categories and there are no or limited possibilities to move funds between these. This is the case of France, Portugal and Sweden. In Italy, like other EU countries such as UK, Norway, The Netherlands and Spain, in addition to the block grant funding formula, there are no restrictions on the internal allocation of funds, and, moreover, the surplus can be kept by universities without any external approval or amount limitation. This reduces the use of accounting manipulation among the different budget lines, because the liquidity is already employed by the single university for expenses considered strategically appropriated.

5. Conclusions

During the last years, there has been a general tendency of reforming traditional cash accounting of public entities towards business-like accrual accounting. In particular, through a long process started with the Legislative Decree n. 240/2010, the MIUR is reforming the university sector, putting on the same level the economic and financial conditions, and introducing, among other documents, the accrual accounting and the balance sheet. The main reason is that the cash accounting is perceived as being too much focused on a legislative control mechanism of public funds, without providing management information. On the contrary, the new accounting system aims at measuring academic assets and liabilities, and at improving performance management and long.term sustainability.

Therefore, future researches will have the opportunity to apply the Benford's Law to a long list of discretionary accruals, and not only to the receivables and payables numbers.

The novelty in the use of Benford's Law is that managers (and auditors) analyse the relationships between the elements of a data set of accruals to determine whether they are reasonable, focusing on the consistency of the data set as a whole rather than on the single value. More specifically, they could assume that the reported accruals follow Benford's Law, assigning an expected frequency to each number of a list. They could carry out a statistical analysis, and they should focus on the significant deviations of numbers from their expected values or their uncommon variation over particular periods: deviations might signal irregularities and might refer to numbers that have been deliberately manipulated.

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Appendix: *Chi-squared test on receivables and payables numbers from 2012 to 2004*

YEARS 2012	Receivables 1° digit	Number of observations	Receivables 2° digit	Number of observations	Payables 1° digit	Number of observations	Payables 2° digit	Number of observations
Polytechnic MARCHE	0,52	41	0,44	41	0,04	96	0,66	96
BARI	0,84	35	0,48	35	0,70	135	0,93	135
BOLOGNA	0,02	65	0,27	64	0,27	102	0,50	102
CAGLIARI	0,12	49	0,38	48	0,84	76	0,74	76
CASSINO	0,87	31	0,38	31	0,87	64	0,20	64
CATANIA	0,84	38	0,12	38	0,55	138	0,07	135
FERRARA	0,29	45	0,63	44	0,78	113	0,36	113
FIRENZE	0,05	34	0,22	34	0,93	123	0,27	123
GENOVA	0,39	56	0,35	56	0,07	95	0,59	95
SALENTO	0,93	36	0,94	36	0,41	107	0,83	107
MACERATA	0,40	35	0,08	34	0,64	80	0,34	80
MESSINA	0,83	36	0,51	35	0,91	128	0,98	128
MILANO	0,07	44	0,36	44	0,58	98	0,71	98
Polytechnic MILANO	0,11	35	0,82	34	0,38	97	0,96	97
MODENA and REGGIO EMILIA	0,04	50	0,39	50	0,75	122	0,07	121
NAPOLI Federico II	0,68	62	0,49	62	0,71	119	0,04	119
PADOVA	0,04	45	0,71	45	0,54	85	0,71	84
PALERMO	0,24	44	0,14	44	0,61	124	0,06	124
PARMA	0,68	17	0,38	16	0,68	76	0,73	74
PAVIA	0,25	57	0,40	57	0,72	114	0,90	111
PERUGIA	0,02	55	0,14	55	0,54	103	0,67	103
PISA	0,24	46	0,15	46	0,87	113	0,43	113
ROMA La Sapienza	0,88	52	0,47	52	0,24	121	0,50	120
ROMA Tor Vergata	0,15	42	0,04	42	0,69	88	0,39	88
SALERNO	0,98	50	0,17	50	0,80	123	0,57	123
SASSARI	0,54	50	0,11	50	0,06	112	0,52	112
SIENA	0,43	21	0,50	21	0,12	113	0,82	113
TORINO	0,49	75	0,25	75	0,15	106	0,60	106
VITERBO	1,00	48	0,31	48	0,28	107	0,47	107
VENEZIA Ca' Foscari	0,27	39	0,33	39	0,38	102	0,78	102
VENEZIA I.U.A.V.	0,48	30	0,37	30	0,72	85	0,25	85
BASILICATA	0,55	37	0,34	37	0,95	102	0,20	101
MOLISE	0,61	36	0,05	36	0,47	55	0,45	55
VERONA	0,46	32	0,28	32	0,34	102	0,54	100
NAPOLI Parthenope	0,56	32	0,80	32	0,27	106	0,39	106
NAPOLI L'Orientale	0,00	36	0,91	35	0,02	82	0,15	80
PISA Normale	0,47	19	0,55	19	0,43	70	0,30	70
PISA Sant'Anna	0,84	31	0,63	31	0,57	57	0,70	57
TRIESTE S.I.S.S.A.	0,30	24	0,08	24	0,67	87	0,12	86
BRESCIA	0,49	39	0,66	39	0,67	118	0,67	118
REGGIO CALABRIA	0,60	31	0,51	31	0,02	85	0,40	84
Polytechnic BARI	0,23	47	0,40	46	0,30	104	0,31	103
NAPOLI Seconda Università	0,19	40	0,72	40	0,06	99	0,05	98
BERGAMO	0,59	28	0,86	28	0,69	85	0,84	85
CHIETI-PESCARA	0,15	32	0,92	32	0,08	93	0,72	90
L'AQUILA	0,05	24	0,64	24	0,84	67	0,24	67
URBINO	0,09	26	0,24	25	0,32	89	0,26	88
University for Foreigners of SIENA	0,43	18	0,62	18	0,64	83	0,89	82
University for Foreigners of PERUGIA	0,14	24	0,61	24	0,08	56	0,99	56
ROMA TRE	0,63	30	0,68	30	0,55	73	0,32	72
TERAMO	0,77	27	0,19	27	0,07	88	0,75	88
ROMA Foro Italico	0,54	20	0,62	20	1,00	74	0,76	73

BENEVENTO	0,56	29	0,48	29	0,33	75	0,57	74
CATANZARO	0,12	34	0,30	34	0,68	75	0,45	74
MILANO Bicocca	0,11	43	0,38	40	0,61	101	0,91	101
INSUBRIA	0,61	40	0,32	40	0,91	81	0,62	80
PIEMONTE ORIENTALE	0,63	51	0,76	51	0,36	79	0,87	79
FOGGIA	0,84	33	0,12	33	0,29	104	0,83	103
PAVIA I.U.S.S.	0,82	17	0,48	17	0,71	62	0,50	61
LUCCA I.M.T.	0,83	18	0,73	18	0,52	76	0,75	76
FIRENZE S.U.M.	0,50	11	0,29	11	0,44	47	0,86	47

YEARS 2011	Receivables 1° digit	Number of observations	Receivables 2° digit	Number of observations	Payables 1° digit	Number of observations	Payables 2° digit	Number of observations
Polytechnic MARCHE	0,12	45	0,61	45	0,73	75	0,60	75
BARI	0,31	32	0,24	32	0,19	112	0,38	110
BOLOGNA	0,54	68	0,79	67	0,95	91	0,82	91
CAGLIARI	0,81	47	0,94	47	0,92	99	0,90	98
CASSINO	0,78	31	0,33	31	0,03	52	0,27	52
CATANIA	0,15	34	0,52	34	0,61	96	0,60	96
FERRARA	0,56	48	0,40	48	0,28	101	0,31	101
FIRENZE	0,26	35	0,08	35	0,64	112	0,97	112
GENOVA	0,91	57	0,73	60	0,33	98	0,75	98
SALENTO	0,49	41	0,87	41	0,95	107	0,45	107
MACERATA	0,59	33	0,30	33	0,58	80	0,79	80
MESSINA	0,85	31	0,87	31	0,03	128	0,92	128
MILANO	0,20	44	0,65	44	0,75	98	0,24	98
Polytechnic MILANO	0,85	40	0,55	40	0,21	97	0,17	97
MODENA and REGGIO EMILIA	0,18	49	0,18	49	0,80	122	0,40	122
NAPOLI Federico II	0,74	60	0,65	60	0,65	119	0,19	119
PADOVA	0,10	43	0,38	43	0,49	85	0,90	85
PALERMO	0,15	44	0,56	44	0,89	124	0,68	124
PARMA	0,57	18	0,82	18	0,36	76	0,08	76
PAVIA	0,06	54	0,10	54	0,90	114	0,24	114
PERUGIA	0,15	61	0,21	61	0,75	103	0,20	103
PISA	0,61	48	0,56	48	0,68	113	0,76	113
ROMA La Sapienza	0,76	50	0,09	50	0,75	121	0,21	121
ROMA Tor Vergata	0,10	41	0,66	41	0,28	88	0,42	88
SALERNO	0,79	53	0,58	53	0,17	123	0,50	123
SASSARI	0,63	50	0,11	50	0,78	112	0,28	112
SIENA	0,06	23	0,20	23	0,53	113	0,51	113
TORINO	0,62	78	0,80	78	0,69	106	0,61	106
VITERBO	0,45	46	0,35	46	0,38	107	0,52	107
VENEZIA Ca' Foscari	0,64	50	0,46	50	0,66	102	0,55	102
VENEZIA I.U.A.V.	0,46	29	0,02	29	0,24	85	0,12	85
BASILICATA	0,71	38	0,20	38	0,69	102	0,19	102
MOLISE	0,69	44	0,11	44	0,26	55	0,11	55
VERONA	0,73	34	0,06	34	0,14	102	0,21	102
NAPOLI Parthenope	0,44	32	0,59	32	0,49	106	0,89	106
NAPOLI L'Orientale	0,45	34	0,16	33	0,49	82	0,64	82
PISA Normale	0,41	22	0,69	22	0,58	70	0,38	70
PISA Sant'Anna	0,95	40	0,03	40	0,39	57	0,14	57
TRIESTE S.I.S.S.A.	0,00	27	0,59	27	0,70	87	0,25	87
BRESCIA	0,40	38	0,59	38	0,61	118	0,27	118
REGGIO CALABRIA	0,92	34	0,88	34	0,34	85	0,68	85
Polytechnic BARI	0,51	49	0,93	48	0,46	104	0,17	104
NAPOLI Seconda Università	0,12	37	0,28	37	0,49	99	0,24	99
BERGAMO	0,18	27	0,10	27	0,81	85	0,46	85
CHIETI-PESCARA	0,39	32	0,12	32	0,70	93	0,37	93
L'AQUILA	0,47	25	0,42	25	0,88	67	0,81	67
URBINO	0,58	30	0,01	30	0,71	89	0,52	89

University for Foreigners of SIENA	0,08	23	0,65	23	0,19	83	0,78	83
University for Foreigners of PERUGIA	0,00	20	0,12	19	0,21	56	0,80	56
ROMA TRE	0,61	26	0,02	26	0,10	73	0,42	73
TERAMO	0,76	27	0,31	27	0,70	88	0,24	88
ROMA Foro Italico	0,40	26	0,52	26	0,44	74	0,29	74
BENEVENTO	0,85	30	0,81	30	0,42	75	0,72	75
CATANZARO	0,20	34	0,04	32	0,31	75	0,23	75
MILANO Bicocca	0,26	45	0,26	43	0,55	101	0,81	101
INSUBRIA	0,26	45	0,26	43	0,71	81	0,45	81
PIEMONTE ORIENTALE	0,67	59	0,62	59	0,10	79	0,87	79
FOGGIA	0,76	35	0,42	35	0,26	104	0,40	104
PAVIA I.U.S.S.	0,66	14	0,39	14	0,78	62	0,67	62
LUCCA I.M.T.	0,22	16	0,50	16	0,70	76	0,23	76
FIRENZE S.U.M.	0,17	12	0,97	12	0,54	47	0,22	47

YEARS 2010	Receivables 1° digit	Number of observations	Receivables 2° digit	Number of observations	Payables 1° digit	Number of observations	Payables 2° digit	Number of observations
Polytechnic MARCHE	0,55	42	0,56	42	0,70	77	0,20	77
BARI	0,86	31	0,24	31	0,19	114	0,38	114
BOLOGNA	0,48	70	0,79	70	0,95	94	0,82	94
CAGLIARI	0,74	44	0,94	44	0,92	99	0,90	99
CASSINO	0,29	30	0,33	30	0,03	51	0,27	51
CATANIA	0,25	37	0,52	37	0,61	97	0,60	97
FERRARA	0,17	48	0,40	48	0,28	101	0,31	101
FIRENZE	0,67	33	0,08	33	0,64	113	0,97	113
GENOVA	0,91	58	0,73	58	0,57	99	0,50	99
SALENTO	0,61	40	0,87	40	0,28	110	0,62	110
MACERATA	0,47	32	0,30	32	0,98	79	0,21	79
MESSINA	0,62	29	0,87	29	0,51	128	0,09	128
MILANO	0,13	42	0,65	42	0,92	100	0,33	100
Polytechnic MILANO	0,41	38	0,55	38	0,79	98	0,84	98
MODENA and REGGIO EMILIA	0,24	47	0,18	47	0,92	125	0,67	125
NAPOLI Federico II	0,7	57	0,65	57	0,80	121	0,48	121
PADOVA	0,88	45	0,38	45	0,58	86	0,54	86
PALERMO	0,21	45	0,56	45	0,21	121	0,63	121
PARMA	0,37	18	0,82	18	0,20	76	0,71	76
PAVIA	0,19	53	0,10	53	0,45	115	0,30	115
PERUGIA	0,61	64	0,21	64	0,79	102	0,44	102
PISA	0,63	48	0,56	48	0,21	112	0,23	112
ROMA La Sapienza	0,24	53	0,09	53	0,28	123	0,32	123
ROMA Tor Vergata	0,68	40	0,66	40	0,09	89	0,85	89
SALERNO	0,65	54	0,58	54	0,24	124	0,79	124
SASSARI	0,29	49	0,11	49	0,92	110	0,30	110
SIENA	0,12	24	0,20	24	0,57	115	0,78	115
TORINO	0,74	79	0,80	79	0,33	109	0,54	109
VITERBO	0,21	45	0,35	45	0,15	105	0,31	105
VENEZIA Ca' Foscari	0,36	53	0,46	53	0,09	99	0,19	99
VENEZIA I.U.A.V.	0,73	26	0,02	26	0,63	84	0,31	84
BASILICATA	0,86	37	0,20	37	0,30	102	0,38	102
MOLISE	0,27	43	0,11	43	0,83	54	0,12	54
VERONA	0,54	32	0,06	32	0,46	103	0,16	103
NAPOLI Parthenope	0,81	33	0,59	33	0,37	106	0,76	106
NAPOLI L'Orientale	0,44	32	0,16	32	0,33	84	0,60	84
PISA Normale	0,11	24	0,69	24	0,42	67	0,14	67
PISA Sant'Anna	0,1	39	0,03	39	0,35	57	0,19	57
TRIESTE S.I.S.S.A.	0,89	25	0,59	25	0,83	89	0,83	89
BRESCIA	0,79	40	0,59	40	0,15	121	0,18	121
REGGIO CALABRIA	0,81	37	0,88	37	0,90	88	0,20	88

Polytechnic BARI	0,35	48	0,93	48	0,10	101	0,36	101
NAPOLI Seconda Università	0,62	40	0,28	40	0,92	100	0,78	100
BERGAMO	0,26	30	0,10	30	0,30	82	0,76	82
CHIETI-PESCARA	0,73	34	0,12	34	0,65	96	0,84	96
L'AQUILA	0,89	25	0,42	25	0,10	64	0,54	64
URBINO	0,66	32	0,01	32	0,22	86	0,58	86
University for Foreigners of SIENA	0,54	20	0,65	20	0,47	84	0,59	84
University for Foreigners of PERUGIA	0,25	21	0,12	21	0,16	56	0,34	56
ROMA TRE	0,39	24	0,02	24	0,21	70	0,73	70
TERAMO	0,5	27	0,31	27	0,27	91	0,82	91
ROMA Foro Italico	0,36	23	0,52	23	0,28	76	0,74	76
BENEVENTO	0,36	29	0,81	29	0,38	78	0,64	78
CATANZARO	0,45	31	0,04	31	0,28	76	0,11	76
MILANO Bicocca	0,67	43	0,26	43	0,16	100	0,73	100
INSUBRIA	0,86	48	0,26	48	0,21	78	0,23	78
PIEMONTE ORIENTALE	0,21	62	0,62	62	0,65	78	0,83	78
FOGGIA	0,59	37	0,42	37	0,84	101	0,70	101
PAVIA I.U.S.S.	0,64	16	0,39	16	0,19	62	0,21	62
LUCCA I.M.T.	0,11	19	0,50	19	0,45	79	0,53	79
FIRENZE S.U.M.	0,56	14	0,97	14	0,35	45	0,15	45

YEARS 2009	Receivables 1° digit	Number of observations	Receivables 2° digit	Number of observations	Payables 1° digit	Number of observations	Payables 2° digit	Number of observations
Polytechnic MARCHE	0,25	44	0,62	44	0,72	76	0,48	76
BARI	0,23	33	0,24	33	0,19	114	0,38	114
BOLOGNA	0,52	69	0,79	69	0,95	92	0,82	92
CAGLIARI	0,55	45	0,94	45	0,92	96	0,90	96
CASSINO	0,09	27	0,33	27	0,03	50	0,27	50
CATANIA	0,63	37	0,52	37	0,61	100	0,60	100
FERRARA	0,37	46	0,40	46	0,28	101	0,31	101
FIRENZE	0,89	33	0,08	33	0,64	111	0,97	111
GENOVA	0,3	57	0,73	57	0,57	97	0,50	97
SALENTO	0,5	41	0,87	41	0,28	108	0,62	108
MACERATA	0,61	29	0,30	29	0,98	79	0,21	79
MESSINA	0,15	30	0,87	30	0,51	131	0,09	131
MILANO	0,16	41	0,65	41	0,92	100	0,33	100
Polytechnic MILANO	0,82	39	0,55	39	0,79	100	0,84	100
MODENA and REGGIO EMILIA	0,66	45	0,18	45	0,92	123	0,67	123
NAPOLI Federico II	0,15	58	0,65	58	0,80	122	0,48	122
PADOVA	0,35	48	0,38	48	0,58	88	0,54	88
PALERMO	0,44	42	0,56	42	0,21	122	0,63	122
PARMA	0,73	17	0,82	17	0,20	77	0,71	77
PAVIA	0,58	50	0,10	50	0,45	115	0,30	115
PERUGIA	0,24	61	0,21	61	0,79	105	0,44	105
PISA	0,64	47	0,56	47	0,21	112	0,23	112
ROMA La Sapienza	0,09	50	0,09	50	0,28	120	0,32	120
ROMA Tor Vergata	0,59	37	0,66	37	0,09	91	0,85	91
SALERNO	0,31	56	0,58	56	0,24	126	0,79	126
SASSARI	0,23	48	0,11	48	0,92	112	0,30	112
SIENA	0,73	27	0,20	27	0,57	113	0,78	113
TORINO	0,76	82	0,80	82	0,33	112	0,54	112
VITERBO	0,52	45	0,35	45	0,15	104	0,31	104
VENEZIA Ca' Foscari	0,76	55	0,46	55	0,09	96	0,19	96
VENEZIA I.U.A.V.	0,45	28	0,02	28	0,63	83	0,31	83
BASILICATA	0,86	40	0,20	40	0,30	99	0,38	99
MOLISE	0,28	43	0,11	43	0,83	52	0,12	52
VERONA	0,83	30	0,06	30	0,46	106	0,16	106

NAPOLI Parthenope	0,81	35	0,59	35	0,37	105	0,76	105
NAPOLI L'Orientale	0,51	34	0,16	34	0,33	87	0,60	87
PISA Normale	0,36	25	0,69	25	0,42	67	0,14	67
PISA Sant'Anna	0,63	41	0,03	41	0,35	57	0,19	57
TRIESTE S.I.S.S.A.	0,22	23	0,59	23	0,83	86	0,83	86
BRESCIA	0,69	42	0,59	42	0,15	119	0,18	119
REGGIO CALABRIA	0,62	35	0,88	35	0,90	87	0,20	87
Polytechnic BARI	0,39	47	0,93	47	0,10	102	0,36	102
NAPOLI Seconda Università	0,34	39	0,28	39	0,92	97	0,78	97
BERGAMO	0,78	30	0,10	30	0,30	80	0,76	80
CHIETI-PESCARA	0,28	31	0,12	31	0,65	95	0,84	95
L'AQUILA	0,56	23	0,42	23	0,10	65	0,54	65
URBINO	0,08	35	0,01	35	0,22	84	0,58	84
University for Foreigners of SIENA	0,56	17	0,65	17	0,47	81	0,59	81
University for Foreigners of PERUGIA	0,55	19	0,12	19	0,16	59	0,34	59
ROMA TRE	0,38	27	0,02	27	0,21	73	0,73	73
TERAMO	0,91	27	0,31	27	0,27	90	0,82	90
ROMA Foro Italico	0,52	23	0,52	23	0,28	76	0,74	76
BENEVENTO	0,15	27	0,81	27	0,38	79	0,64	79
CATANZARO	0,62	32	0,04	32	0,28	73	0,11	73
MILANO Bicocca	0,56	42	0,26	42	0,16	103	0,73	103
INSUBRIA	0,2	47	0,26	47	0,21	78	0,23	78
PIEMONTE ORIENTALE	0,47	64	0,62	64	0,65	75	0,83	75
FOGGIA	0,67	37	0,42	37	0,84	104	0,70	104
PAVIA I.U.S.S.	0,63	19	0,39	19	0,19	63	0,21	63
LUCCA I.M.T.	0,34	17	0,50	17	0,45	80	0,53	80
FIRENZE S.U.M.	0,73	13	0,97	13	0,35	45	0,15	45

YEARS 2008	Receivables 1° digit	Number of observations	Receivables 2° digit	Number of observations	Payables 1° digit	Number of observations	Payables 2° digit	Number of observations
Polytechnic MARCHE	0,55	46	0,12	46	0,56	78	0,23	78
BARI	0,92	31	0,24	31	0,19	115	0,38	115
BOLOGNA	0,77	66	0,79	66	0,95	92	0,82	92
CAGLIARI	0,41	48	0,94	48	0,92	93	0,90	93
CASSINO	0,43	30	0,33	30	0,03	48	0,27	48
CATANIA	0,25	40	0,52	40	0,61	102	0,60	102
FERRARA	0,56	44	0,40	44	0,28	99	0,31	99
FIRENZE	0,82	36	0,08	36	0,64	110	0,97	110
GENOVA	0,40	59	0,73	59	0,57	98	0,50	98
SALENTO	0,34	40	0,87	40	0,28	111	0,62	111
MACERATA	0,25	26	0,30	26	0,98	77	0,21	77
MESSINA	0,53	30	0,87	30	0,51	129	0,09	129
MILANO	0,24	41	0,65	41	0,92	101	0,33	101
Polytechnic MILANO	0,50	40	0,55	40	0,79	97	0,84	97
MODENA and REGGIO EMILIA	0,20	46	0,18	46	0,92	120	0,67	120
NAPOLI Federico II	0,70	60	0,65	60	0,80	123	0,48	123
PADOVA	0,83	46	0,38	46	0,58	89	0,54	89
PALERMO	0,52	44	0,56	44	0,21	125	0,63	125
PARMA	0,55	15	0,82	15	0,20	74	0,71	74
PAVIA	0,56	53	0,10	53	0,45	118	0,30	118
PERUGIA	0,87	63	0,21	63	0,79	104	0,44	104
PISA	0,17	45	0,56	45	0,21	109	0,23	109
ROMA La Sapienza	0,71	50	0,09	50	0,28	121	0,32	121
ROMA Tor Vergata	0,16	39	0,66	39	0,09	94	0,85	94
SALERNO	0,53	53	0,58	53	0,24	127	0,79	127
SASSARI	0,78	47	0,11	47	0,92	115	0,30	115
SIENA	0,54	25	0,20	25	0,57	115	0,78	115

TORINO	0,50	83	0,80	83	0,33	112	0,54	112
VITERBO	0,36	42	0,35	42	0,15	106	0,31	106
VENEZIA Ca' Foscari	0,20	58	0,46	58	0,09	97	0,19	97
VENEZIA I.U.A.V.	0,75	27	0,02	27	0,63	82	0,31	82
BASILICATA	0,29	40	0,20	40	0,30	99	0,38	99
MOLISE	0,20	46	0,11	46	0,83	50	0,12	50
VERONA	0,45	32	0,06	32	0,46	107	0,16	107
NAPOLI Parthenope	0,08	37	0,59	37	0,37	103	0,76	103
NAPOLI L'Orientale	0,70	33	0,16	33	0,33	90	0,60	90
PISA Normale	0,17	25	0,69	25	0,42	64	0,14	64
PISA Sant'Anna	0,42	40	0,03	40	0,35	55	0,19	55
TRIESTE S.I.S.S.A.	0,36	22	0,59	22	0,83	88	0,83	88
BRESCIA	0,09	39	0,59	39	0,15	122	0,18	122
REGGIO CALABRIA	0,76	34	0,88	34	0,90	86	0,20	86
Polytechnic BARI	0,38	49	0,93	49	0,10	105	0,36	105
NAPOLI Seconda Università	0,22	39	0,28	39	0,92	98	0,78	98
BERGAMO	0,69	33	0,10	33	0,30	81	0,76	81
CHIETI-PESCARA	0,20	32	0,12	32	0,65	97	0,84	97
L'AQUILA	0,89	26	0,42	26	0,10	66	0,54	66
URBINO	0,52	32	0,01	32	0,22	81	0,58	81
University for Foreigners of SIENA	0,78	16	0,65	16	0,47	84	0,59	84
University for Foreigners of PERUGIA	0,56	20	0,12	20	0,16	60	0,34	60
ROMA TRE	0,63	28	0,02	28	0,21	72	0,73	72
TERAMO	0,85	30	0,31	30	0,27	91	0,82	91
ROMA Foro Italico	0,44	24	0,52	24	0,28	77	0,74	77
BENEVENTO	0,14	26	0,81	26	0,38	76	0,64	76
CATANZARO	0,80	35	0,04	35	0,28	71	0,11	71
MILANO Bicocca	0,87	43	0,26	43	0,16	100	0,73	100
INSUBRIA	0,18	46	0,26	46	0,21	75	0,23	75
PIEMONTE ORIENTALE	0,21	65	0,62	65	0,65	73	0,83	73
FOGGIA	0,44	39	0,42	39	0,84	107	0,70	107
PAVIA I.U.S.S.	0,24	22	0,39	22	0,19	62	0,21	62
LUCCA I.M.T.	0,13	20	0,50	20	0,45	79	0,53	79
FIRENZE S.U.M.	0,33	13	0,97	13	0,35	45	0,15	45

YEARS 2007	**Receivables 1° digit**	**Number of observations**	**Receivables 2° digit**	**Number of observations**	**Payables 1° digit**	**Number of observations**	**Payables 2° digit**	**Number of observations**
Polytechnic MARCHE	0,65	47	0,13	47	0,61	79	0,80	79
BARI	0,30	31	0,24	31	0,19	116	0,38	116
BOLOGNA	0,46	63	0,79	63	0,95	89	0,82	89
CAGLIARI	0,20	46	0,94	46	0,92	91	0,90	91
CASSINO	0,15	29	0,33	29	0,03	48	0,27	48
CATANIA	0,22	39	0,52	39	0,61	103	0,60	103
FERRARA	0,33	44	0,40	44	0,28	102	0,31	102
FIRENZE	0,10	37	0,08	37	0,64	113	0,97	113
GENOVA	0,38	56	0,73	56	0,57	96	0,50	96
SALENTO	0,40	39	0,87	39	0,28	114	0,62	114
MACERATA	0,67	24	0,30	24	0,98	80	0,21	80
MESSINA	0,24	28	0,87	28	0,51	129	0,09	129
MILANO	0,42	44	0,65	44	0,92	103	0,33	103
Polytechnic MILANO	0,11	40	0,55	40	0,79	96	0,84	96
MODENA and REGGIO EMILIA	0,22	48	0,18	48	0,92	121	0,67	121
NAPOLI Federico II	0,25	57	0,65	57	0,80	124	0,48	124
PADOVA	0,16	44	0,38	44	0,58	91	0,54	91
PALERMO	0,69	47	0,56	47	0,21	124	0,63	124
PARMA	0,77	17	0,82	17	0,20	71	0,71	71
PAVIA	0,76	51	0,10	51	0,45	119	0,30	119

PERUGIA	0,39	64	0,21	64	0,79	107	0,44	107
PISA	0,63	48	0,56	48	0,21	106	0,23	106
ROMA La Sapienza	0,08	51	0,09	51	0,28	120	0,32	120
ROMA Tor Vergata	0,19	36	0,66	36	0,09	97	0,85	97
SALERNO	0,84	56	0,58	56	0,24	129	0,79	129
SASSARI	0,78	50	0,11	50	0,92	115	0,30	115
SIENA	0,78	26	0,20	26	0,57	115	0,78	115
TORINO	0,32	81	0,80	81	0,33	112	0,54	112
VITERBO	0,90	45	0,35	45	0,15	105	0,31	105
VENEZIA Ca' Foscari	0,90	61	0,46	61	0,09	94	0,19	94
VENEZIA I.U.A.V.	0,72	25	0,02	25	0,63	81	0,31	81
BASILICATA	0,60	38	0,20	38	0,30	100	0,38	100
MOLISE	0,38	48	0,11	48	0,83	50	0,12	50
VERONA	0,65	29	0,06	29	0,46	110	0,16	110
NAPOLI Parthenope	0,59	37	0,59	37	0,37	105	0,76	105
NAPOLI L'Orientale	0,90	34	0,16	34	0,33	89	0,60	89
PISA Normale	0,78	25	0,69	25	0,42	66	0,14	66
PISA Sant'Anna	0,54	41	0,03	41	0,35	53	0,19	53
TRIESTE S.I.S.S.A.	0,13	25	0,59	25	0,83	87	0,83	87
BRESCIA	0,26	42	0,59	42	0,15	120	0,18	120
REGGIO CALABRIA	0,30	34	0,88	34	0,90	85	0,20	85
Polytechnic BARI	0,64	49	0,93	49	0,10	106	0,36	106
NAPOLI Seconda Università	0,47	36	0,28	36	0,92	97	0,78	97
BERGAMO	0,41	32	0,10	32	0,30	79	0,76	79
CHIETI-PESCARA	0,70	31	0,12	31	0,65	94	0,84	94
L'AQUILA	0,34	23	0,42	23	0,10	66	0,54	66
URBINO	0,44	30	0,01	30	0,22	84	0,58	84
University for Foreigners of SIENA	0,63	15	0,65	15	0,47	84	0,59	84
University for Foreigners of PERUGIA	0,61	17	0,12	17	0,16	62	0,34	62
ROMA TRE	0,48	27	0,02	27	0,21	75	0,73	75
TERAMO	0,13	33	0,31	33	0,27	91	0,82	91
ROMA Foro Italico	0,24	27	0,52	27	0,28	76	0,74	76
BENEVENTO	0,70	25	0,81	25	0,38	73	0,64	73
CATANZARO	0,67	35	0,04	35	0,28	68	0,11	68
MILANO Bicocca	0,79	46	0,26	46	0,16	100	0,73	100
INSUBRIA	0,72	48	0,26	48	0,21	73	0,23	73
PIEMONTE ORIENTALE	0,53	64	0,62	64	0,65	72	0,83	72
FOGGIA	0,34	40	0,42	40	0,84	104	0,70	104
PAVIA I.U.S.S.	0,33	24	0,39	24	0,19	64	0,21	64
LUCCA I.M.T.	0,30	19	0,50	19	0,45	78	0,53	78
FIRENZE S.U.M.	0,11	12	0,97	12	0,35	45	0,15	45

YEARS 2006	Receivables 1° digit	Number of observations	Receivables 2° digit	Number of observations	Payables 1° digit	Number of observations	Payables 2° digit	Number of observations
Polytechnic MARCHE	0,29	45	0,68	45	0,22	77	0,38	77
BARI	0,56	31	0,24	31	0,19	119	0,38	119
BOLOGNA	0,28	65	0,79	65	0,95	86	0,82	86
CAGLIARI	0,60	43	0,94	43	0,92	91	0,90	91
CASSINO	0,53	27	0,33	27	0,03	49	0,27	49
CATANIA	0,63	38	0,52	38	0,61	105	0,60	105
FERRARA	0,80	46	0,40	46	0,28	99	0,31	99
FIRENZE	0,77	35	0,08	35	0,64	111	0,97	111
GENOVA	0,74	53	0,73	53	0,57	97	0,50	97
SALENTO	0,18	36	0,87	36	0,28	112	0,62	112
MACERATA	0,74	25	0,30	25	0,98	83	0,21	83
MESSINA	0,83	25	0,87	25	0,51	130	0,09	130
MILANO	0,76	41	0,65	41	0,92	101	0,33	101
Polytechnic MILANO	0,39	43	0,55	43	0,79	93	0,84	93

MODENA and REGGIO EMILIA	0,25	51	0,18	51	0,92	118	0,67	118
NAPOLI Federico II	0,69	56	0,65	56	0,80	121	0,48	121
PADOVA	0,44	43	0,38	43	0,58	93	0,54	93
PALERMO	0,38	49	0,56	49	0,21	122	0,63	122
PARMA	0,20	17	0,82	17	0,20	68	0,71	68
PAVIA	0,72	53	0,10	53	0,45	118	0,30	118
PERUGIA	0,46	61	0,21	61	0,79	106	0,44	106
PISA	0,92	49	0,56	49	0,21	109	0,23	109
ROMA La Sapienza	0,32	52	0,09	52	0,28	123	0,32	123
ROMA Tor Vergata	0,53	38	0,66	38	0,09	97	0,85	97
SALERNO	0,49	55	0,58	55	0,24	126	0,79	126
SASSARI	0,16	53	0,11	53	0,92	118	0,30	118
SIENA	0,35	24	0,20	24	0,57	115	0,78	115
TORINO	0,85	80	0,80	80	0,33	113	0,54	113
VITERBO	0,40	44	0,35	44	0,15	107	0,31	107
VENEZIA Ca' Foscari	0,21	59	0,46	59	0,09	91	0,19	91
VENEZIA I.U.A.V.	0,41	23	0,02	23	0,63	81	0,31	81
BASILICATA	0,50	38	0,20	38	0,30	99	0,38	99
MOLISE	0,45	51	0,11	51	0,83	52	0,12	52
VERONA	0,47	28	0,06	28	0,46	111	0,16	111
NAPOLI Parthenope	0,70	39	0,59	39	0,37	108	0,76	108
NAPOLI L'Orientale	0,87	31	0,16	31	0,33	92	0,60	92
PISA Normale	0,46	23	0,69	23	0,42	69	0,14	69
PISA Sant'Anna	0,33	39	0,03	39	0,35	51	0,19	51
TRIESTE S.I.S.S.A.	0,44	24	0,59	24	0,83	86	0,83	86
BRESCIA	0,77	40	0,59	40	0,15	121	0,18	121
REGGIO CALABRIA	0,75	36	0,88	36	0,90	87	0,20	87
Polytechnic BARI	0,13	48	0,93	48	0,10	105	0,36	105
NAPOLI Seconda Università	0,31	37	0,28	37	0,92	95	0,78	95
BERGAMO	0,92	30	0,10	30	0,30	78	0,76	78
CHIETI-PESCARA	0,85	34	0,12	34	0,65	93	0,84	93
L'AQUILA	0,65	21	0,42	21	0,10	67	0,54	67
URBINO	0,32	30	0,01	30	0,22	86	0,58	86
University for Foreigners of SIENA	0,21	14	0,65	14	0,47	82	0,59	82
University for Foreigners of PERUGIA	0,46	17	0,12	17	0,16	65	0,34	65
ROMA TRE	0,28	26	0,02	26	0,21	78	0,73	78
TERAMO	0,16	36	0,31	36	0,27	92	0,82	92
ROMA Foro Italico	0,81	25	0,52	25	0,28	76	0,74	76
BENEVENTO	0,35	28	0,81	28	0,38	76	0,64	76
CATANZARO	0,73	37	0,04	37	0,28	71	0,11	71
MILANO Bicocca	0,86	48	0,26	48	0,16	100	0,73	100
INSUBRIA	0,33	45	0,26	45	0,21	76	0,23	76
PIEMONTE ORIENTALE	0,50	64	0,62	64	0,65	72	0,83	72
FOGGIA	0,09	43	0,42	43	0,84	102	0,70	102
PAVIA I.U.S.S.	0,42	25	0,39	25	0,19	61	0,21	61
LUCCA I.M.T.	0,34	17	0,50	17	0,45	76	0,53	76
FIRENZE S.U.M.	0,80	9	0,97	9	0,35	46	0,15	46

YEARS 2005	**Receivables 1° digit**	**Number of observations**	**Receivables 2° digit**	**Number of observations**	**Payables 1° digit**	**Number of observations**	**Payables 2° digit**	**Number of observations**
Polytechnic MARCHE	0,15	44	0,22	44	0,62	74	0,09	74
BARI	0,40	31	0,24	31	0,19	117	0,38	117
BOLOGNA	0,76	68	0,79	68	0,95	85	0,82	85
CAGLIARI	0,49	42	0,94	42	0,92	94	0,90	94
CASSINO	0,63	24	0,33	24	0,03	46	0,27	46
CATANIA	0,29	41	0,52	41	0,61	106	0,60	106
FERRARA	0,80	45	0,40	45	0,28	99	0,31	99

YEARS 2004	Receivables 1° digit	Number of observations	Receivables 2° digit	Number of observations	Payables 1° digit	Number of observations	Payables 2° digit	Number of observations
FIRENZE	0,42	36	0,08	36	0,64	108	0,97	108
GENOVA	0,15	51	0,73	51	0,57	97	0,50	97
SALENTO	0,62	34	0,87	34	0,28	115	0,62	115
MACERATA	0,14	25	0,30	25	0,98	85	0,21	85
MESSINA	0,76	24	0,87	24	0,51	127	0,09	127
MILANO	0,54	43	0,65	43	0,92	104	0,33	104
Polytechnic MILANO	0,78	46	0,55	46	0,79	90	0,84	90
MODENA and REGGIO EMILIA	0,62	51	0,18	51	0,92	117	0,67	117
NAPOLI Federico II	0,61	58	0,65	58	0,80	120	0,48	120
PADOVA	0,16	46	0,38	46	0,58	93	0,54	93
PALERMO	0,84	50	0,56	50	0,21	124	0,63	124
PARMA	0,81	18	0,82	18	0,20	71	0,71	71
PAVIA	0,42	50	0,10	50	0,45	121	0,30	121
PERUGIA	0,38	61	0,21	61	0,79	107	0,44	107
PISA	0,31	49	0,56	49	0,21	111	0,23	111
ROMA La Sapienza	0,43	55	0,09	55	0,28	120	0,32	120
ROMA Tor Vergata	0,87	41	0,66	41	0,09	95	0,85	95
SALERNO	0,54	54	0,58	54	0,24	128	0,79	128
SASSARI	0,68	51	0,11	51	0,92	121	0,30	121
SIENA	0,68	21	0,20	21	0,57	114	0,78	114
TORINO	0,61	83	0,80	83	0,33	116	0,54	116
VITERBO	0,77	46	0,35	46	0,15	104	0,31	104
VENEZIA Ca' Foscari	0,24	62	0,46	62	0,09	93	0,19	93
VENEZIA I.U.A.V.	0,47	25	0,02	25	0,63	80	0,31	80
BASILICATA	0,34	40	0,20	40	0,30	99	0,38	99
MOLISE	0,37	50	0,11	50	0,83	53	0,12	53
VERONA	0,72	31	0,06	31	0,46	108	0,16	108
NAPOLI Parthenope	0,28	39	0,59	39	0,37	107	0,76	107
NAPOLI L'Orientale	0,45	30	0,16	30	0,33	93	0,60	93
PISA Normale	0,25	24	0,69	24	0,42	66	0,14	66
PISA Sant'Anna	0,81	36	0,03	36	0,35	50	0,19	50
TRIESTE S.I.S.S.A.	0,52	22	0,59	22	0,83	87	0,83	87
BRESCIA	0,24	39	0,59	39	0,15	121	0,18	121
REGGIO CALABRIA	0,77	34	0,88	34	0,90	87	0,20	87
Polytechnic BARI	0,72	48	0,93	48	0,10	107	0,36	107
NAPOLI Seconda Università	0,83	38	0,28	38	0,92	97	0,78	97
BERGAMO	0,27	31	0,10	31	0,30	81	0,76	81
CHIETI-PESCARA	0,53	31	0,12	31	0,65	90	0,84	90
L'AQUILA	0,31	22	0,42	22	0,10	68	0,54	68
URBINO	0,35	28	0,01	28	0,22	84	0,58	84
University for Foreigners of SIENA	0,89	11	0,65	11	0,47	79	0,59	79
University for Foreigners of PERUGIA	0,87	20	0,12	20	0,16	66	0,34	66
ROMA TRE	0,08	26	0,02	26	0,21	81	0,73	81
TERAMO	0,19	35	0,31	35	0,27	89	0,82	89
ROMA Foro Italico	0,22	22	0,52	22	0,28	75	0,74	75
BENEVENTO	0,09	29	0,81	29	0,38	77	0,64	77
CATANZARO	0,38	40	0,04	40	0,28	74	0,11	74
MILANO Bicocca	0,47	49	0,26	49	0,16	97	0,73	97
INSUBRIA	0,57	48	0,26	48	0,21	79	0,23	79
PIEMONTE ORIENTALE	0,52	61	0,62	61	0,65	74	0,83	74
FOGGIA	0,60	41	0,42	41	0,84	103	0,70	103
PAVIA I.U.S.S.	0,22	22	0,39	22	0,19	63	0,21	63
LUCCA I.M.T.	0,64	17	0,50	17	0,45	79	0,53	79
FIRENZE S.U.M.	0,92	7	0,97	7	0,35	43	0,15	43

Polytechnic MARCHE	0,12	43	0,11	43	0,51	75	0,73	75
BARI	0,11	28	0,24	28	0,19	115	0,38	115
BOLOGNA	0,17	69	0,79	69	0,95	84	0,82	84
CAGLIARI	0,56	41	0,94	41	0,92	91	0,90	91
CASSINO	0,60	21	0,33	21	0,03	47	0,27	47
CATANIA	0,44	44	0,52	44	0,61	107	0,60	107
FERRARA	0,92	44	0,40	44	0,28	100	0,31	100
FIRENZE	0,74	36	0,08	36	0,64	110	0,97	110
GENOVA	0,75	49	0,73	49	0,57	99	0,50	99
SALENTO	0,38	36	0,87	36	0,28	116	0,62	116
MACERATA	0,27	28	0,30	28	0,98	84	0,21	84
MESSINA	0,50	26	0,87	26	0,51	127	0,09	127
MILANO	0,50	45	0,65	45	0,92	104	0,33	104
Polytechnic MILANO	0,92	45	0,55	45	0,79	92	0,84	92
MODENA and REGGIO EMILIA	0,09	52	0,18	52	0,92	114	0,67	114
NAPOLI Federico II	0,37	59	0,65	59	0,80	117	0,48	117
PADOVA	0,86	46	0,38	46	0,58	95	0,54	95
PALERMO	0,78	53	0,56	53	0,21	125	0,63	125
PARMA	0,85	16	0,82	16	0,20	72	0,71	72
PAVIA	0,45	53	0,10	53	0,45	124	0,30	124
PERUGIA	0,37	62	0,21	62	0,79	107	0,44	107
PISA	0,46	47	0,56	47	0,21	110	0,23	110
ROMA La Sapienza	0,60	55	0,09	55	0,28	119	0,32	119
ROMA Tor Vergata	0,75	44	0,66	44	0,09	97	0,85	97
SALERNO	0,46	56	0,58	56	0,24	129	0,79	129
SASSARI	0,60	51	0,11	51	0,92	121	0,30	121
SIENA	0,36	22	0,20	22	0,57	112	0,78	112
TORINO	0,24	85	0,80	85	0,33	116	0,54	116
VITERBO	0,10	49	0,35	49	0,15	102	0,31	102
VENEZIA Ca' Foscari	0,78	64	0,46	64	0,09	91	0,19	91
VENEZIA I.U.A.V.	0,35	24	0,02	24	0,63	77	0,31	77
BASILICATA	0,41	42	0,20	42	0,30	102	0,38	102
MOLISE	0,31	52	0,11	52	0,83	52	0,12	52
VERONA	0,76	31	0,06	31	0,46	107	0,16	107
NAPOLI Parthenope	0,79	41	0,59	41	0,37	104	0,76	104
NAPOLI L'Orientale	0,32	32	0,16	32	0,33	96	0,60	96
PISA Normale	0,52	22	0,69	22	0,42	63	0,14	63
PISA Sant'Anna	0,08	36	0,03	36	0,35	48	0,19	48
TRIESTE S.I.S.S.A.	0,24	21	0,59	21	0,83	86	0,83	86
BRESCIA	0,44	40	0,59	40	0,15	123	0,18	123
REGGIO CALABRIA	0,17	33	0,88	33	0,90	84	0,20	84
Polytechnic BARI	0,90	51	0,93	51	0,10	110	0,36	110
NAPOLI Seconda Università	0,89	36	0,28	36	0,92	96	0,78	96
BERGAMO	0,43	28	0,10	28	0,30	84	0,76	84
CHIETI-PESCARA	0,52	34	0,12	34	0,65	90	0,84	90
L'AQUILA	0,84	20	0,42	20	0,10	66	0,54	66
URBINO	0,46	29	0,01	29	0,22	82	0,58	82
University for Foreigners of SIENA	0,36	12	0,65	12	0,47	77	0,59	77
University for Foreigners of PERUGIA	0,88	22	0,12	22	0,16	67	0,34	67
ROMA TRE	0,73	28	0,02	28	0,21	82	0,73	82
TERAMO	0,23	38	0,31	38	0,27	91	0,82	91
ROMA Foro Italico	0,13	22	0,52	22	0,28	77	0,74	77
BENEVENTO	0,43	26	0,81	26	0,38	75	0,64	75
CATANZARO	0,83	42	0,04	42	0,28	71	0,11	71
MILANO Bicocca	0,78	51	0,26	51	0,16	98	0,73	98
INSUBRIA	0,59	46	0,26	46	0,21	81	0,23	81
PIEMONTE ORIENTALE	0,10	59	0,62	59	0,65	76	0,83	76
FOGGIA	0,79	43	0,42	43	0,84	104	0,70	104

| PAVIA I.U.S.S. | 0,59 | 20 | 0,39 | 20 | 0,19 | 65 | 0,21 | 65 |
| LUCCA I.M.T. | 0,92 | 15 | 0,50 | 15 | 0,45 | 78 | 0,53 | 78 |