THE MODELING OF FINANCIAL ACTIVITIES OF PHARMACEUTICAL COMPANIES

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Introduction. For effective management of the company is necessary to develop strategy of its development. For this can be used mechanism of financial planning. The basis of the modern approach to financial planning is the modelling of possible scenarios of business development. Currently developed models for financial planning use different mathematical apparatus: the solution of systems of algebraic equations, methods of mathematical programming, regression analysis, and econometric approach. These models differ in the level of complexity, feasibility simulations, forecasting and optimization. Depending on the choice of model of financial planning the result can be a forecast of the overall financial balance of the company or its components.

Aim. The use of methods of mathematical simulation for forecasting of the development of company in the medium term.

Materials and methods. This paper considers the modification of the mathematical model of Warren-Shelton for financial planning, which designed for simulation of results of financial activity of the company depending on changes in sales volume, of profits, the ratio of equity capital, loans and financial needs. The model consists from twenty of algebraic equations that describe the investment, financial, industrial and dividend the company's activities. The equations of the model are divided into subgroups, corresponding to data on sales, investments, financing and profitability.

Subgroup 1. The equations describing the volume of sales and income excluding interest and taxes.

$$sl_t = sl_{t-1}(1 + gsl_t); \qquad eb_t = reb_t \cdot sl_t,$$

where sl - sales, gsl – sales growth, eb – income before interest and taxes, reb – operating income as a percentage of sales, the index t is the estimated time period.

Subgroup 2. The equations describing the total demand for assets.

$$ca_t = rca_t \cdot sl_t; \qquad fa_t = rfa_t \cdot sl_t; \quad a_t = ca_t + fa_t,$$

where ca – current assets, rca – fixed assets. a - total assets, rca and rfa – current and fixed assets as a percentage of sales, respectively.

Subgroup 3. The equations describing the funding requirements.

$$cl_t = rcl_t \cdot sl_t; \quad nf_t = (a_t - cl_t) - (l_{t-1} - l_r) - s_{t-1} - r_{t-1} - b_t(1 - T_t)(eb_t - i_{t-1}(l_{t-1} - lr_t));$$

$$nf_t + b_t\left(1-T_t\right)\left(i_t^0 + U_t^i\right)\cdot nl_t = nl_t + ns_t; \quad l_t = l_{t-1} - lr_t + nl_t; \quad s_t = s_{t-1} + ns_t;$$

$$r_t = r_{t-1} + b_t\left(1-T_t\right)\left(eb_t - i_t\cdot l_t - U_t^i\cdot nl_t\right); \quad i_t = i_{t-1}\left(\frac{l_{t-1}-lr_t}{l_t}\right) + i_t^0\cdot\frac{nl_t}{l_t}; \quad k_t = \frac{l_t}{s_t + r_t},$$

where cl – accounts payable, nf - necessity of funds, nl – receipts from debtors, ns – proceeds from new shares, l - total debt, s - cost of shares, r - retained profit, i – the interest rate on the debt, rcl – payments as a percentage of sales, lr – expenses for repayment of debt, b - the coefficient of reinvestment, T – average tax rate, i_t^0 – expected interest rate on new debt, U_t^i – cost of placing the debt, k - ratio of debt to owner funds.

Subgroup 4. The calculation of the specific (per share) indicators.

$$eaf_t = \left(1-T_t\right)\left(eb_t - i_t\cdot l_t - U_t^i\cdot nl_t\right); cmd_t = \left(1-b_t\right)\cdot eaf_t; num_t = num_{t-1} + \frac{ns_t}{1-U_t^s\cdot P_t}; P_t = m_t\cdot\frac{eaf_t}{num_t};$$

$$dps_t = \frac{cmd_t}{num_t},$$

where eaf – profits from which to pay dividends, cmd – dividend amount, num – number of shares outstanding, P - share prices, eps – profit per share, dps – dividend per share, U_t^s – expenses on placing of shares, m - ratio of shares price to the profit.

Results and discussions. The model used for the forecast of the overall financial balance, and determining the ratio of income and expenses of the pharmaceutical company. In the calculation of the overall balance includes the forecast of changes of current and fixed assets, amounts, dividends and profits from shares, debt and profit of the company. In determining trends in the changes of revenues and costs of the company were calculated the volume of sales, all types of income and expenditure. The forecast of revenues and expenditures of the company was calculated on period of 5 years, as the base years adopted 2015 year. The calculations are performed using the software MathCad and MS Excel. Sample results of calculations are presented in figures 1-2.

Figure 1
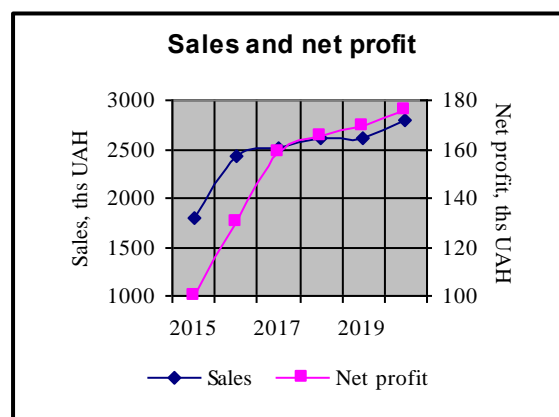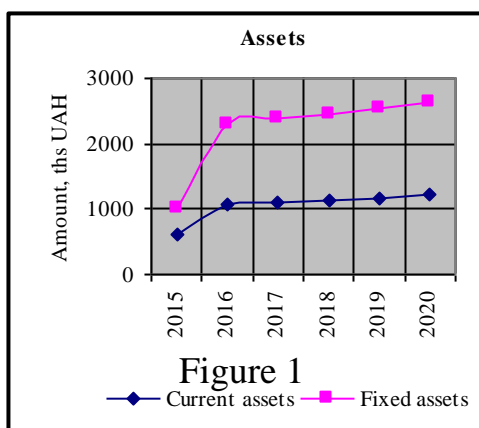
Conclusions. The use of this model will allow managers to analyse various scenarios of enterprise development, and to make informed decisions when designing its financial policy.