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NEW PERFORMANCE FUNDING MODELS AS A WAY OF FUNDING MANAGEMENT IMPROVEMENT IN MINING ENTERPRISES*

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Abstract: Mining industry in Poland faces many financial problems. One of them is to determine the proper performance funding structure. The main objective of this article is to create new models of funding performance in mining enterprises and to propose the way of examining influence of separate models on effectiveness of finance management in mining enterprises. As the measure of effectiveness growth regarding finance management the Authors adopted the value growth of mining enterprise. In the following stages of research there were assumptions and procedure presented for building funding models of mining enterprises as well as the basic funding models were suggested and the method of examining models' influence on the value of a mining enterprise was described. In order to solve the research problem there were several general methods used: financial data analysis, comparison and generalization and also detailed methods such as: observation, documents analysis method, statistic methods.

Introduction

Performance funding in coal mining enterprises is a multi-thread and complex research problem. This stems from the fact that mining enterprises perform in different conditions than other companies in the market, they carry weight of experience connected with many state programs regarding their restructuring which started in 90s and last until these days. In the beginning of 90s there were 70 mines in Poland under state property. There was over-production of hard coal

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in the sector resulting from demand decrease in the domestic market.[1] Currently, 5 mining corporations exist in Poland gathering from few to over a dozen hard coal mines and lignite mines. Nevertheless, still most of the mines functioning in the frames of coal enterprises have to be regarded as companies facing financial crisis. The research results on mining enterprises' finances that the Authors have conducted basing on two enterprises out of five[2] show that these enterprises mostly fund themselves through outer capital. Their capital structures break most of funding rules. In the first researched enterprise (marked as P1), equity capital does not exceed 20% of total liabilities in the period of 2003–2009. The company performing is such conditions is faced to a very high financial risk as it is not consistent with the assumed safety debt norms. This financial pathology is additionally deteriorated by the fact that among outer capitals short-term liabilities dominate. In the conditions of market economy, in case of companies from other industries than mining, such financial structure is not seen. It disables proper company performance. Bad financial situation in mining industry is also proved by the financial analysis of the second researched enterprise (P2). In this case, equity capital share in funding structure oscillates about 40%. Similarly to the first researched company, in enterprise P2 a significant position is taken by short-term liabilities. When analyzing such untypical financial situation for market conditions, additionally, it should be noticed that the examined enterprises, because of their activity profile, are specific for high assets blockage of a big amount which are practically impossible to cash (buildings and objects of underground engineering, excavations, professional mining machines, etc.). Such assets should be financed by equity capital. However, in researched enterprises, there is negative net working capital to be seen proving that a great share of fixed assets is funded by outer capital and this situation is even more disturbing if, in the same way as in case of researched enterprises, it is short-term outer capital (Michalak, Turek 2009 pp. 99–113).

Such funding structure, as we deal with in researched mining companies, results in alarming level of most financial ratios. Liquidity ratios as especially worrying in the examined enterprises. In the whole analyzed period, current financial liquidity balances considerably below the bottom level of value norm. It mostly stems from the low share of current assets in total company assets and high share of current liabilities in funding sources. The problem of either examined enterprise is high level of short-term liabilities which faces them to the risk

[1] In 1991 coal extraction equaled 140 million tons and the demand in the domestic market was estimated on 90–100 million tons. More on that matter in: I. Jonek-Kowalska, M. Turek: *Zmiany w zarządzaniu kosztami w kopalniach węgla kamiennego,* Studia i Prace Wydziału Nauk Ekonomicznych i Zarządzania Uniwersytetu Szczecińskiego, No 5, 2008, pp. 419–437.

[2] More on that matter in: M. Turek (red.), *Modele finansowania działalności operacyjnej przedsiębiorstw górniczych*, Główny Instytut Górnictwa, Katowice 2011.

of financial liquidity loss and at the same time of disability to settle these liabilities (Jonek-Kowalska, Turek 2009 pp. 115–125).

The aforementioned facts emphasize the need to undertake analysis of rebuilding current funding structures in mining enterprises. Therefore, the objective of research conducted by the Authors is to create new models of mining enterprises funding and proposing the way of analyzing the influence of separate models on finance management effectiveness in mining enterprises. As the measure of finance management effectiveness growth the Authors adopted the value accrual of mining enterprises.

In the next stages of research the assumptions and procedure of building funding models in mining enterprises were presented, the example funding models were suggested as well as the method of analyzing the model influence on the value of mining enterprise.

In order to find a solution to the research problem, there were following general methods used: financial data analysis, comparison and generalization and detailed methods: observation, document analysis, statistical methods.

Model assumptions

The model is the representation of reality in a smaller size or simplification. The model allows to focus on the most important elements of researched phenomenon which work similarly to the original. The multiplicity of elements included in the process of performance funding in mining enterprises makes it impossible to represent the exact conditions in which the process occurs. For this reason, the model was used in order to concentrate on the most vital elements of the process, omitting details. Thus, the models created are descriptive models. There is a basic assumption made that financing in each model is grounded on **dominating capital**. The share of dominating capital is the highest in funding structure. The other kinds of capital do not possess such feature and are called **supplementary** (Michalak 2007, pp. 116). The dominating capital and supplementing capital(s) constitute funding structure in some way which was described in hereby study as funding model. Because there are many possible combinations of dominating and supplementary capital, there are many options of funding models too.

Regarding the conditions of performance for mining enterprises that were presented in the introduction, capital dominating in performance funding models of mining models is considered to be equity capital. It may come from many different sources e.g. inner sources such as: income, amortization, lease, etc. and outer sources such as shares issue. Supplementary capital, on the other hand, is assumed as outer capital coming from any source, e.g.:

– bank loan,
– capital from shares issue,

– supporting capital (e.g. from EU funds),
– short-term securities,
– leasing,
– short-term liabilities and others.

In each model, for the dominating capital example supplementary capitals are assigned. Then it is possible to construct many options of performance funding models in mining enterprise through choosing different levels of dominating capital with various combinations of supplementary capitals.[3]

As each financing source included in the funding model has its cost, for each suggested funding model it is possible to estimate WACC –weighted average cost of capital using following formula (Brigham, Gapenski 2000, pp. 238):

$$WACC = \sum_{i=1}^{n} w_i K_i$$

where:
w_i – the share of subsequent sources in investment funding structure,
K_i – the cost of capital deriving from subsequent sources,
n – the number of capital sources in investment funding structure.

In order to indicate weighted average cost of capital there should be known capital costs from several sources establishing funding structure.

Funding models building in mining enterprises

When building funding model in mining enterprises it is assumed that in capital structure equity capital shall be dominating which comes from various sources gathered altogether in order to calculate the level of equity capital and its share in funding structure. It was assumed that the level of equity capital shall not be lower than 50 % of total assets. As fixed assets constitute about 80% of assets in the analyzed mining enterprises it may be estimated that to fulfill basic funding rules (golden bank rule, etc.) these assets shall be covered by fixed capital which is equity capital and long-term liabilities. Such funding structure is the one desired in mining enterprises, however, it is not possible to achieve in each enterprise and that is why the other options shall be analyzed as well. The model which shall be created on the assumptions of at least 50% share of equity capital and at least 80% share of fixed capital in capital structure would be the type consistent with **conservative** or **moderate strategy of finance management.** Some

[3] More about the reasons for choosing dominating and supplementary capital the Authors describe in monography (*Modele finansowania...*, Katowice 2011).

mining enterprises which are of a better financial situation than the one in analyzed enterprises P1 and P2 may adopt a more **aggressive** funding strategy of their assets, that is using funding model resulting in a negative net working capital, i.e. lower than 80% share of fixed capital in capital structure. Nevertheless, the basic assumption regarding minimum 50% share of equity capital should be strictly fulfilled.

Having analyzed the contemporary funding structures in the researched mining enterprises (the chosen positions of funding structure in enterprise P1 are presented in table 1 and in enterprise P2 in table 2) it is possible to notice that in both cases, the share of equity capital in funding structure is low. However, in enterprise P2 it is closer to the assumed amount of 50% of liabilities but its share in funding structure indicates a decreasing tendency. In order to ensure proper functioning, this capital should be increased to the assumed level of 50%. It is also visible that income cannot bear the weight of self-funding and it is necessary to supplement equity capital from other sources. The average share of income in capital structure in the examined years equals 7%. It is an optimistic value, especially regarding a negative dynamics of this position of liabilities. Consequently, the significance of income in equity capital structure in the examined mining enterprises is very low.

Table 1. Funding structure of enterprise P1 (%)

		State on						
		2003	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
		year						
A.	**Equity capital, including:**	3,93	12,12	17,48	14,67	14,63	14,44	14,24
1.	Net income (loss)	*	4,16	2,34	*	0,11	0,26	0,25
B.	**Liabilities and provisions, including:**	96,07	87,88	82,52	85,33	85,37	85,56	85,76
I	Provisions	15,47	21,96	25,24	31,17	36,15	41,52	42,27
II	Long-term liabilities	22,30	18,12	15,69	14,53	10,31	10,43	9,27
III	Short-term liabilities	33,33	28,71	25,56	29,32	33,45	32,15	33,17
Total liabilities		100	100	100	100	100	100	100

*the negative amounts were not indicated as the percentage of balance sum

Source: own study based on financial reports of enterprise P1.

Table 2. Funding structure of enterprise P2 (%)

		State on						
		2003	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
		year						
A.	**Equity capital, including:**	53,10	39,95	40,44	36,19	34,38	32,66	29,10
1.	Net income (loss)	48,59	4,80	2,88	3,22	0,63	0,19	1,86
B.	**Liabilities and provisions, including:**	46,90	60,05	59,56	63,81	65,62	67,34	70,90
I	Provisions	9,82	27,33	31,55	35,01	33,04	26,47	25,59
II	Long-term liabilities	1,54	0,74	0,38	0,40	0,38	2,94	3,66
III	Short-term liabilities	34,88	31,47	26,98	27,87	31,72	37,55	41,26
Total liabilities		100	100	100	100	100	100	100

Source: own study based on financial reports of enterprise P2.

The current situation in coal market (limited possibilities of generating income) and the current state of public finances (low probability of capital increase by the current owner – National Treasury) shall force the state to undertake actions leading to performance effectiveness increase. One of possibilities is demutualization and additional shares issue. The remaining part of funding structure would be a proper combination of long- and short-term outer capitals. They may become so called supplementary capitals in separate funding models. However, among the long-term outer capital there are bank loan and shares issue and short-term outer capital consist of non-interest short-term liabilities (merchant loan, pay payable, tax liabilities etc.) and renewable loan. In connection with the assumption of dominant equity capital in funding models it is estimated that in funding models the level of outer capital should not exceed 50% of total capital. Additionally, there should be another differentiation made regarding outer capital structure, especially relation of long- and short-term liabilities which influences the level of fixed capital.

For the conditions presented it is possible to suggest the example performance funding models in mining enterprises consistent with conservative (figure 1), moderate (figure 2) and aggressive (figure 3) strategy of finance management.

Figure 1. Example funding models of mining enterprises consistent with conservative strategy of finance management

Conservative funding model – option 1 (data in %)					
fixed capital	EQUITY CAPITAL	Contemporary equity capital	25		80
		Additional shares issue	25		
	Long-term liabilities	Long-term loan	15	30	
		Bonds issue	15		
	Short-term liabilities	Non-interest liabilities	18	20	
		Loans and credits	2		
Conservative funding model – option 2 (data in %)					
fixed capital	EQUITY CAPITAL	Contemporary equity capital	25		80
		Additional shares issue	25		
	Long-term liabilities	Long-term loan	30		
	Short-term liabilities	Non-interest liabilities	18	20	
		Loans and credits	2		
Conservative funding model – option 3 (data in %)					
fixed capital	EQUITY CAPITAL	Contemporary equity capital	25		80
		Additional shares issue	25		
	Long-term liabilities	Bonds issue	30		
	Short-term liabilities	Non-interest liabilities	18	20	
		Loans and credits	2		

Source: own study.

Funding models consistent with **conservative** management strategy fulfill the golden bank rule. It means that fixed capital in a certain funding model covers fixed assets. Mining industry, as it was mentioned before, is specific for a high level assets blockage. In the structure of assets in mining enterprises fixed assets dominate which most of them are impossible to cash. The share of fixed assets in the structure of assets equals in the examined enterprises, similarly as in the whole industry, about 80%. To fulfill golden bank rule in such circumstances fixed capital, which consists of equity capital and long-term liabilities should constitute about 80% of all funding sources. As it was assumed that the share of equity capital should equal at least 50% so the share of long-term liabilities

in funding structure should amount about 30%. There is an optimistic prognosis adapted in the models assuming that fixed capital coming from income gained will achieve the share of 7% in total capital structure (the average value on the basis of historic data of two examined mining enterprises). However, the other equity capital gains the level of almost 18% of total assets. Contemporary equity capital constitutes 25% of total capital. To let the equity capital achieve the level of 50% of liabilities, additional equity capital should amount 25% of total capital. As it was aforementioned above, it is assumed that the mining enterprise shall get an additional capital due to shares issue. The other assumptions concern long-term outer capital, it should equal 30% of total capital in a conservative model. In the first option it was stated that 15% of total capital comes from long-term loan and 15% from shares issue. In the next options, it was assumed that total required long-term outer capital comes from the first or second source.

If the mining enterprises use an **aggressive** funding strategy then models built for them do not fulfill the golden bank rule. In such models a negative working capital occurs. Consequently, in such models' funding structure there will be still equity capital dominating (on the level of at least 50% of liabilities), however supplementing long-term liabilities shall gain a capital share lower than 30% in this structure. At the same time fixed capital shall not cover the assumed value in conservative models, 80% of assets constituting fixed assets. The example aggressive operational activity funding models in mining enterprises are shown in figure 2.

Figure 2. Example funding models of mining enterprises consistent with aggressive strategy of finance management

<table>
<tr><td colspan="6">Aggressive funding model – option 4 (data in %)</td></tr>
<tr><td rowspan="3">fixed capital</td><td rowspan="2">EQUITY CAPITAL</td><td>Contemporary equity capital</td><td colspan="2">25</td><td rowspan="3">60</td></tr>
<tr><td>Additional shares issue</td><td colspan="2">25</td></tr>
<tr><td rowspan="2">Long-term liabilities</td><td>Long-term loan</td><td>5</td><td rowspan="2">10</td></tr>
<tr><td></td><td>Bonds issue</td><td>5</td></tr>
<tr><td></td><td rowspan="2">Short-term liabilities</td><td>Non-interest liabilities</td><td>25</td><td colspan="2" rowspan="2">40</td></tr>
<tr><td></td><td>Loans and credits</td><td>15</td></tr>
<tr><td colspan="6">Aggressive funding model – option 5 (data in %)</td></tr>
<tr><td rowspan="3">fixed capital</td><td rowspan="2">EQUITY CAPITAL</td><td>Contemporary equity capital</td><td colspan="2">25</td><td rowspan="3">60</td></tr>
<tr><td>Additional shares issue</td><td colspan="2">25</td></tr>
<tr><td>Long-term liabilities</td><td>Long-term loan</td><td colspan="2">10</td></tr>
<tr><td></td><td rowspan="2">Short-term liabilities</td><td>Non-interest liabilities</td><td>25</td><td colspan="2" rowspan="2">40</td></tr>
<tr><td></td><td>Loans and credits</td><td>15</td></tr>
</table>

continued figure 2

Aggressive funding model – option 6 (data in %)					
fixed capital	EQUITY CAPITAL	Contemporary equity capital	25		60
		Additional shares issue	25		
	Long-term liabilities	Bonds issue	10		
	Short-term liabilities	Non-interest liabilities	25	40	
		Loans and credits	15		

Source: own study.

A **moderate** strategy shall result in the intermediate situation between two types of aforementioned models. The example options of models corresponding to this strategy are presented in figure 3.

Figure 3. Example funding models of mining enterprises consistent with moderate strategy of finance management

Moderate funding model – option 7 (data in %)					
fixed capital	EQUITY CAPITAL	Contemporary equity capital	25		70
		Additional shares issue	25		
	Long-term liabilities	Long-term loan	10	20	
		Bonds issue	10		
	Short-term liabilities	Non-interest liabilities	20	30	
		Loans and credits	10		
Moderate funding model – option 8 (data in %)					
fixed capital	EQUITY CAPITAL	Contemporary equity capital	25		70
		Additional shares issue	25		
	Long-term liabilities	Long-term loan	20		
	Short-term liabilities	Non-interest liabilities	20	30	
		Loans and credits	10		

continued figure 2

Moderate funding model – option 9 (data in %)				
fixed capital	EQUITY CAPITAL	Contemporary equity capital	25	70
		Additional shares issue	25	
	Long-term liabilities	Bonds issue	20	
	Short-term liabilities	Non-interest liabilities	20	30
		Loans and credits	10	

Source: own study.

The influence of funding models on mining enterprises value

The economic goal of any commercial enterprises activity in market economy is maximizing the benefits of its owners. Each decision taken in the process of enterprise management, including all decisions concerning the way of funding the activity should be aimed at increasing the enterprise value (Machała 2004, pp. 21). The value of enterprise is decided mainly by two factors, the effectiveness of managing the enterprise assets and the correct way of choosing sources of funding its activity.

For each enterprise there is a corresponding, optimal (the most beneficial) capital structure, specific for this enterprise. This structure cannot be determined once and for all, it is subjected to changes along with changes occurring inside the enterprise and its environment (Szczepański, Szyszko 2007, pp. 333). Therefore, while choosing the most beneficial option of funding the activity of a given enterprise it is considered to be worth checking how the particular (taken into consideration) funding options influence the enterprise value.

Below a method was presented enabling the choice of the most beneficial model of mining enterprise performance. Generally speaking, the method aims to:

- prepare few models of mining enterprise performance funding, differing from each other in the structure of sources of acquiring capital,
- verification of cash flows projections, taking into consideration the particular models (each model will generate different flows related to acquiring and paying back the capital and possible interests),
- determine for each funding model the weighted average cost of capital (WACC), which will be at the same time the coefficient discounting the cash flow in particular years,

– research to what degree the particular funding options influence the change in enterprise value,
– estimate the risk of achieving a specific level of enterprise value and the risk of enterprise bankruptcy,
– basing on the data gathered this way, making a choice of funding option that will provide a rational balance between the acceptable risk level and the acceptable enterprise value, estimated according to the current value of future cash flows.

One of the most credible and important methods of enterprise value measurement is the method based on estimating the future cash flows generated by the enterprises. The enterprise value – according to this method – is equal to the sum of current (discounted) value of future net cash flows and current (discounted) value of enterprise assets, estimated for the last year of the analysis conducted (Ostaszewski, Cicirko 2006, p. 310).

In a situation, when the discount rate in the whole analyzed period remains the same the value of the enterprise may be expressed by the following formula (Ostaszewski, Cicirko 2006, p. 310, Krysiak 2006, p. 53).

$$V = \sum_{t-1}^{n} \frac{FCF_t}{(1+WACC)^t} + \frac{RV_n}{(1+WACC)^n}$$

where:
V – enterprises value,
FCF_t – cash flows in time
$WACC$ – weighted average cost of capital used to finance the enterprise's activity
t =1, 2, … n – number of years for which the cash flows are being calculated (the number of years taken into consideration in the forecast)
RV_n – residual value of the enterprises at the end of n period

In case when the discount rate in analyzed period varies, the formula for the enterprise value is presented by the following formula (Ostaszewski, Cicirko 2006, pp. 315):

$$V = \sum_{t=1}^{n} \frac{FCF_t}{\prod_{k=1}^{t}(1+WACC_k)} + \frac{RV_n}{\prod_{t=1}^{n}(1+WACC_t)}$$

where: $WACC_t$ – weighted average cost of capital used to finance the enterprise's activity in t period, other symbol are as above.

Residual value RV_n may be determined by estimating the current value of net cash flows generated by the enterprises after the period covered by the forecast (after the end of period n) up to infinity. Using the Gordon model, this value may be expressed by the following formula (Ostaszewski, Cicirko 2006, p. 287):

$$RV_n = \frac{FCF_{n+1}}{WACC - g}$$

where: FCF_{n+1} – net cash flows in n+1 period, i.e. in the first year after the end of the period covered by the forecast,

g – expressed in per cent the rate of net cash flows rise, after the end of period n, i.e. after the end of the period covered by the forecast (it means that $FCF_{n+1} = FCF_n(1+g)$), other symbols are as above.

In practice, the usage of the formulas presented in order to evaluate the enterprise value is not easy. One of the most difficult and laborious aspects connected to determining the enterprise value is the estimation of net cash flows generated by the enterprise in given years. Another important issue related to the practical usage of the formulas for enterprise value is the determining the number of years, for which the net cash flows should be estimated. Taking into consideration the fact, that even very high flows that will be generated by the enterprise several decades into the future give a small or very small current value. The issue of determining the number of years taken into consideration may be solved by accepting the rule according to which in the evaluation of enterprise value, one should consider subsequent cash flows for as long, until the discounted flow in a given year will change the final value of the enterprise by more than e.g. 5 or 10 per cent or by another arbitrarily accepted border value (Machała 2004, p. 453).

In a simplified way, the choice of the most beneficial enterprise activity funding option may be conducted by performing, with the formulas for the V value presented above, examination on the sensitivity of the enterprise value to the change of weighted average cost of capital characterizing the particular enterprise activity funding models that are considered. The sensitivity analysis provides the answer to the question: by what amount the enterprise value will increase or decrease as a result of using one or another option of funding its activity (Pawełczyk, Sojda 2011, pp. 350–370).

As summary, it should be stated that the suggested method requires evaluating the net cash flows, generated by the mining enterprise in the period of many years into the future. In practice, for some of the enterprises it may represent some problem because of the essential difficulties concerning the way of estimating the flows and the unstable financial conditions of the activity conducted. The mining enterprises currently examined do not create long-term financial plans in a way enabling the conducting of correct forecast. It seems that when facing demutualization even those companies will accept maximizing the enterprise value as the basic, long-term goals of their activity, becoming at the same time interested in new solution in the area of improving the effectiveness of managing mining enterprises finances.

Conclusion

The specifics of managing mining enterprises differs from managing a typical processing enterprise. The mining enterprises performance is above everything capital-intensive and subjected to a greater risk than the activity of other economic subjects. Furthermore, as the industry strategic for the economy and playing an important role in ensuring the energy safety of the country, it is directly exposed to regulative actions from the state. The current situation of mining enterprises is not typical for market conditions. To a large degree it was influenced by the previously existing social and political system which enabled acquiring the capital in mining enterprises by falling into debt in relation to the state budget and para-budgets. In such conditions, one should approach in a specific way the issue of managing mining enterprise finances and particularly the problem of funding mining activity.

The problem of funding mining enterprises is a burning issue for mining industry in Poland. The existing mining enterprises funding structures have no reason for existence in the conditions of free market in mining industry. They break most funding rules and result in alarming levels of many financial indicators. In such conditions attempts to create new mining enterprises funding models are justified. In the article example methods were presented that may be used in mining enterprises using a conservative, balanced and aggressive strategy of managing finances. Also a method of choosing the most beneficial model was presented, with taking into consideration the influence of particular options on the value of a given mining enterprise. This method assumes examining the influence of the funding models created for given enterprises on its cash flows. Basing on values of cash flows discounted by the rate correspondent to the weighted average cost of capital of a given model the value of mining enterprise is calculated. The mining enterprise should implement this model of funding that generates the largest value of mining enterprise on the acceptable risk level. The presented method will not immediately find its place in all of the mining enterprises because of the necessity of having long-term financial plans in the enterprise, particularly concerning the forecasts of cash flows. It seems however, that in the face of close demutualization all mining enterprises represent long-term financial plans and as the basic, long-term goals of their activity they accept the maximizing of enterprise value. They will become in that case interested in new solutions in the area of improving effectiveness of managing mining enterprise finances, and in particular the method of building the optimal structure of performance funding.

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