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DEVELOPMENT PERSPECTIVE AND OPTIMIZATION OF THE USE OF FINANCIAL INSTRUMENTS IN THE FUND MARKETS OF THE REPUBLIC OF AZERBAIJAN

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Abstract

The paper assesses the impact of financial instruments in Azerbaijan on the stock market and joint stock companies and determines the effect of the stock market capitalization level on budget revenues and expenditures and the optimal threshold. A significant part of financial resources for investment purposes arises in the securities market, especially in the corporate securities sector. The main factor in improving the efficiency of the securities market should be increasing the volume of trading operations and creation of favorable conditions for this, increasing the variety and use of capital instruments, the issuance of new financial instruments. Based on the correlation between budget expenditures and budget revenues and the level of capitalization of the stock market with the application of economic-mathematical methods, the optimal level of capitalization of the stock market was determined. Based on the elasticity coefficient, it was determined that budget revenues and budget expenditures will change by 0.17% due to a 1% change in the capitalization level of the stock market in Azerbaijan. As a result of economic-mathematical methods, it was determined that a 1% increase in the capitalization level of the stock market in Azerbaijan results in a 0.17% increase in GDP.

Keywords: Financial markets, stock markets, financial instruments, stock market efficiency.
JEL Codes: D53, E44, G15.

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1. Introduction

The financial markets in parallel with the banking system plays a significant role as a conductor of cash flows in the economy to revive the real sector, so development and improvement of all segments of the financial market is of important matter. In particular, the problem of redistribution of incomes concentrated in the oil sector of Azerbaijan to other sectors of the economy is a reason for special attention to the financial sector of the country. The successful formation of the financial market is possible if the market infrastructure is created through the implementation of economic and legal reforms. One of the most important segments of an organized market infrastructure is the securities market. The securities market, along with the state budget and the banking system, is the most important element of financing the economy. This market ensures the redistribution of financial resources between various sectors and spheres of the economy in favor of promising and profitable dynamically developing industries by stimulating the mobilization of capital.

In many countries, including Azerbaijan, one of the tasks facing the economy and requiring its immediate resolution is the problem of mutual debts, including mutual non-payments of enterprises. The point is that the existence of the problem of non-payments simultaneously creates new problems. Businesses are unable to pay taxes because customers do not pay debts for products purchased. The state, in turn, cannot fulfill the budget plan due to a lack of tax revenues, as a result of which state aid to some sectors of the economy is delayed or not at all implemented. All this taken together affects the economic life of the country, and the state loses its power, be it in the economic, political or any other sphere. Currently, both at the government level and across the enterprise, the necessary measures are being taken to solve these problems. The improvement and development of this securities market in Azerbaijan will not only contribute to the solution of these problems, which have a tangible impact on the development of the economy but will also give impetus to the business activity of economic entities.

2. Literature review

Extensive researches were done on the development issues of financial infrastructure. The International Finance Corporation (IFC) views the financial infrastructure as the backbone of the financial system and defines it as the set of institutions that ensure the efficient operation of financial intermediaries (https://www.ifc.org/). In a broader sense, financial infrastructure encompasses the existing regulatory framework for financial sector operations. The infrastructure of the securities market consists of a trading system, an accounting system, a securities storage system, a clearing system, a payment system, a regulatory system and an information disclosure system. The financial infrastructure is an important part of the entire financial system. The need for intermediary services is associated with minimizing the investor's risks.

The nature of the financial infrastructure is most accurately described by the theory of evolutionary economics, since it allows one to consider negative processes in the economy. This concept views the infrastructure of the stock market as a living organism in which the work of each organ is vital. Deficiencies in the system of one organ entail negative consequences for the whole organism. Therefore, in the economy it is important

to achieve a clear interaction of all elements. J.S. Mill, K. Marx and J. Schumpeter are the predecessors of evolutionary economics who used the methodology of the evolutionary approach in research. Currently among scientists working in the framework of the evolutionary approach, one can note R. Nelson, S. Winter, A. Alchian, K. Friedman, J. Dosey, K. Perez.

Neoclassical theory, along with evolutionary economics, is a theory of technological change. Its representatives R. Solow and M. Brown associate technological changes with the parameters of production functions. According to this concept, the development of the economic system depending on the size and integrity is determined by its technological structure. The efficiency of the system is possible with relatively small differences in the technological level of related industries. The introduction and replacement of outdated information technologies with innovative ones will ensure the effective functioning of this system along the entire technological chain: from information support to cash settlements and registration of property rights when changing the owner of securities. (Brown, 1966); (Solow, 1957)

When analyzing the interaction of elements of the financial market infrastructure, it is advisable to use a marketing approach. It will allow to apply methods that detect the influence of various factors on the formation and functioning of the stock market, which are real or potential market niches / market segments. Therefore, the definition of segments of issuers and investors, sellers and buyers of securities, taking into account their needs and preferences for differentiated groups based on differences in age, gender, education, nationality, income level, and makes it possible to identify new economic prospects, to ensure the flow of additional investment resources, as well as modernization and growth of the country's economy. The infrastructure of the stock market is a large-scale complex socio-economic system, consisting of many interacting elements, therefore, the issues of the regulatory behavior of participants in this market remain relevant. The concept of "large systems", which also implies the infrastructure under consideration, obliges to take into account the property of synergy of large systems, according to which the unidirectionality of actions of the components of subsystems increases the efficiency of its work as a whole.

3. Data and Methodology

Stock market analysis includes various methods and techniques for studying its indicators, factors, indicators, etc. To conduct an effective analysis of the stock market stock indices are used, which are indicators calculated for a representative set of securities traded on the market (stocks, bonds) in order to assess the level and general direction of movement of their value. In general, these are indicators of changes in prices of a certain group of securities.

An important parameter that characterizes any stock market, is its efficiency, which shows how well the stock market copes with the task of a fair assessment of the issuing company. In general, developed markets are significantly more efficient than emerging markets, which makes them more stable and attracts many investors. (Ross & Westerfield, 2002)

In 1953, Maurice Kendall studied the behavior of stock prices, and to his great amazement, he could not find any predictability in their behavior. The prices seemed to behave in a

random fashion. Prices could either rise on a day or decline, regardless of previous values. Trading data did not provide an opportunity to predict prices. Initially, Kendal's results baffled some economists. In their opinion, the stock market was influenced by market psychology. In other words, it seemed that he was permeated with "animal instincts", that is, did not follow any logical rules. In short, the results showed that the market was irrational. However, later economists came to the opposite interpretation of the above results, it became clear that the randomness of the movement of market prices is an indicator of a well-functioning or efficient market. (Kane &Marcus, 1999)

There are many definitions of an efficient market, but the most accurate definition corresponding to the efficient market hypothesis can be given by imagining a situation in which all investors, first, have free access to current information that allows them to make predictions for the future. Secondly, all investors are good analysts and, thirdly, they all closely monitor market rates and react accordingly to their changes.

Based on these parameters, the following most capacious definition of the stock market efficiency can be offered: An efficient market is a market in which the value of securities instantly reacts to new information. In this case, the price of the security will be a good estimate of its investment value. Investment value is the present value of a security, considering the prospective estimate of the level of its demand price and future returns, calculated by well-informed and capable analysts, which can be considered fair value. (Sharpe et.al, 1998)

In this case, an effective market can be called a market in which the price of each security is always equal to its investment value. Since in such a market each security is sold at its fair price, it is impossible to find securities with the wrong prices. For making it possible to test this hypothesis, it is necessary to deeply consider the question of the awareness of agents of the effective market. As described above, in an efficient marketplace, the information array is complete and new information is instantly reflected in market rates. In terms of information efficiency, the definition of an effective market will sound as follows - the market is efficient in relation to certain information if, using this information, it is impossible to make a decision to buy or sell securities, which allows obtaining super profits.

A national model of regulating the financial activities of enterprises is currently being formed in Azerbaijan. This model combines four main aspects:

- regulation based on financial methods;

- use of financial methods;

- Orientation to compliance with the legislation;

- use of stock market instruments.

One of the main indicators determining the scale of stock markets is the level of capitalization. It should be noted that the level of capitalization of the country's stock market is also an important factor in assessing the institutional security of the economy. There is a high correlation between the level of economic development of countries and the level of capitalization of their stock markets. The level of development of national companies affects the growth of stock markets, increasing the level of market capitalization. The development of stock markets increases the share of the level of

capitalization of national companies in GDP. The increase in the share of national companies in the level of capitalization has a significant impact on the share of their stocks sold in GDP. It should be noted that the level of capitalization of stock markets is related to the level of capitalization of financial instruments.

The level of capitalization of financial instruments is formed and developed due to investments in fixed assets, deposits of the population, foreign investments. Table 1 reflect the above-mentioned indicators through 2011-2017.

Table 1: Data for analyses

Indicators	2011	2012	2013	2014	2015	2016	2017
Capitalization level of financial instrument	2,11	8,43	8,43	8,47	13,10	8,44	5,7
Foreign investment	0	8,67	10,31	10,54	11,7	10,72	10,2
Fixed capital investment	9,91	12,8	15,41	17,86	17,62	15,95	14,9
Deposits of the population	3,03	4,12	5,11	6,4	7,19	9,47	7,45

Source: The figures in the table were calculated and compiled by the author according to the data of State Statistics Committee of the Republic of Azerbaijan.

In order to determine the opportunities for independent development of stock markets in Azerbaijan, the above-mentioned data is used, which reflects the level of capitalization of financial instruments and investment in fixed assets in 2011-2017.

Capitalization level of financial instrument and fixed capital investment will be selected as indicators for the model to determine the opportunities for independent development of stock markets in Azerbaijan. When studying the dependence of changes in investments in fixed assets (ΔI) on the changes in the level of capitalization of financial instruments (ΔY), the time condition is considered. Thus, in order to develop economic sectors, as a rule, investments is transferred from the increase in capitalization level of financial instrument account of current year to the fixed capital investment account for the following year. As a result, ΔI_t increases of fixed capital investment in the current t year are formed due to ΔY_t-1 increases in the capitalization of financial instruments in the previous (t – 1) year. Considering this rule Table 2 is formulated to assess the ability of stock markets to develop independently in Azerbaijan between 2012-2017.

Table 2: 2012-2017 data on variables

Years	ΔI_t	ΔY_{t-1}	Calculation indicators		
n=6	Y	X	x^2	Xy	$\Delta\dot{I}_t^* = 5{,}06 + 0{,}118\ \Delta Y_{t-1}$
1	2	3	4	5	6
2013	2,61	2,89	8,3521	7,5429	-22
2014	2,45	2,61	6,8121	6,3945	14,721
2015	-0,24	2,45	6,0025	-0,588	35,289
2016	-1,67	-0,24	0,0576	0,4008	8,986
2017	-1,05	-1,67	2,7889	1,7535	6,815
Σ	2,1	6,04	24,0132	15,5037	2,0998908

Source: The figures in the table were calculated and compiled by the author according to data in Table 1

4. Results and Discussion

As shown in the table above, the dependence of investment-oriented changes in fixed capital in year t on the changes in the level of capitalization of financial instruments in year (t – 1)

$$\Delta\dot{I}_t = (a_0 + a_1\Delta Y_{(t-1)})$$

sought in the form of a linear equation. In this dependence: ΔI_t - investment increases directed to an increase fixed capital in year t; $\Delta Y_{(t-1)}$ - increases in the capitalization of financial instruments in the year (t-1); a_1 is the acceleration indicator. The acceleration indicator a_1 represents the amount of investment directed to the growth of fixed capital due to the increase in the capitalization of financial instruments in the previous period (t-1).

Coefficients a_0 and a_1 in the linear equation found by solving the following system of equations: (Noskov, 2002)

$$a_0 n + a_1\sum(\Delta Y) = \sum(\Delta\dot{I})$$

$$a_0 \sum(\Delta\dot{I}) + a_1\sum (\Delta Y)^2 = \sum (\Delta\dot{I}\Delta Y)$$

The coefficients a_0 and a_1, which are included in the system of linear equations, are determined by solving the Kramer method using the Mathcad program. For this purpose, the main determinant Δ of the system of equations and additional determinants Δ_0, Δ_1 related to the coefficients a_0, a_1 are calculated. The coefficients are calculated by dividing the additional determinants into the main determinant:

$$a_0 = \Delta_0/\Delta;\ a_1 = \Delta_1/\Delta$$

The accuracy of the found values of the coefficients a_0 and a_1 in the linear equation is checked by means of equations 1 or 2 of the system of equations.

The assessment is done in the following sequence.

1. Based on the information in Table 2, the following system of equations has been developed:

$$5{,}000\ a_0 + 6{,}04a_1 = 2{,}1$$

$$6{,}04a_0 + 24{,}0132a_1 = 15{,}5037$$

2. The system of equations was solved by the Kramer method and the coefficients a0 and a1 were found:

$$\Delta = \begin{vmatrix} 5 & 6{,}04 \\ 6{,}04 & 24{,}0132 \end{vmatrix} = 83{,}5844$$

$$\Delta_0 = \begin{vmatrix} 2{,}1 & 6{,}04 \\ 15{,}5037 & 24{,}0132 \end{vmatrix} = -43{,}2146$$

$$\Delta_1 = \begin{vmatrix} 5 & 2{,}1 \\ 6{,}04 & 15{,}5037 \end{vmatrix} = 64{,}8345$$

$$a_0 = \Delta_0/\Delta = -0{,}51702;\ a_1 = \Delta_1/\Delta = 0{,}775677.$$

The acceleration indicator is in the range $(0 < \acute{\alpha} \leq 1]$.

3. The values of the obtained coefficients a_0 and a_1 are first checked according to:

$5{,}000\ a_0 + 6{,}04a_1 = 2{,}1$

$5 * (-0{,}51702) + 6{,}04 * 0{,}775677 = 2{,}1.$

Conclusion: The equation of growth of investments in fixed assets in the Republic of Azerbaijan in 2012-2017 due to the increase in the level of capitalization of financial instruments is expressed by:

$$\Delta\dot{I}_t^* = -0{,}51702 + 0{,}775677\Delta Y_{t-1}$$

Based on the index $a_1 = 0.776$ in the obtained equation, we consider that the stock markets in the Republic of Azerbaijan had the ability to develop independently during the period under study.

Based on the acceleration indicator obtained as a result of the report, it is possible to determine the amount of investments in fixed assets required for the projected increase in the capitalization level of financial instruments for any prospective period.

The density of correlation between economic-capital investment goals and the level of capitalization of the stock market is higher. In order to determine this relationship, the relationship between fixed capital investments affecting the level of capitalization of the stock market of the Republic of Azerbaijan for 2011-2017, foreign investments attracted to the country, deposits attracted by banks from the population, state budget revenues and state budget expenditures should be found.

Table 3: 2011-2017 data on variable in million manats

Years	Fıxed capital investment, (X1)	Foreign investment (X2)	Deposits from population, (X3)	State budget revenues (X4)	State budget expenditures (X5)	Capitalization of stock market (Y)
2011	9906	4851	3030	11403	11766	2110
2012	12799	5102	4120	15701	15398	8433
2013	15407	6067	5113	17282	17417	8433
2014	17851	6200	6396	19496	19144	8476
2015	17619	6928	7188	18401	18709	13103
2016	15957	18329	9474	17498	17785	8456
2017	14903	17271	7449	17499	17744	5696

Source: The figures in the table were calculated and compiled by the author according to the data of State Statistics Committee of the Republic of Azerbaijan.

Using the Eviews software package, the following results in Table 4 are obtained.

Table 4: Results

Dependent Variable: Y

Method: Least Squares

Date: 26/08/20 Time: 11:59

Sample: 2011 2017

Included observations: 7

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X5	9.736863	1.357199	7.174235	0.0882
X4	-3.631258	0.864168	-4.202027	0.1487
X3	5.868573	0.600922	9.765954	0.0650
X2	-2.025740	0.188678	-10.73649	0.0591
X1	-6.683437	0.806593	-8.286006	0.0765
C	-12830.48	2140.164	-5.995091	0.1052

R-squared	0.997055	Mean dependent var	7815.286
Adjusted R-squared	0.982332	S.D. dependent var	3331.961
S.E. of regression	42.8870	Akaike info criterion	14.79288
Sum squared resid	96148.9	Schwarz criterion	14.74652
Log likelihood	-45.77509	Hannan-Quinn criter.	14.21985
F-statistic	67.71961	Durbin-Watson stat	2.626953
Prob(F-statistic)	0.091987		

Source. The E-views application was developed by the author based on the software package.

Similarly, using the MS Excel application software package, we obtain the following result based on the data in Table 3.

Table 5: Summary results

Regression statistics	
Multiple R	0,998527
R-square	0,997055
Adjusted R square	0,982332
Standard error	42,887
Observation	7

Dispersion analysis

	Df	*SS*	*MS*	*F*	*Significance F*
Regression	5	66415631	13283126	67,71961	0,091987
Residual	1	196148,9	196148,9		
Total	6	66611779			

	Coefficients	*Standard error*	*t-Stat*	*P-Value*	*Lower 95%*	*Upper 95%*
Y-intercept	-12830,5	2140,164	-5,99509	0,105221	-40023,8	14362,88
X1	-6,68344	0,806593	-8,28601	0,076461	-16,9322	3,565302
X2	-2,02574	0,188678	-10,7365	0,059124	-4,42312	0,371641
X3	5,868573	0,600922	9,765954	0,064961	-1,76686	13,50401
X4	-3,63126	0,864168	-4,20203	0,148736	-14,6116	7,349039
X5	9,736863	1,357199	7,174235	0,088169	-7,50798	26,98171

Source. MS Excel application is developed by the author based on the software package.

Based on the results obtained from the Eviews and MS Excel software packages, the regression equation will be as follows:

Y=-12830,5-6,68344*X1-2,02574*X2+5,868573X3-3,63126*X4+9,736863*X5

The next step is constructing a newly corrected regression equation by analyzing the correlation dependence between the free variables in the above model and the dependent variable, removing the factors with weak correlation dependence from the object of study. For this purpose, if we build a correlation matrix in the MS Excel application software package, we get the following table:

Table 6: Correlation Matrix

	Y	*X1*	*X2*	*X3*	*X4*	*X5*
Y	1	0,796874	-0,04166	0,477998	0,754883	0,758765
X1	0,796874	1	0,236778	0,718741	0,967107	0,97626
X2	-0,04166	0,236778	1	0,81227	0,288508	0,344747
X3	0,477998	0,718741	0,81227	1	0,698647	0,748785
X4	0,754883	0,967107	0,288508	0,698647	1	0,993861
X5	0,758765	0,97626	0,344747	0,748785	0,993861	1

Source. MS Excel application is developed by the author based on the software package.

There is a high direct relationship between the variables Y and X1 according to the Chedok scale. There is almost no connection between the variables Y and X2, a medium direct relationship between the variables Y and X3, and a high direct relationship between the variables Y and X4, Y and X5. The regression equation will be as follows:

Y=-12830,5-6,68344 *X1+5,868573 X3-3,63126*X4+9,736863* X5

According to this established contact equation,

$$y = \alpha_0 + \alpha_1 x_1 + \alpha_2 x_2 + \alpha_3 x_3 + \alpha_4 x_4 + \alpha_5 x_5 = \mathbf{-12830,5 - 6,68344}\, x_1 + \mathbf{5,868573}\, x_3 - \mathbf{3,63126} x_4 + \mathbf{9,736863}\, x_5$$

Here $(\alpha_3 > 0)$, $(\alpha_5 > 0)$. This means that the level of capitalization of the stock market is increasing due to the increase in deposits and budget expenditures attracted by banks from the population. Conversely, since $(\alpha_1 < 0)$, $(\alpha_4 < 0)$, the level of capitalization of the stock market decreases due to increased investments in fixed assets and x_3 budget revenues. From the relationship equation, it can be concluded that a single increase in factor X1, which represents the volume of investments in fixed assets, leads to a decrease in the capitalization of the stock market in Azerbaijan by 6.68344 units, a single increase in deposits from banks (X3) by 5.868573 unit increase, one unit increase of state budget revenues (X4) leads to a decrease of 3.63126 units of stock market capitalization, one unit increase of state budget expenditures (X5) leads to 9.736863 units increase of stock market capitalization level.

Multiply R = 0.998527 indicates that the relationship between the variables X and Y on the Cheddock scale is very high. The fact that the coefficient of determination is R^2 = 0.997055 means that the corresponding regression equation is explained by 99.7% of the variance result, and 0.3% by the influence of other factors. The high coefficient of determination indicates that the regression equation is better able to express the initial data and that most part of the result factor (99.7%) is explained by the factors included in the model.

If we calculate the value of $y_{account}$ in Excel for 2011-2017, we get the following table.

Table 7: Data for equation building

Years	Y	Y account	$\left\|\frac{y - y_{account}}{y}\right\|$
2011	2110	12351,79183	4,85392978
2012	8433	19170,47541	1,27326876
2013	8433	21485,26122	1,54776014
2014	8476	21456,26578	1,53141408
2015	13103	27395,42797	1,09077524
2016	8456	46201,0295	4,46369791
2017	5696	40958,67229	6,19077814
Total		189018,924	20,951624

Source. The Eviews application was developed by the author based on the software package.

The average error of approximation can be determined according to the following formula:

$\mathbf{A=\frac{1}{n}\sum\left|\frac{(y-\widehat{y})}{y}\right| * 100\% = 20,951624/7*100\% = 299,3\%}$

A= 299,3%

The mean error of approximation is assumed to be practically no more than 12-15% [124].

With the help of the F-Fisher criterion, the statistical significance of the set of regression equations can be checked. For this purpose, the F-Fisher criterion can be calculated as follows [136].

$$\text{F-Fishe criterion} = \frac{RSS/m}{ESS/(n-m-1)} = (66415631/5)/(196148,9/(7-5-1)) = 67,7196059$$

The result of the report is the same as the result obtained from the initial data in EXCEL.

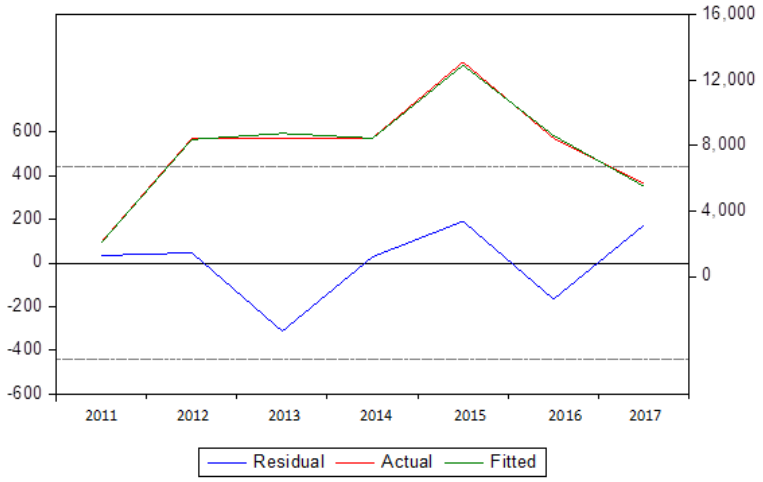
If we set the value of table F in EXCEL using the formula F_{table} (a; m; n-m-1) = F,

$$F_{table}\ (a; m; n-m-1) = F\ (0,05; 5; 7-5-1) = 3,79$$

When the F-Fisher criterion is compared with the value of F_{table} (a; m; n − m − 1) =, it appears that the F-Fisher criterion > F_{table} (67,7196059 >3,79). This means that the regression equation is statistically significant, and the model is adequate.

The below graph shows Fitted and actual values of the model, as well as the residuals between them obtained by equation

Graph 1: Dynamics of fitted and actual values and residuals obtained by the regression equation



Source. Compiled by the author using the EViews software package.

The level of capitalization is closely linked to GDP. It should be noted that the relationship between these indicators is easily determined using economic mathematical methods. It is more expedient to determine the relationship between the level of capitalization of the stock market and GDP using the econometric model. (Baraz, 2010)

Thus, the relationship between the studied indicators can be determined using the method of correlation-regression analysis. To determine the relationship between GDP and the level of capitalization of the stock market, the following table based on preliminary statistics is built:

Table 8: Capitalization level of the stock market with the GDP of the Republic of Azerbaijan for 2010-2016.

Years	Capitalization level of stock markets billion. manats, (x)	GDP, billion. manats. (y)
1	2	3
2010	2,11	42,5
2011	8,43	52,1
2012	8,43	54,7
2013	8,48	58,2
2014	13,1	59
2015	8,44	54,4
2016	5,7	60,4
n=7	$\sum x$ =54,69	$\sum y$ = 381,3

Source: Compiled by the author according to data of Central Bank of the Republic of Azerbaijan

Based on the data, using the E-views software package, we obtain the following result.

Dependent Variable: Y

Method: Least Squares

Date: 26/08/20 Time: 16:00

Sample (adjusted): 2010 2016

Included observations: 7 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X	1.214422	0.601614	2.018608	0.0995
C	44.98332	5.053075	8.902167	0.0003

R-squared	0.449022	Mean dependent var	54.47143
Adjusted R-squared	0.338827	S.D. dependent var	6.035372
S.E. of regression	4.907516	Akaike info criterion	6.254369
Sum squared resid	120.4185	Schwarz criterion	6.238915
Log likelihood	-19.89029	Hannan-Quinn criter.	6.063357
F-statistic	4.074777	Durbin-Watson stat	1.109135
Prob(F-statistic)	0.099547		

According to the parameters of the regression model, the regression model between GDP and the level of capitalization of the stock market will be as follows:

$$y = \alpha_0 + \alpha_1 x = 44{,}98332 + 1{,}214422\text{X}$$

According to this defined relationship equation, $y = \alpha_0 + \alpha_1 x = 44{,}98332 + 1{,}214422\text{X}$, the parameter α_1 is a positive number. This means that the level of capitalization of the stock market increases due to the increase in GDP. It can be concluded that an increase of 1 billion manat in the capitalization of the stock market will result in an average increase in GDP of 1.21 billion manat.

Adequacy of the regression model is determined by correlation analysis. For this purpose, the density of the correlations between the variables (x) and (y) is determined. The density of correlation relationships is measured by empirical correlation relationships.

When calculating the correlation relations, the rules of variance distribution are followed. The theoretical formula of correlation relations will be as follows [136]:

$$R^2 = \frac{S_y^2 - S_{yx}^2}{S_y^2} \quad \rightarrow \quad R = \sqrt{\frac{S_y^2 - S_{yx}^2}{S_y^2}}$$

The expression of correlation relations expresses the coefficient of determination. [136]

The coefficient of determination indicates the specific gravity of the variation. That is, the result changes under the influence of the variation factor.

Theoretical correlations are used to measure the density of the relationship between the result and the factorial and are calculated by the following formula.

$$R^2 = \frac{S_y^2 - S_{yx}^2}{S_y^2} = \frac{31{,}22254194 - 17{,}19035269}{31{,}22254194} = 0{,}449$$

The theoretical correlation relating to the model of GDP dependence on the stock market capitalization level was calculated according to the following formula:

$$R = \sqrt{\frac{S_y^2 - S_{yx}^2}{S_y^2}} = \sqrt{0{,}449} = 0{,}67$$

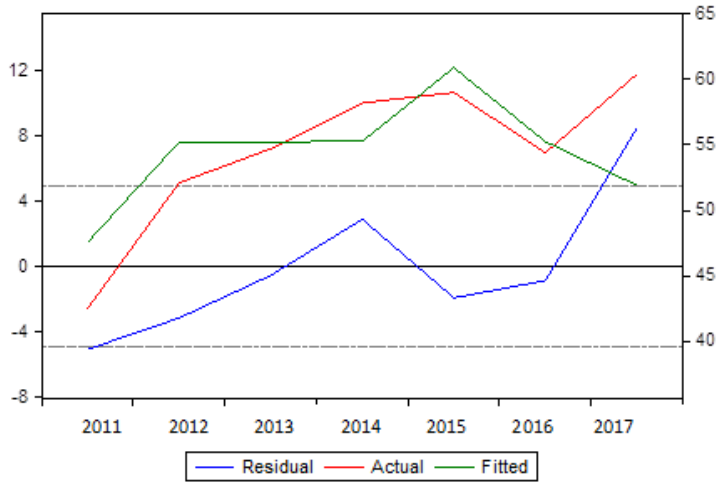
The fact that the multiple correlation coefficient R = 0.67 indicates that the relationship between the variables X and Y on the Cheddock scale is at a noticeable level. The fact that the coefficient of determination is R^2 = 0.449022 means that the corresponding regression equation is explained by 44.9% of the variance results, and 55.1% by the influence of other factors.

Based on the above reports, the determination coefficient was 0.67. According to the correlation equation between the level of capitalization of world stock markets and GDP, compiled based on data from 60 countries, the correlation coefficient was equal to $R = \sqrt{0{,}6154}$ =0,7845. This shows a high correlation between the level of capitalization of world stock markets and world GDP on the Cheddock scale. In Azerbaijan, this figure is 0.67, which is higher than the average on this scale meaning that the increase in the level of capitalization of stock markets plays an important role in GDP growth.

As can be seen from the Cheddock scale, the dependence of the stock market capitalization level on GDP is moderate. Coefficient of determination varies in the range of [0; 1]. A ratio close to 1 indicates a high-quality connection. The importance of the coefficient of determination is that it shows that the share of change in the result indicators changes due to the conditioned variation factor. (1-r_{xy}) indicates that the change in the result indicator is due to other factors not included in the model. On this basis, we can say that due to the level of capitalization of the stock market, GDP changed by 44.9%, and due to other indicators (1-0,449) 55.1%.

The below graph shows Fitted and actual values of the model, as well as the residuals between them obtained by equation.

Graph 2: Dynamics of fitted and actual values and residuals obtained by the regression equation



Source: Compiled by the author

Linear regression expressing the dependence of the stock market capitalization level variable (x) on the the GDP (y).

Fisher's F-test is used to determine the stability of the equation ($y = \alpha_0 + \alpha_1 x =$ 44,98332 + 1,214422X). For this, a zero hypothesis is put forward. H_0:b=0 In this case, the regression coefficient is equal to 0. A regression factor of 0 means that the cause factor does not affect the outcome factor.

The F-criterion is related to the determination coefficient and its value is calculated as follows (Baraz, 2010):

$$F_{accounted.} = \frac{R_{xy}^2}{1 - R_{xy}^2} \times \frac{(n - m - 1)}{m}$$

where, n- the number of observations; m - the number of factors.

In this case, $F_{accounted.} = \frac{0,449}{1-0,449} \times \frac{(7-1-1)}{1} = 4,07$

$$F_{critical.} = 0,83$$

There is a linear relationship between Y and X since $F_{accounted.} > F_{critical.}$ To evaluate the quality of the built model, it is necessary to calculate the average error of the approximation. This indicator is determined by the following formula [31, 32]:

$$A = \frac{1}{n} \sum \frac{y - \bar{y}}{y} \times 100\%$$

Here, the average error of the A-approximation is the average deviation of the resultant value from the actual value of the resultant value (Y) [68]. According to this formula,

$$A = \frac{1}{7} \times \frac{0{,}1567}{381{,}3} \times 100\% = 0{,}006\%$$

The selected regression model is considered quite normal if the value of the average approximation error does not exceed 10%. As can be seen, A = 0.006%. This means the correct regression model is selected.

Correlation between stock market capitalization and GDP.

$y = \alpha_0 + \alpha_1 x = 44{,}98332 + 1{,}214422X$ For the linear regression equation of the double correlation, it is necessary to calculate the coefficient of elasticity, which represents the percentage change in the dependent variable as a result of a 1% change in the free variable.

$$E = \frac{\alpha_1 \bar{x}}{\bar{y}}$$

where, α_1 is the regression coefficient;

$\bar{x}$ - average value of the factorial factor;

$\overline{y}$ - average value of the result factor;

The coefficient of elasticity (E) shows how many percent the factor (x) will change as a result of a 1% change in the value of other factors (y). [136]

$$E = \frac{\alpha_1 \bar{x}}{\bar{y}} = \frac{1{,}21 \times 7{,}81}{54{,}45} = 0{,}17$$

As a result of the report, it was determined that a 1% increase in the capitalization level of the stock market in Azerbaijan resulted in a 0.17% increase in GDP.

Thus, based on the method of correlation-regression analysis with the application of economic-mathematical methods, it can be concluded that there is a moderate correlation between the level of capitalization of the stock market in Azerbaijan and GDP. The assigned regression model $y=44{,}98332 + 1{,}214422X$ is fully adequate. From the relationship equation, it can be concluded that increasing the capitalization level of the stock market by 1 billion manat will lead to an average GDP growth of 1.21 billion manat.

5. Conclusion

So, the impact of financial instruments in Azerbaijan on the stock market and joint stock companies was assessed, the effect of the stock market capitalization level on budget revenues and expenditures and the optimal threshold were determined. Based on the analysis the efficiency of the use of financial instruments in the development of joint stock companies, several recommendations were obtained. A significant part of financial resources for investment purposes arises in the securities market, especially in the corporate securities sector. Research shows that today the main part of the securities

market in Azerbaijan is concentrated in government short-term bonds, which prevents the allocation of financial resources at the required level, efficiently and effectively. The main factor in improving the efficiency of the securities market should be increasing the volume of trading operations and creation of favorable conditions for this, increasing the variety and use of capital instruments, the issuance of new financial instruments. In order to ensure liquidity in capital bases, the activities of relevant government agencies should be coordinated, optimal solutions should be found through the application of fiscal and monetary policy, and necessary measures should be taken in this direction. In order to expand trade, it is necessary to assess the opportunities and awareness of several state-owned enterprises in the stock market, as well as the formation of appropriate legal and organizational mechanisms.

Besides all of this when financing projects in the private sector, state support should be provided by stock market instruments, and in this case, preference should be given to companies listed on the stock exchange, and the cost of obtaining financial resources should be determined by capital market instruments. In order to expand the opportunities for financing SME projects from the capital markets, a trading platform should be formed on the Baku Stock Exchange. It is important to increase the range of investment instruments offered on the stock exchange. Also, the application of financial instruments offered in the international market in the local market, and the possibility of bringing instruments offered in the local market to the world market should be evaluated. Relevant normative-legal base and organizational measures should be taken to offer local securities in foreign capital markets.

Expansion of supply of competitive financial instruments in the securities market, study and application of the practice of financing infrastructure projects with stock market instruments should be realized, trade mechanisms for various debt securities and futures contracts should be established. Favorable tax environment is of great importance in expanding investment opportunities in both the private and public sectors. From this point of view, it is necessary to study the possibilities of conducting the conditions of taxation in the securities market in accordance with international practice, including the application of certain tax benefits to income from securities, income from the purchase and sale of securities. Favorable fiscal conditions should be created to stimulate the activity of investment funds and the inclusion of companies in the listing of stock exchanges.

The development of horizontal and vertical integration processes through mergers and acquisitions based on share capital is gaining momentum. Carrying out these transactions implies the need and expediency of assessing the market value of share capital. Mergers and acquisitions facilitate the flow of share capital from one place to another, have a significant impact on the structural reorganization of the economy, which serves the purpose of increasing the economic efficiency of the economy. Preliminary results of the shareholding prove that the market value of privatized enterprises, which do not consider all the components, has been reduced. During this period, there is a tendency for large institutional investors to acquire a controlling stake in the privatized enterprise. At the same time, most of the privatized enterprises had an unacceptable share capital structure and needed to be restructured. The distinctive feature of privatization in Azerbaijan was that it was carried out in such a short period of time that it did not allow the state to take the necessary measures to increase their competitiveness until its enterprises were sold by checks and then at money auctions.

As a result, the next stage in the implementation of the shareholding mechanism was the activity of institutional investors in the restructuring of assets and liabilities of joint-stock companies, including measures for financial rehabilitation in the form of reduction of receivables and payables. As a result, there has been an increase in the number and volume of corporate mergers and acquisitions.

Commercial banks seeking to own shares in society through a controlling stake and thus influencing the real sector of the economy are helping to reduce the liquidity of their capital. In this context, the method of integration of banking and industrial capital based on financial-industrial groups becomes a more flexible method. In our country, these processes are influenced by certain state support, the direction and scope of which could be further expanded due to the obvious lack of national bank capital for the implementation of investment projects arising from the requirements of the real sector of the economy. On the other hand, it is expedient to expand the practice of administrative integration in several leading sectors of the economy, as it can negatively affect the pricing of shares of Azerbaijani companies in the stock market.

The income approach to valuing a company is more acceptable in terms of investment reasons, because any investor, first, receives a set of future income, not the sum of the assets of the enterprise. In addition, this approach can be used to evaluate any operating entity. The application of the income approach can be considered as a basis for the assessment of an enterprise with a certain history of economic activity and located in the stage of growth or stable economic development. However, this method is less appropriate for companies that are systematically operating at a loss, as well as for new businesses with uncertain returns.

Inflation of the fund's assets has a certain impact on the choice of reasonable methods and techniques for valuing the company's share capital. In the context of inflation, the cash flow discounting method is preferred because it is based on taking into account changes in the price of the company's shares over time, eliminating time discrepancies between cash inflows and outflows, thus reflecting the quality of a dynamic approach. The development of a business valuation methodology provides the tools to address a wide range of investment issues in mergers and acquisitions. In this case, the income method for the valuation of the existing enterprise is superior to the methods of comparison and cost approach. In determining the liquidation value of the company, it is more appropriate to use a method based on the sale of assets in parts and considering the time factor, which reflects the statistical approach.

Based on the correlation between budget expenditures and budget revenues and the level of capitalization of the stock market with the application of economic-mathematical methods, the optimal level of capitalization of the stock market was determined. Based on the elasticity coefficient, it was determined that budget revenues and budget expenditures will change by 0.17% due to a 1% change in the capitalization level of the stock market in Azerbaijan. As a result of economic-mathematical methods, it was determined that a 1% increase in the capitalization level of the stock market in Azerbaijan results in a 0.17% increase in GDP. Based on the equation of the relationship between the level of capitalization of the stock market and GDP in Azerbaijan, it was concluded that increasing the level of capitalization of the stock market by 1 billion manat will lead to an average GDP growth of 1.21 billion manat.

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