PAYMENT DISCIPLINE OF BUSINESS IN THE EU COUNTRIES

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Abstract: An important condition for a good payment discipline practice of businesses is to keep the maturity date of financial obligations, which seem to be the biggest threat of failure in the business sector. Receivables become a risky asset that has a negative impact on the solvency of businesses. We address the issue of insolvency through cluster analysis. The main objective of this study was to analyze the categorization of EU member states according to several pre-determined aspects of corporate insolvency in 2016. A traditional hierarchical cluster analysis with Ward's method, and a non-hierarchical k-mean clustering were applied. The European Payment Report 2016 and Doing Business 2017 data were used for the analysis. As a result of the analysis, the member states of the EU fall into three basic groups according to the structure of insolvency indicators. A research question was set, but it did not explicitly confirm the classification set by us.

Keywords: payment discipline, insolvency, payment of receivables, cluster analysis

1 Introduction

The business environment represented by European business has been suffering for a long time because of insufficient payment discipline of business partners, which in many cases results in insolvency of business entities. When assessing the public sector of the EU countries, the payment discipline is even more critical. The current business environment shows an expanding trend of purchasers, who fail to meet their financial obligation, causing problems that spread as a chain reaction in the economy and business relations (Grančay et al. 2015), as well as thousands of companies fall into insolvency (Rahman et al, 2017; Ključnikov Belás, 2016; Michalski 2014). A large number of European businesses have suffered financial difficulties in the recent years due to late payments and their number is still increasing. Disparities are recognized in different regions of Europe in terms of regional and economic development (Simionescu et al., 2017; Bicekova, et al., 2015), as well as in the context of payment discipline (Duľová Spišáková et al., 2017; Klieštiková et al. 2017; Imrovič, 2013). This situation is further associated with a loss of workplaces (increasing unemployment), and this problem in long term is highlighted by several professionals (Obeng, 2017). The situaton results in worsening economic and social situation of the country. The small and medium-sized businesses are mainly endangered, which are waiting too long for payment of invoices or not receiving payment at all. These businesses are struggling with financial deficit, which hinders their further development (Siničáková et al., 2017; Tóth & Mura, 2014).   It was necessary to create a common European legislative document to prevent the trend of payment delays, thereby simplifying the methods of invoicing and receiveng payments in time. The Directive 2011/7 EU on combating late payment in commercial transactions was adopted on 16 February, which is also aimed at improving competitiveness of the EU member states. The Late Payments Directive, as well as its assessment was adopted under the Regulatory Suitability and Efficiency Program (Commission REFIT)[1] to ensure that the expected benefits are met. Reducing the number of late payments would help to expand and sustain improvements not only for individual businesses, but the economy of the country as well (European Commission, 2016).

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[1] REFIT is was set up as a program for suitability and effectiveness of regulations by the EU Commission. The main objective was to simplify the EU legislation and reduce the regulatory costs. It contributes to clear, stable and predictable regulatory framework that fosters the growth and employment (http://ec.europa.eu/smart-regulation/refit/index_sk.htm).

2 Literature review

Nearly 78% of the businesses in Europe experienced late payments during 2010-2016. Late payment might have negative impact on public procurement and cross-border trade, as it often results in insolvency and job cuts. There is little evidence that this directive has an impact on payment behaviour and the practice of late payments (Wood, 2007). The most unpleasant consequence of late payments is the insolvency (Režňáková, 2010). The problem of insolvency and bad credits started in the 60s of the 20th century, when the finances of businesses were used to finance the state budget expenditures (Majková, 2008). The end of the 20th century brought a long-term improvement in the payment discipline of business entities, which resulted from the fact that the reforms led to significant improvement of the business environment, as well as the interest rates on three credit products started to fall (Podnikateľská aliancia Slovenska, 2011). In the current economic climate it is very difficult to set up and maintain a business activity. The European businesses are important to maintain economic prosperity and should provide workplaces. The research of Laureti (2012), Andrejovská and Bánociová (2014), Ključnikov et al.(2017) proves that it is necessary to implement measures in this field of activity, because half of all enterprises do not survive the first five years of their existence. Failure to pay invoices results in existential crisis. On average, up to 200,000 businesses established in the EU go bankrupt, with a quarter of these bankruptcies showing cross-border character. This results in 1,7 million job losses (EU Commission, 2016). Strelcová (2012) notes that insolvency occurs, when businesses are unable to meet their financial obligations, resulting from business relationships, relationship with financial institutions, employees and other organizations at a certain date. Permanent insolvency can result in bankruptcy. Although the business environment is constantly improving and possibilities of corporate financing are increasing, there are several causes of insolvency (Borovský, 2001; Bylok, 2016; Mihokova et al., 2016). According to Kubranová & Sochora (2009) one of the causes is the primary insolvency, which defines overdue of liabilities after maturity over the overdue receivables. Secondary insolvency reflects the condition when the enterprise has more unpaid receivables towards the third party than the sum of its liabilities. The external causes of insolvency are the negative economic situation resulting from the global economic crisis, insolvency of buyers, complicated recovery of receivables, as well as the reluctance of business partners to repay their financial obligations (Melicheriková, 2008). In this respect, the directive of the European Commission was aimed to help healthy businesses survive (Benda-Prokeinová et al., 2017) provide a second chance for honest entrepreneurs, as well as to protect the right of creditors to obtain their finances back. Serving the interest of all parties, the procedures under the directive should be rapid and effective, should help to preserve workplaces, maintain customers and values in the viable companies. The differences in bankruptcy law of different member countries can result in legal uncertainty and unpleasant business environment. The crucial issues are the following: the time needed to recover receivables, the conditions to start proceedings, the average maturity date of receivables and others (European Commission, 2016).

3 Data and methodology

The aim of the article was to analyze and evaluate the payment discipline and insolvency of enterprises in the EU through cluster analysis. The analysis focused on categorization of EU countries according to several aspects of their insolvency. Several scientific methods can be used to explore deeper contexts. We decided to use cluster analysis. It enables not only to make calculations but excellent presentation of data in form of graphs. This method is used by many scientists e.g. Tvaronavičienė M., & Razminienė K (2017). The cluster analysis was conducted on a statistical sample of 25 EU member states with the exception of Cyprus, Luxembourg and Malta

(there was no availble data in 2016). We gained data from the European Payments Report 2016 and the annual report of Doing Business 2017.

The following variables were chosen for analysis:

- P1 - average contractual maturity of receivables (days),
- P2 – average delay in payment of receivables (days),
- P3 – annual income written off due to non-payment of receivables (%),
- P4 - time requirement for recovering receivables (years),
- P5 – financial burden of recocering receivables (% of the bankruptcy procedure).

The research objective set focused on categorization of countries (based on predefined specifications) in three different clusters. We have formulated the following assumption: „ Is it possible to make a clear distinction between the countries with an excellent payment discipline; countries with high level of payment risk, and countries with a certain degree of payment risk?" We were trying to confirm or reject this assumption.

Before the cluster analysis it was necessary to conduct data standardization with a help of Z-score. Each item was a subject of standardization/normalization by subtracting the mean value, dividing it by the standard deviation, thereby achieving the mean value zero. Subsequently we visualized and evaulated the data and their signs of clustering in terms of mutual distribution of countries (Meloun, Militký, 2004). In the next step, based on the acquired input variables we proceeded to prepare the cluster analysis. The categorization was carried out using a number of methodologicl approaches to study the data, which is based on the concept of Euclidean metrics (Halkidi et al., 2001 and Everitt et al., 2001). In accordance with the objective of the article, hierarchical and non-hierarchical methods of clustering were used. The Ward Linking method (commonly used in practice) was chosen as a hierarchical method. K-means clustering was applied as a non-hierarchical method. To apply this methodological approach it is necessary to form an optimal decomposition of objects with a predetermined number of clusters (in our case it means three clusters). There we can see the difference in comparison with the hierarchical method, where the number of clusters was not predetermined. The statistical analysis was performed in statistical programming language R, using psych, GPArotation, nFactors, cluster and NbClust.

4 Results and discussion

The average contractual maturity in B2B sector (based on the analyzed sample) varied from 14 days in Germany to 60 days in Italy in 2016. This indicates significant differences in the EU that affect factors such as business practices, culture, payment morale and especially the unpleasant economic situation in southern countries. Even though contractual maturity of all countries is in line with the Late Payment Directive of the EU, the efforts to unify it in the territory of the EU forces the PIIGS to make greater efforts to curb them, which can result in an increase of unpaid receivables and further weakening of the economy. Worse situation can be detected in the public sector, which should be an example for other sectors, but up to 9 European countries (Croatia, Bulgaria, Belgium, France, Ireland, Portugal, Spain, Italy and Greece) do not comply with the 30-day contractual maturity directive. An important factor in payment discipline was the actual settlement of receivables resp. delay of receivables. Nearly all of the countries experienced late payment in 2016, with the exception of Lithuania, Latvia, Ireland and the UK. Delayed payments also occured in the most developed Scandinavian countries, ranging from 3 to 5 days. The largest pressure to accept longer terms of payment (58% in Denmark, 73% in Finland, 52% in Sweden) was developed by multinational companies. The worst situation was detected in southern countries with a delay of 11 to 20 days.

Figure 1. Comparison of contractual and actual maturity within the EU (days)
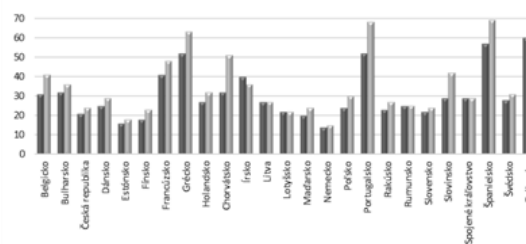
Source: own processing based on Intrum Justitia data (2016) contractual date of maturity, actual payment duration

Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finnland, France, Greece, the Netherlands, Croatia, Ireland, Latvia, Lithuania, Hungary, Germany, Poland, Portugal, Austria, Romania, Slovakia, Slovenia, the UK, Spain, Sweden, Italy.

Bad debts, which are not calculated as a tax expense were mainly characteristic for southern states such as Spain (3%), Italy (3,8%), Bulgaria (4,2%) and mainly Greece with 5,8%, which was 3,6 percentage points higher than the EU average of 2,2%; and 5,4% percentage points more than Denmark with the smallest amount of non-repayable debts of only 0,4% of the annual income. The time to revocer outstanding receivables in individual countries of the EU is ranged from 0,4 years in Ireland to 4 years in Slovakia. Slovakia achieved the worst results with inefficient utilization of debt collection agencies resp. receivables not dealt with in time, lack of trust in repayment or worries about losing the business partner. The most effective debt recovery was recognized in Ireland, where the creditors were paid within approximately 144 days (0,4years). The cost of debt collection was the highest in Italy, 22% of the bankruptcy proceedings costs. This was followed by the countries of V4 group with a cost range of 14,5-18%. The lowest investment in debt collection was registered in Finnland, the Netherlands and Belgium (3,5%).

5 Hierarchical and non-hierarchical methods of cluster analysis

Ward's method
The Ward's method, which is based on the Euclidean distance was chosen from the hierarchical methods of clustering. The output of this method is a dendogram (Figure 2), which has ranked the European countries into the following clusters:

Figure 2. Ward's dendogram
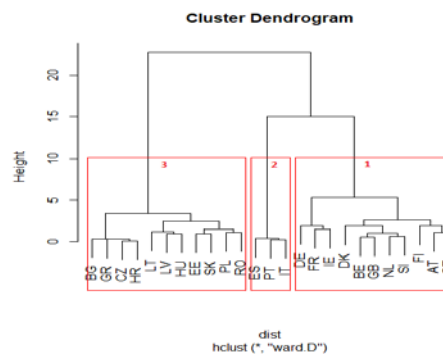
Source: own processing in the statistical programming language R

The first cluster was formed by those European countries (Belgium, Denmark, Finnland, France, the Netherlands, Ireland, Germany, Austira, Slovenia, the UK, Sweden), which have shown the best payment discipline in the survey sample. We can talk about developed economies with an average contractual maturity of 28 days, where the average delay in settling claims were 4 days, and it equals to the European average. The cluster showed low values in case of percentage of annual income

written off due to non-payment of receivables and the costs of recovering claims. Surprising was to see Ireland in the cluster of developed countries since it had been threatened by debt crisis (PIIGS). This has probably happened, because Ireland significantly increased the average contractual maturity period by 12 days in 2016 compared to the previous year, which means that the average settlement of claims in the country is 4 days before the contractual date of maturity. Another variable, in which Ireland preceded all the European countries, was the recoverability of receivables within a period of 144 days.

The second cluster was formed by some of the countries mentioned as PIIGS (Portugal, Spain, Italy). These were the countries with the worst results of payment discipline, where creditors, despite the longest contractual maturity of the analyzed sample (57 days in average) were waiting for their claimes to be settled by 16 days longer than the agreement in the contract was. The disobedience of the cluster was confirmed by the above than average 3% write-off of annual income due to unpaid receivables.

The third cluster was formed by V4 countries, as well as the Baltic and other smaller countries (Bulgaria, Czech Republic, Estonia, Greece, Croatia, Latvia, Lithuania, Hungary, Poland, Romania, Slovakia), which can be characterized as average countries. On the basis of the input variables we cannot clearly categorize them as countries with payment discipline resp. indisciplined. Checking the input data we found that these countries have achieved better results than countries in the first cluster in terms of contractual maturity (24 days) and delays (4 days), but on the other hand they are characterized by the longest duration of recoverability of receivables (3 years). The Ward's method grouped Greece among the average countries, but according to values of variables Greece should be rather ranked among the countries with high payment indiscipline.

The K-means clustering
The second method used was the method of the closest center of gravity, K-means. Since it is a non-hierarchical clustering method, it was necessary to set the number of clusters (3) based on the comparability criterion.

Figure 3. The results of K-means clustering
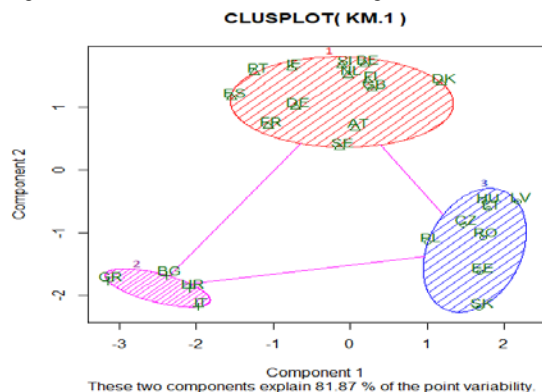
Source: own processing in the statistical programming language R

Similarly to Ward's Method, the first cluster consisted of the most developed EU countries (Belgium, Denmark, Finnland, France, the Netherlands, Ireland, Germany, Portugal, Austria, Slovenia, the UK, Spain, Sweden) except 3 countries of the PIIGS group. According to K- means clustering, not only Ireland, but Portugal and Spain as well fell into the category of countries with payment discipline.

The second cluster of countries with payment indiscipline is formed by Greece, Italy, Bulgaria and Croatia. Their categorization in this cluster can be explained by high, almost a double percentage (4,2% in Bulgaria) of annual income written off due to non-payment of receivables compared to the EU average of 2,2%, as well as a time-consuming recovery of the

receivables over a period of 3.3 years. Similar situation was detected in Croatia with a length of debt recovery 3,1 years in 2016.

The countries labelled as average according to K-means clustering (Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Romania, Slovakia) belong to cluster three with an exception of Bulgaria and Croatia, which fell into the second cluster as in the case of hierarchical clustering. Using *proximities* we compared the distance between the clusters. The results show that the second cluster with its characteristics was closer to indiscipline in payments (p-value=0,81) compared to the group of countries with payment discipline (p-value=0,85). Despite the best average results of indicators, the contractual maturity (22 days), the delay in settlement of receivables (2 days) and the percentage of annual income written off due to outstanding claims (1,7%) this fact was caused by assigning the greatest importance of indicator of recovering receivables at 12,5% of the bantkruptcy value, in which the cluster shows the worst results.

Evaluation of results by using both methods of clustering
When evaluating the results we received by hierarchical and non-hierarchical clustering, we focused on confirming or rejecting the assumption, where we predicted creation of three clusters, where each cluster should involve countries with the same results. The first cluster was formed to involve countries with a payment discipline. The second cluster was formed to include countries with no payment discipline with a high degree of payment risk. The third cluster was expected to involve the countries with payment instability and a certain level of payment risk (average countries).

The results (Table 1) confirmed that 14 countries fell into the same cluster according to both models. Since the models have assigned different weigh of importance to each input variable, the categorization of other countries was not absolutely clear according to methods applied, and therefore we cannot confirm the question and the assumptions that countries can be clearly categorized as disciplined, indisciplined and average.

Table 1. Comparison of cluster analysis results

Country	Ward's method	K-means clustering
Belgium	1	1
Bulgaria	3	2
Czech Republic	3	3
Denmark	1	1
Estonia	3	3
Finnland	1	1
France	1	1
Greece	3	2
the Netherlands	1	1
Croatia	3	2
Ireland	1	1
Latvia	3	3
Lithuania	3	3
Hungary	3	3
Germany	1	1
Poland	3	3
Portugal	2	1
Austria	1	1
Romania	3	3
Slovakia	3	3
Slovenia	1	1
the UK	1	1
Spain	2	1
Sweden	1	1
Italy	2	2

Source: own processing

The most precise grouping is a cluster of countries with payment discipline: Belgium, Denmark, Finnland, France, the Netherlands, Ireland, Germany, Austria, Slovenia, the UK and Sweden. These were the most developed countries with payment

stability in the EU, with the exception of Ireland, which has shown different value of indicators regarding the delay in settlements of claims and recovery of receivables. Italy fell into the group of countries with payment indiscipline with the highest delay in payment of receivables with an average duration up to 20 days, as well as the recovery costs of 22% of the bankruptcy procceeding. The Czech Republic and Latvia could not be clearly categorized, so they belong to a group of countries that have neither the best nor the worst payment discipline.

Unlabelled countries have become a part of more clusters, but certain similarities were followed also in this case. In most of the cases, the group formed by Estonia, Lithuania, Hungary, Poland, Romania and Slovakia was incorporated into the third cluster (average countries), but in K-means clustering they have shown the highest payment discipline. The reason of transfer of these countries was the value of their input variables P4 and P5. These countries have achieved the worst results of input variables in the EU. The time required for debt recovery ranged from 2 to 4 years and the costs related to that ranked between 9 and 18% of the bankruptcy proceeding, while the longest time interval (4 years) and the highest costs (18%) were registered in Slovakia. Another similar group was formed by Greece and Croatia, ranked as average in hierarchical clustering model. Other models ranked them as countries with payment indiscipline. Even the real data reflected their payment instability e.g. Greece has the highest percentage of annual income written off due to non-payment of receivables up to 5,8%. Bulgaria compared to Greece and Croatia was ranked average also according to K-means clustering.

Interesting results were achieved by Spain and Portugal. These countries belong to the group of countries with payment discipline, but countries with payment indiscipline as well. Categorization to countries with payment indiscipline was due to 16 days of delay in claim settlement (Ward's method), while financial costs of debt recovery reach 20% of the bankruptcy proceedings. This is why Portugal can be found among the countries with payment discipline according to K-means clustering.

The European Central Bank (2016) and the European Payment Report traditionally ranked Austria and the Scandinavian countries among the countries with payment stability. The northern countries are characterized by shorter contractual maturities, lower occurance of late receivables, so they have a low payment risk. There is also a stable payment discipline in the Austrian business environment, where proposals for accepting longer payment terms are mainly the responsibility of the public sector. Further research by Checherita-Westphal, et al. (2015) Ključnikov, et al. (2017) Parkitna, et al. (2016), Rocholl, et al. (2016) which monitored the payment insolvency of the EU countries in different time intervals were identical to results achieved by us with the help of selected methods of cluster analysis. The results of analysis show similarities in identifying countries with payment discipline. These are Denmark, Finnland, Austria and Sweden. Further economies with payment stability are Belgium, France, the Netherlands, Germany, Slovenia and the UK. Relevant differences between the statements of Sticlosu and Pîrvulescu, (2015) show the categorization of the most risky countries in terms of payment discipline. We have not achieved a full compliance in neither of the models. According to Checherita-Westphal, et al. (2015), Ireland is considered to be a country with worse payment discipline, while our models ranked the country among the most disciplined in payments. Good position of Latvia and Lithuania is reflected by the exemplary behaviour of businesses to meet their obligations, as the settlement of receivables is realized during the contractual period, while most of the businesses in these countries do not expect an increase of risk of late payments the next year. Even if companies are aware of the European directive on late payment in Estonia, only 10% of late payments are realized in average duration of 2 days. Some of the V4 countries (Czech Republic, Slovakia, Hungary) are ranked among countries with good payment discipline, as they were characterized by a short contractual maturity and a delay in the

settlement of claims. Our models have characterized these countries as average. The most risky economies in terms of payment discipline according to the ECB (2016) and the European Payment Report (2016) were the countries of southern Europe. Greece, Spain, Portugal and Italy have been suffering of financial shock for a long time. The business environment is characterized by a need to respect longer payment terms, despite of the fact that these countries have the longest average contractual maturity, which is an obstacle to growth of businesses and results in existential problems.

6 Conclusion

Late payments are currently the biggest threat to business environment across the EU. They worsen the payment discipline of individual economic entities, which might result in insolvency spreading through the whole economy. We can assess that the cluster analysis conducted on a sample of 25 member states of the EU with an exception of Cyprus, Luxembourg and Malta, has only partially confirmed the conclusions of our research question. We expected the individual countries to be grouped based on their similar features. The assumption that the first cluster will be made up of countries with the best payment discipline was not confirmed. The second cluster was expected to include countries with payment indiscipline. The question was confirmed, but only in case of Ward's method applied. The third cluster aimed to group countries with payment instability and a certain level of payment risk (average countries) was confirmed via K-means clustering. The analysis conducted, as well as the different research results show that the member states cannot be clearly classified as disciplined or indisciplined. Differences still occur in the monitored input variables, which show different values in different countries. It would be necessary to increase the number of observed variables, as well as the methods applied. If we want to asses the payment discipline of businesses and reduce the insolvency, the suitable solution is to prevent the occurance of recoverable receivables by better utilization of information received about customers and the customer behaviour.

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