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THE APPROACH TO TAX DEBTORS SEGMENTATION

A segmentation-based tax debt management is the most perspective way to improve tax collection. Despite the innovations in the tax debtor segmentation the amount of the tax debt in most countries continues to be grown. Especially the share of an "old" debt remains high. It actualizes the further search of the alternative ways to tax debtor segmentation. The authors suggest to segment tax debtors on the debt nonpayment risk estimation. They form the segments that mean the risk category. Each segment consists of the sub-segments divided according to the criteria of the tax debt amount and age. Using the method of risk integrate estimation the authors determine the marginal indicators according to which the tax debtors should be distributed under the sub-segments. The indicators chosen for risk estimation mirror the propensity to pay and capacity to pay. The authors suggest the strategies of tax debt management for each sub-segment of the tax debtors. They reflect such way of interrelations between the fiscal authorities and tax debtors, in which the tax debtors have the opportunity to pay independently without enforcement, and each subsequent stronger impact on the debtor depends on its reaction to the previous intervention. The debtor moves to the next category of risk, if within a certain time he did not respond to a softer strategy. The main goal of such approach is to provide the tax debt repayment on the early stages of its emergence and prevent it from aging.
JEL: C38; C58; G41; H26

1. Introduction

Despite the innovations in tax administration the amount of tax debt each year increases. According to the State fiscal service of Ukraine official data, since 2000 to 2019 the tax debt increased by 10 times (from 10 bln UAH in 2000 to 101 bln UAH as of 2019) but the

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highest rate of increase was observed since 2014. At the moment the total sum of tax debt equals 10% of GDP of Ukraine.

The problem of tax debt is of a crucial importance not only for Ukraine. Most counties of all over the world, as mentioned in the OECD reports (2014, 2015, and 2017), have increasing tax debts trends. The correlation analysis between data of GDP and tax debt in Ukraine shows that along the GDP growth the tax debt also races. It may indicate a particular type of taxpayers' behavior. We mean that increase in the tax base leads with the increases in the amounts of tax liabilities. Some taxpayers conduct business but do not pay taxes. Such behavior has negative impact on both state budget revenues, tax culture and business climate in the region or in the country at all. The constant increase in the tax debt and low level of paying tax liabilities by tax debtors' evidence that the methods of tax debt management in Ukraine have to be improved. And extremely important for this is to improve the strategies of tax debt management.

The experience of numerous countries demonstrates that the segmentation-based tax debt management is the most resultative one. The state fiscal authorities in Ukraine have never previously made a segmentation of tax debtors in order to develop appropriate strategies of working with such tax debtor and improve tax debt management at all. Now it is one of the main tasks of the fiscal authorities in Ukraine. Moreover, despite some advance in the topic of the taxpayer segmentation in the European countries the revenue authorities of a lot of them search new alternative approaches how to group tax debtors and what strategies should be applied to them for providing tax collection. Therefore, the case of Ukraine could be valuable and informative to the authorities and researches in the European countries too.

2.   The Related Works, Database and Methodology

2.1. The related works

The various approaches to the segmentation of tax debtors are systematized and represented in the reports of OECD (2013, 2014, 2017), IOTA (2016) and consulting firm McKinsey & Company (2008-2009). They state that the stages of segmentation in the analyzed countries are different. It means that there is no unified logic of this process. The criteria and indicators that are used for segmentation also vary. But despite differences, most of segmentation strategies are based on risk estimation. The taxpayers' behavior is taken into consideration in segmentation process. All approaches and technologies of segmentation mirror scientific findings in the field of tax compliance (Wenzel, 2002), tax morale (Erzo, Singhal, Singhal, 2014), tax avoidance and tax evasion (Hacking, 2006; Schneider, Kirchler, Maciejovsky, 2003).

Dohrmann and Pinshaw (2009) use three groups of performances for tax debt and debtors segmentation: 1) taxpayers' characteristics; 2) debt characteristics; 3) risk/complexity to collect tax. Such characteristic as compliance history (the first of mentioned groups), value of debt (the second group), financial situation of taxpayer and taxpayer trustworthiness and willingness to pay (the third group) are very important and will be used in our approach to tax debtor segmentation. We also have to note that in most cases the scholars reveal a

segmentation of taxpayers, not tax debtors. But the approaches and fundamentals of such segmentation is extremely useful for our research. The fact is that the segmentation of taxpayers is important for the proper organization of tax administration. It is built on the study of the behavior of taxpayers, their attitude to tax compliance. The taxpayers are divided into some groups, to each of which the respective management strategies are applied. Similarly, the taxpayers who have a debt may have different reasons for failure to pay taxes on time, and also have a different attitude towards their obligation to pay off tax debt. Very often the taxpayer segmentation is the starting point for further segmentation of tax debtors. Usually taxpayers are divided into such groups: 1) large; 2) medium and small; 3) separate taxpayers (OECD 2014). Rassel (2010) divides them into: 1) individuals; 2) micro and small businesses; 3) medium-size businesses; 4) large businesses; 5) non-profit organizations; and 6) government organizations. Than the sub-segments are formed under the amounts of the tax debt and behaviour of taxpayers.

Stankevicius and Kundeliene (2017) suggest following taxpayer's behavioural risk stage: 1) determined not to comply; 2) unwilling to comply; 3) want to comply, but doesn't always succeed; 4) have an intention and can comply. The same we can say about tax debtors. We are using this approach for segmentation tax debtors in Ukraine. More detail explanation is presented in section 3 of this article.

2.2. Database and methodology

First of all, we should provide an answer to "What should be segmented?". Answering this question, we have to understand what exact information about tax debtors is available for researchers. In Ukraine such information is represented on the official webpage of the State Fiscal Service of Ukraine (as of 01.02.2019) and designed in the following way (table1).
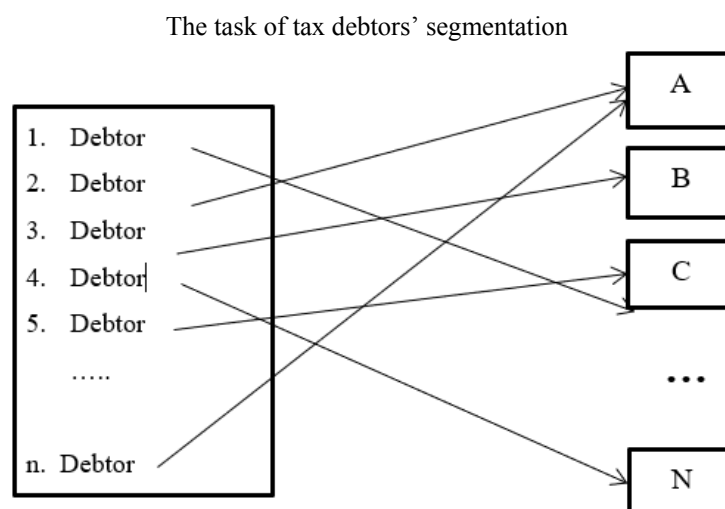
Table 1

Frame of the information base about the tax debtors in Ukraine

№	Name of legal entity Name, surname of physical person	Code in the Unified State Register of Enterprises and Organizations of Ukraine	Name, surname of the legal entity or entrepreneur head	Name of the territorial body of the State Fiscal Service of Ukraine (SFSU)	Name, surname of the SFSU unit head	The amount of the tax debt to the State budget	The amount of the tax debt to the local budget
1							
2							
…							
n							

According to the data officially presented on the site of the SFS of Ukraine as of January 1, 2019 the number of the total tax debtors equals to 953.9 thousand (physical and legal entities) and the aggregate amount of the tax debt is UAH 99498 million. To manage such a huge quantity of tax debtors is not an easy thing. Our task is to segment 953.9 thousand

debtors into some groups on the risk-based approach (figure 1). We mean the risk of tax debt nonpayment.

Figure 1

The task of tax debtors' segmentation

Comparing table 1 and figure 1 we can conclude that the available official information is not enough for the achievement of the set goal. There are not any indicators to determine propensity to pay and capacity to pay. So, we should define the necessary indicators, substantiate the stage, segments and sub-segments and then suggest the strategies for each segment of the tax debtors.

The research methodology relies mostly but not only on statistical and economical-mathematical methods of analysis. On the basis of analyzing frequency and grouping of tax debtors by the sum of tax debt, the optimal intervals of tax debt's value and subgroups of taxpayers' debt duration are discovered. The risk category of tax debtors is defined on the basis of applying integral assessment, probability intervals and method of coefficients. As a result of the coefficient analysis under the proposed groups the integral indicator for each segment of tax debtors is calculated. The method of logical conclusions was applied to substantiate the indicators and their weighing coefficients that should be used for integral assessment of tax debtors' behavior risk as well as for the description of variants of the strategies that can be applied to each of the defined segments of tax debtors. The idea of the research is to show approach to the segmentation of tax debtors into groups and subgroups and highlight the possible strategies that could be applied to each segment of tax debtors, but not conduct the actual segmentation of tax debtors. The statistical data on total sum of tax debt and within tax debtors is based on official data of State Fiscal Service of Ukraine, Accounting Chamber of Ukraine and Ministry of Finance of Ukraine. It is expected that the further researches will be focused on approbation of the developed methodology of tax debtor clustering in collaboration with the State fiscal service of Ukraine.

3. Results

Considering, that the risk of not paying tax debts by a certain taxpayer is in the basis of tax debtors' segmentation, it is necessary to determine the indicators which should be used for risk assessment.

According to our point of view, tax debt repayment depends on:

1) Liquidity and debtor solvency;

2) Property status of the debtor;

3) Behaviour of the debtor concerning the performance of tax liabilities.

The coefficients of debtor's liquidity and solvency should be estimated on the basis of financial statements analysis. From the entire set of possible indicators to conduct such an assessment, the following indicators should be used:

- Absolute values: gross income from the sale; profit; balances on accounts;

- Relative values: coefficient of current liquidity; coefficient of quick liquidity; coefficient of absolute liquidity; profitability of sales; profitability of assets; coefficient of financial independence; ratio of own and borrowed funds; credits-to-receivables ratio; balances on accounts to tax debt amounts ratio.

In the context of the prospects of tax arrears repayment the property status of the debtor should be assessed on the basis of the following indicators:

- Absolute values: residual value of fixed assets;

- Relative values: fixed assets' residual value to the tax debt amount ratio; equity to total sum of fixed assets ratio.

The debtor's behaviour and attitude to tax compliance could be assessed on the basis of his payment discipline in the retrospective (in previous reporting periods) and indicators of business' fictitiousness

The taxpayers' payment discipline can be estimated by the following indicators:

- volume of the aggregate tax debt (in dynamics);

- frequency of the tax debt occurrence during the last 3 years (times);

- period of the tax debt repayment (days).

Business fictitiousness could be estimated by a set of indicators:

- addresses of registration (the registration at the addresses of taxpayers' mass registration may indicate the fictitiousness of legal entity);

- residual value of fixed assets (is already included into the group of indicators characterizing the property status);

- number of employees in the company (for example when director and accountant is one person, or the enterprise has fewer than 2 registered employees).

These groups of indicators (liquidity, solvency, debtor's property state and its behaviour) should be described (and prioritised) in the degree of significance (weighting) in terms of the probability of the tax debt repayment. In our opinion, debt repayment depends primarily on the solvency of the debtor, because, even if the residual value of the assets does not cover the amount of debt, but the degree of business activity is high, so it generates incoming cash flows on the enterprise and raises the likelihood of paying off debts. Therefore, this group of indicators ranks first in our rating of significance. To quantify the parameters of risk, in order to apply a methodology of integral assessment, this group of indicators is provided with a weighted value of 50% (or 0.5).

The indicators of property state should be on the second rank, as the sufficiency of property is the guarantee of tax debt repayment due to the sale of property, if even the debtor cannot repay for its obligations within a specified time. The weight coefficient for this group is 30% (or 0.3).

The behaviour indicators are important, but we give them third rank, as even if the payer's wish to repay the debt, it will be impossible to do this if there is no property or business activity. The weight coefficient for this group is 20% (or 0.2).

There should be noted that accuracy is not of a crucial importance for quantify weight coefficients. The main task is to preserve the group order of indicators depending on their priority.

Considering that we outlined three groups of indicators to reveal the risky debtors' categories, we need to define the possible combinations of these groups of indicators. Taking into account the above weighing coefficients, the following matrix of combinations was received (table 2).

Table 2

The risk categories of debtors based on the possible combinations of matrix groups selected for risk assessment

Risk indicators	Combination of groups of indicators for risk assessment							
Liquidity and solvency	+	+	+	+	-	-	-	-
Property status	+	+	-	-	+	+	-	-
Debtor behaviour	+	-	+	-	+	-	+	-
Group of risk	I	II	III	IV	V	VI	VII	VIII

The data in table 2 indicates eight possible combinations of the indicators listed above. So, 8 risky debtors' categories can be defined. The results of the parameter estimation of risk, taking into account the weighing coefficients presented in table 3.

Table 3

The quantitative estimation of the parameters for distinguishing risky categories of debtors

Group of risk									
Indicators	Weighing coefficient of group indicators	I	II	III	IV	V	VI	VII	VIII
Liquidity and solvency	0.5	0.5	0.5	0.5	0.5	0	0	0	0
Property status	0.3	0.3	0.3	0	0	0.3	0.3	0	0
Debtor behaviour	0.2	0.2	0	0.2	0	0.2	0	0.2	0
The integral indicator to determine the risk category (when risk grow and the probability of debt repayment decline)		1	0.8	0.7	0.5	0.5	0.3	0.2	0
Risk category (where A is the lowest risk, E is the highest risk)		A	B		C		D		E
The probability interval of tax debt repayment		0.8-1.0	0.6-0.79		0.30-0.59		0.20-0.29		0-0.19

Table 3 shows that there is a possibility of combining those groups where the same integral indices are obtained, or the indices with a nonessential deviation. At the same time the priority to repay the debt is guaranteed. In particular, groups II and III, IV and V, as well as VI and VII can be combined. Thus, we get 5 risk groups of debtors, which are assigned with abbreviations A, B, C, D, E (Figure 2).

Figure 2

The scale of the risk categories of nonpayment tax debt
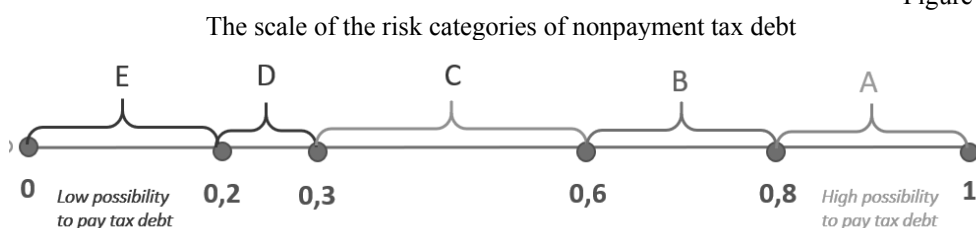
Group A includes debtors, the probability of repayment of tax debts for which is from 0.8 to 1. Group B includes debtors, the probability of repayment of tax debts for which is from 0.6 to 0.79, in group C – from 0.3 to 0.59, in group D – from 0.2 to 0.29, in group E – tax debtors, the probability of tax debts repayment for which is less than 0.2.

It is also necessary to determine a zero category of tax debtors (0), whose debt is not more than 1020 UAH. In accordance with Ukrainian legislation, the State fiscal service of Ukraine cannot apply any measures of influence in order to recover the debt to this category of debtors. At the same time this group of debtors is quite numerous: as of February 2019 almost 40% of debtors-legal entities had the tax debt in the amount that not exceeded 1020 UAH. We consider, that some economically efficient measures of influence on such tax debtors must be applied. If do not react on such amount of debt, in the future they can grow. By reducing a significant number of the debtors with small amounts of debt, which have a high probability of repayment in case of timely response and informing it is possible to improve the performance of the State fiscal service of Ukraine, as well as to facilitate the management of the tax debtors with significant amounts of debt, or with low risk of failure to pay.

To determine the risk category for each individual debtor, it is necessary to establish the quantitative parameters. In relation to these parameters each of three selected groups of indicators (liquidity and solvency, property state and business fictitiousness) will be assessed.

We consider that to assess the risks, the actual indicators should be compared to their normative values, and take into account the weight coefficients within the separate groups (table 4). For liquidity, financial independence, financial stability and credits-to-receivables ratio we propose to use generally accepted values, which are theoretically justified and are being used in the analysis of the financial state of the entity. It is quite difficult to substantiate the normative value for profitability indices, because the average indices differ by branches of economic activity. We offer to use a minimum indicator that indicates revenue (return on assets) and profit (sales profitability). It means that the company is economically active and has the potential of debt repayment.

When setting the normative value for indicators of property status, in particular, the ratio characterizing the balance of funds on accounts and the amount of tax debt, we proceeded from the fact that the risk-free situation is a state where the amount of funds is sufficient for repayment of the tax debt, that is, both indicators are approximately equal. Consequently, normative value is 1. Similarly, we reasoned on the substantiation of normative values for fixed assets' residual value to the tax debt amount ratio, equity to total sum of fixed assets ratio. Thus, for the first of these two indicators, "1" means that in the case of the sale of fixed assets, the amount of proceeds will be sufficient to repay the tax debt. This is a risk-free situation for the state as a subject of taxation. For the second indicator, "1" means that the fixed assets are not in credit purchased; therefore they can be transferred to the tax pledge. That is why it increases the probability of the tax debt repayment (Table 5).

Table 4

The algorithm for calculating the risk index for the group of indicators of liquidity and solvency (α)

Indicators	Symbolic marking	actual value	Table/normative value of indicator	The correspondence of the actual value to the table (0-1)	weighing coefficient	Estimated	Condition for Calculating Column 3
		1	2	3 (see 6)	4	5 = 3*4	6
Coefficient of current liquidity	K1		2	Automatically calculated	0.1	Automatically calculated	If ≥ 2 = 1, if < 2 = 0
Coefficient of quick liquidity	K2		0.6	Automatically calculated	0.1	Automatically calculated	if ≥ 0,6 = 1, if < 0,6 = 0
Coefficient of absolute liquidity	K3		0.1	Automatically calculated	0.1	Automatically calculated	if ≥ 0,1 = 1, if < 0,1 = 0
Profitability of sales	K4		0.01	Automatically calculated	0.1	Automatically calculated	if ≥ 0,01 = 1, if < 0,01 = 0
Profitability of assets	K5		0.01	Automatically calculated	0.1	Automatically calculated	if ≥ 0,01 = 1, if < 0,01 = 0
Coefficient of financial independence	K6		0.5	Automatically calculated	0.1	Automatically calculated	if ≥ 0,5 = 1, if < 0,5 = 0
Ratio of own and borrowed funds	K7		1	Automatically calculated	0.1	Automatically calculated	if ≥1 = 1, if <1 = 0
Credits-to-receivables ratio	K8		1	Automatically calculated	0.1	Automatically calculated	if ≤ 1 = 1, if < 1 = 0
Balances on accounts to tax debt amounts ratio	K9		1	Automatically calculated	0.2	Automatically calculated	if ≥1 = 1, if <1 = 0
Total							

Note. The table only shows the actual values of the indicators (in column 1.) All other indicators are calculated automatically, taking into account the constraints indicated in column 6 and the weighting factors indicated in column 4. For further calculations of the risk index, the value of the amount by column 5 is used.

Table 5

Algorithm for calculating the risk index for a group of the property status indicators (β)

Indicators	Symbolic marking	actual value	Table/normative value of the indicator	The correspondence of the actual value to the table (0-1)	weighing coefficient	Estimated	Condition for Calculating Column 3
		1	2	3 (see 6)	4	5 = 3*4	6
Fixed assets' residual value to the tax debt amount ratio	K10		1	Automatically calculated	0.6	Automatically calculated	if ≥1 = 1, if <1 = 0
Equity to total sum of fixed assets ratio	K11		1	Automatically calculated	0.4	Automatically calculated	if ≥1 = 1, if <1 = 0
Total							

Note. The table only shows the actual values of the indicators (in column 1.) All other indicators are calculated automatically, taking into account the constraints indicated in column 6 and the weighting factors indicated in column 4. For further calculations of the risk index, the value of the amount by column 5 is used.

For a group of indicators that characterize the debtor's behavior, we also proceeded from logical considerations. Thus, the increase of the total tax debt, firstly, increases the risk of its failure to pay, and secondly, can characterize a certain stereotype of the taxpayer's behavior, especially if indicators of solvency are normal. The rate of the tax debt frequency should be justified on the basis of taxpayers' personal cards analysis, at least, for sample of debtors. Since we do not have excess to such data, we came out with the fact that according to the legislation the tax period for VAT is 1 month, and for the income tax is 1 quarter (these two kinds of taxes, on the one hand, have the highest fiscal significance in Ukraine, and on the other hand the value of the tax debt for these taxes is the highest too). If the tax debt of VAT appears 2 times per year, and income tax is 1 time, plus the fourth case we "reserved" for any other tax, then this situation is not a risky or has little risk for the state. Although our opinion on this issue is not uncontroversial and could be discussed. The debt repayment period also characterizes the taxpayer behavior. If the debt is repaid within 60 days by the taxpayer independently, then this situation is not risky. The average period of tax debt repayment can be determined for the previous year or previous 3 years based on personal tax cards data. In assessing the risk of nonpaying tax debt, we also need to consider the address of the payer. The address at the place of mass registration of business entities may indicate the fictitiousness of the business entity, and therefore the risk of failure to pay is increasing. To the number of employees we can say that unfortunately, the

current legislation does not establish a number of employees, which is minimal for the recognition of the subject of business as a legal entity. We consider the fact that the company should have at least a head (director) and financially responsible person (accountant). Therefore, the number of employees must be at least 2 (table 6).

Table 6

Algorithm for calculating the risk index for a group of the tax debtor's behavior indicators (γ)

Indicators	Symbolic marking	actual value	Table/normative value of indicator	The correspondence of the actual value to the table (0-1)	weighing coefficient	Estimated	Condition for Calculating Column 3
		1	2	3 (see 6)	4	5 = 3*4	6
volume of the aggregate tax debt increases	K12		no	Automatically calculated	0.2	Automatically calculated	if yes = 0, if no = 1
frequency of tax debt occurrence during the last 3 years	K13		4 times	Automatically calculated	0.25	Automatically calculated	if ≤ 4 = 1, if > 4 = 0
period of tax debt repayment	K14		60 days	Automatically calculated	0.25	Automatically calculated	If less 60 days = 1; if from 61 to 1 year = 0,5; if from 1 year to 3 years = 0,2; if more than 3 years = 0
addresses of registration (registration at the addresses of taxpayers' mass registration)	K15		no	Automatically calculated	0.2	Automatically calculated	if yes = 0, if no = 1
number of employees in the company	K16		2 persons	Automatically calculated	0.1	Automatically calculated	If ≥ 2 = 1, if < 2 = 0
Total							

Note. The table only shows the actual values of the indicators (in column 1.) All other indicators are calculated automatically, taking into account the constraints indicated in column 6 and the weighting factors indicated in column 4. For further calculations of the risk index, the value of the amount by column 5 is used.

In general, the risk-category identification algorithm for each individual tax debtor is that the actual value is compared to the normative (or table measure) and its correspondence is determined. Quantitatively the correspondence can be evaluated in different ways:

1) 1 – if corresponds to a criterion, 0 – if not responding;

2) from 0 to 1 according to the degree of deviation from normative value.

Then, a weight coefficient is applied and the evaluation indicator is determined. With the use of Excel software as a result of applying the appropriate formulas, the risk category for each tax debtor is determined automatically according to its actual indicators (taxpayer's tax card, financial statements No1, No2) and specified with above-outlined probability intervals (table 3).

The system of equations to assess the debtor's risk is as following:

$$
\begin{cases}
R = 0,5\alpha + 0,3\beta + 0,2\gamma \\
\alpha = 0,1 \cdot K1 + 0,1 \cdot K2 + 0,1 \cdot K3 + 0,1 \cdot K4 + 0,1 \cdot K5 + 0,1 \cdot K6 + 0,1 \cdot K7 + 0,1 \cdot K8 + 0,2 \cdot K9 \\
\beta = 0,6 \cdot K10 + 0,4 \cdot K11 \\
\gamma = 0,2 \cdot K12 + 0,25 \cdot K13 + 0,25 \cdot K14 + 0,2 \cdot K15 + 0,1 \cdot K16
\end{cases}
$$

де, $K1 = 1$ *if* $\dfrac{Current\ asset}{Current\ liabilities} \geq 2$, *if not* $K1 = 0$

$K2 = 1$ *if* $\dfrac{Current\ asset - Inventory}{Current\ liabilities} \geq 0,6$, *if not* $K2 = 0$

$K3 = 1$ *if* $\dfrac{Cash}{Current\ liabilities} \geq 0,1$, *if not* $K3 = 0$

$K4 = 1$ *if* $\dfrac{Profit}{Sales} \geq 0,01$, *if not* $K4 = 0$

$K5 = 1$ *if* $\dfrac{Profit}{Average\ annual\ value\ of\ assets} \geq 0,01$, *if not* $K5 = 0$

$K6 = 1$ *if* $\dfrac{Equity}{Total\ assets} \geq 0,5$, *if not* $K6 = 0$

$K7 = 1$ *if* $\dfrac{Equity}{Current\ liabilities} \geq 1$, *if not* $K7 = 0$

$K8 = 1$ *if* $\dfrac{Current\ accounts\ payable}{Current\ Accounts\ receivable} \leq 1$, *if not* $K8 = 0$

$K9 = 1$ *if* $\dfrac{Balances\ on\ the\ accounts}{Tax\ debt} \geq 1$, *if not* $K9 = 0$

$K10 = 1$ *if* $\dfrac{Fixed\ assets}{Tax\ debt} \geq 1$, *if not* $K10 = 0$

K11 = 1 *if* $\dfrac{Equity}{Fixed\ assets} \geq 1$, *if not* K11 = 0

K12 = 0 *if* $\dfrac{Tax\ debt1}{Tax\ debt0} \geq 1$, *if not* K12 = 1

K13 = 1 *if* $H \leq 4$, *if not* K13 = 0

K14 = 1 *if less 60 days, if more than 61 and less than 365 days* = 0,5, *if more than 366 and less than 1095 days* = 0,2, *if not* K14 = 0

K15 = 0 *if yes, if not* K15 = 1

K16 = 1 *if* $Kpersons \geq 2$, *if not* K16 = 0

$$\begin{cases} if\ R \leq 0,19 \rightarrow E, \\ if\ R \geq 0,2\ \&\ \leq 0,29 \rightarrow D \\ if\ R \geq 0,3\ \&\ \leq 0,59 \rightarrow C \\ if\ R \geq 0,6\ \&\ \leq 0,79 \rightarrow B \\ if\ R \geq 0,8 \rightarrow A \end{cases}$$

Each risk category must also be divided into subsegments, according to the value of the tax debt and its duration.

The distribution under the tax debt amount is necessary for further prioritization in tax management process. Having the same probability of debt repayment, first of all it is necessary to pay attention to those debtors, the amount of debt of which is the largest. These actions will improve the administration of tax debt.

Given the results of the preliminary analysis of the database of debtors-legal entities we suggest the following subsegments:

- From UAH 1020 to 10 000 (about 21% of all tax debtors-legal entities)

- From UAH 10 001 to 100 000 (about 14% of all tax debtors-legal entities)

- More than UAH 100 001 (about 10% of all tax debtors-legal entities)

These subsegments are assigned with a conventional designation: 1, 2, 3, respectively.

By the duration of tax debt it is necessary to allocate the following subsegments:

- Up to 60 days – a term during which, according to the legislation, the taxpayer is entitled to repay the tax debt by himself (on his own will);

- From 61 days to 12 months – a term during which there is a relatively high probability of tax debt collection;

- 1 year (inclusive) – up to 3 years – a term which indicates an imperfect collection procedure according to the world practice of tax administration;

- More than 3 years – a term in which there is almost zero probability of tax debt repaying and it can be recognized as hopeless. These subsegments will be assigned a conditional designations a, b, c, d respectively. To visualize the segmentation of debtors, pattern-matrix of tax debtors' segmentation model was constructed (table 8). The first column displays the tax debtors risk categories with the subsegments under the amount of the tax debt. The horizontal line shows intervals of the tax debt duration with subsegments of the number of debtors and general volume of tax debt.

As it been seen from table 8, as a result of the debtors' segmentation on the groups based on three criteria –the amount of tax debt, its age and probability of repayment (based on the risk assessment of entities activity) one can distinguish 64 variants of debtors combinations, to which 5 variants of strategies can be applied.

1) Categories - *00a, 00b* – only informing through the call-center, and the category of 00c, 00d – monitoring of the taxpayer's actions;

2) Categories A1a, A2a, B1a, C1a – only informing through the call-center, as it is either bona fide taxpayers with high probability of tax debt repayment, or taxpayers with minor amount of debt, therefore, in the case of their informing, they most likely to repay (or will ask for installments) within 60 days from the moment of debt occurrence.

3) Categories A1b, A2b, A3b, A3a, B2a, B3a, B1b, B2b, B3b, C2a, C3a, D1a, D2a – monitoring of the debtor's behavior in combination with informing through a call-center. The amendments to the Ukrainian legislation according to which such debtors are obliged to develop and submit a tax manager a list of measures he plans to perform in order to repay the tax debt are required. The schedule of tax debt repayment, in the case of its approval by the tax authorities, must be met. If the repayment schedule is not respected and the legal entity accumulates new tax debts, the bank accounts of the debtor should be automatically blocked until the tax debt repayment.

4) Categories A1c, A2c, A3c, B1c, B2c, B3b, C1b, C2b, C3b, C1c, C2c, D1b, D2b, D3a, E1a – blocking of the debtor's bank accounts and conducting the outbound tax audit with the expiration date only after the tax debt repayment.

5) Categories B3c, C3c, E2a, E3a, E1b, E2b, E3b, D3b, D1c, D2c, D3c - selling assets and property of the tax debtor, debiting money from accounts, conducting the outbound tax audit with the expiration date only after the tax debt repayment

6) Categories A1*d*, A2*d*, A3*d*, B1*d*, B2*d*, B3*d*, C1*d*, C2*d*, C3*d*, D1*d*, D2*d*, D3*d*, E1*d,* E2*d,* E3*d*, E1*c,* E2*c,* E3*c* – write-off of the tax debt with the preservation for 10 years of negative tax history of the owner, founders, managers, etc. of the company. In the case of founding (cofounding) new company (legal entity) by the same owners within the next 5 years from the moment of the tax debt written off, the mechanism of tax debts return of the previous business entity should be applied to the new enterprise. Before writing off the tax debt, the right of fiscal authorities to collect tax debts from the personal property of the owners of the debtor company has to be provided. We consider

that the limited liability should not have the power if it comes to tax debts to the government.

<div align="right">Table 8</div>

<div align="center">Model layout of the tax debtors' segmentation</div>

Category of risk	Amount of Tax Debt		Debt duration							
			Up to 60 days		from 61 days to 12 months		from 1 year to 3 years		over 3 years	
			a		*b*		*c*		*d*	
			K	Σ	K	Σ	K	Σ	K	Σ
0	less 1020	0		*00a*		*00b*		*00c*		*00d*
A (more than 80%)	1020-10 thousand	1		A1*a*		A1*b*		A1c		A1*d*
	10001-100 thousand	2		A2*a*		A2*b*		A2*c*		A2*d*
	exceeds 100 thousand	3		A3*a*		A3*b*		A3*c*		A3*d*
B (60-79%)	1020-10 thousand	1		B1*a*		B1*b*		B1c		B1*d*
	10001-100 thousand	2		B2*a*		B2*b*		B2*c*		B2*d*
	exceeds 100 thousand	3		B3*a*		B3*b*		B3*c*		B3*d*
C (30-59%)	1020-10 thousand	1		C1*a*		C1*b*		C1c		C1*d*
	10001-100 thousand	2		C2*a*		C2*b*		C2*c*		C2*d*
	exceeds 100 thousand	3		C3*a*		C3*b*		C3*c*		C3*d*
D (20-29%)	1020-10 thousand	1		D1*a*		D1*b*		D1c		D1*d*
	10001-100 thousand	2		D2*a*		D2*b*		D2*c*		D2*d*
	exceeds 100 thousand	3		D3*a*		D3*b*		D3*c*		D3*d*
E (less than 20%)	1020-10 thousand	1		E1*a*		E1*b*		E1c		E1*d*
	10001-100 thousand	2		E2*a*		E2*b*		E2*c*		E2*d*
	exceeds 100 thousand	3		E3*a*		E3*b*		E3*c*		E3*d*

The suggested categories are relevant at the beginning of segmentation, because at this moment the fiscal authorities should work with all tax debtors. If the work with the tax debtors would be conducted using the appropriate strategy in the future the certain clusters of this segmentation will become irrelevant (remain unfilled). If the number of tax debtors and the amount of tax debt declines it will evidence that the management of tax debt is getting better.

Conclusion

We suggested the model of the tax debtor segmentation based on the debt nonpayment risk estimation. The segments mean the risk category; subsegments are divided according to the criteria of the tax debt amount and age. The marginal indicators according to which the tax debtors should be distributed under the subsegments have determined on the base of the integrate estimation of risk. The indicators, chosen for risk estimation, mirror the propensity to pay and capacity to pay. The set of indicators can be changed in practice. The best combination can be found in experimental way and can vary in different countries. The strategies of tax debt management are suggested for each subsegment of tax debtors. They reflect such a way of interrelations between fiscal authorities and tax debtors, in which tax debtors have the opportunity to pay independently without enforcement, and each subsequent stronger impact on the debtor depends on its reaction to the previous intervention.

The suggested model of the segmentation can be implemented if all financial statement is filed in electronic form and the necessary indicators for risk estimation can be defined in automatic regime.

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