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The Econometric Model for SME Development in the Republic of Moldova

Valentina GANCIUCOV,
Dr. Univ., Conf. Circle.
„Analysis and Forecast Section", INCE

In a country such as Moldova, they need to find a new form of their more competent existence in the international chain. Small and medium-sized enterprises (SMEs) also have a key role to play in order to integrate into this global chain. One of the main functions of small and medium-sized enterprises is precisely the job creation that our country is so bad about, taking into account that we are one of the main exporters of labor resources today.

In the total number of enterprises in Moldova, the share of small and medium-sized enterprises is on average 98.7%. These companies hire an average of 61% of the employees in the RM. Sales revenue from SME is around 41%. The profit (up to tax) from the SME is on average 50%. The share of small and medium-sized enterprises in the GDP of the Republic of Moldova is 32% on average.

Small and medium-sized enterprises are mainly concentrated in sectors such as: trade, agriculture, real estate transactions and the processing industry. Small and medium-sized enterprises are focused on maximizing profits; they are entrepreneurs who have discovered such a combination of factors that enable them to obtain a certain competitive advantage in a fully innovative way.

The aim of this work is to develop an econometric model to predict the development of SMEs and its main indicators in the medium term. In order to build an econometric model, the method and techniques described in the works of Schatteles T. [1], Klein L.R.,Welfe A., and Welfe W. [2] have been used.

This model consists of a linear equation system and is similar to the models that have been used in Europe (Austria, Romania, Poland, Ukraine, Moldova [3], [4], etc.) and can be used to predict the development of small and medium-sized enterprises in Moldova.

The calculations were based on the main macro indicators developed by the IMF (both for Moldova and the world economy, taking into account the impact of the COVID-19 pandemic on the economies) and published in 'Focus' magazine [5. P.2, p.53-55], world GDP is provided by the World Bank [6, p.1-3].

The equations which take into account the specific of development of the examined country are stochastic, being estimated on the basis of statistical information for the concerned country. The information base is 2009-2019 years [7]. The econometric EViews package.8 was used to estimate the equations. The model includes 9 identity equations. In total, 36 variables are used in the equations, of which 27 – exogenous (of which 10 are DAMMY) and 9 – endogenous.

All variables used in the model are divided into 5 groups:

Remittances to the RM;

Number of enterprises in Moldova (in total per RM and in SME);

– *Number of employees* in the Republic of Moldova (in total per RM and in SME);

Sales revenue in the Republic of Moldova (in total per RM and in SME);

Profit (+), losses (-) before taxation in the Republic of Moldova (in total per RM and in SME).

The remittances in the Republic of Moldova depend on the development of the world economy and will continue to be used in the model as an exogenous variable after termination. The remittances from abroad (coming from Moldovan diaspora) always had an important role in the country's economy and life. The remittances were received from the NBM [8] from 2000 to 2019. The most spectacular increase in this indicator was recorded between 2000 and 2008. In 2008, the rate of remittances in GDP was 27.4%, in 2009 it decreased to 24.06%, but in 2019 it dropped to 13.2%. In this case, the remittances (**REM)** depending on the world GDP (GDPM), the US dollar/lei exchange rate (KD), the number of the year in the concidered period (TR) and the growth rate of the world economy (**ME**) will be determined:

REM = 6.1093e-05*GDPM - 64.9918*KD -
(5.073) (-4.67)
9.6605*TR^2 - 29.1069*ME - 730.436 (1)
(-2.057) (-2.057) (-2.01)

***R^2* =0.88 *DW*=2.4 *F* =11.25**

The numbers wrote under each factor in econometric show the calculated t-statistics, which are compared to the theoretical t-statistics, which can be found in the tables depending on the number of degrees of freedom and level of significance. The number of degrees of freedom is calculated as n-k-1, where n — number of observations, k — number of exogenous factors. The statistic t tells us about the importance of the specific exogenous factor for the endogenous factor. **R^2** – determination coefficient showing what part of the variation of the endogenous factor is explained by the variation of exogenous factors. The values of R^2 € [0.1], the closer the value of this coefficient is to 1, the lower the variation is considered to be due to exogenous factors. F is the Fisher calculated statistic that characterizes the meaning of the entire regression, DW- calculated Durbin-Watson statistics, which tells us about errors autocorrelation. If errors autocorrelation are detected in the model, the regression coefficients are not correctly estimated.

The number of enterprises in Moldova (in total per RM and in SME) is presented by two equations: the number of small and medium-sized enterprises and the total number of enterprises.

The number of small and medium-sized enterprises in Moldova is calculated according to the main macro indicators: GDP, KD (US dollar/lei exchange rate), **CPI** (inflation), **REM** (remittances) and is determined according to the relationship:

N = 0.0001*GDP + 0.0052*REM - 0.16633*KD -
(32.1) (11.4) (-2.69)
0.144*IPC + 0.6566*D12 + 0.5597*D16 -
(-5.01) (3.46) (2.31)

0.7347*D18 + 47.5422 (2)
(-3.37) (18.4)

***R^2* =0.99 *DW*=2.86 *F*=885.2**

where D12, D16, D18 in this equation are the exogenous variables called DUMMY.

D – DUMMIES (the following DUMMY variables were used to attenuate regression peaks: D12, D16, D18, which are called binary variables. These variables are defined while working in the EViews package.8. THE DUMMY variables are defined as all observations are number 0, except for years 2012, 2016, 2018, which have the number 1).

Ik of enterprises in Moldova is calculated according to the main macro indicators **KD, IPC, N** (number of small and medium enterprises) and **REM,** and is determined according to the relationship:

NR = -0.0393*IPC + 0.8949*N + 0.0043*REM +
(-6.04) (92.1) (13.16)
0.1588*KD - 0.2827*D11 – 0.2181*D13 -
(8.43) (-7.68) (-3.15)
2.6839*D14 + 0.2673*D15 + 2.6454 (3)
(-28.14) (7.26) (5.07)

***R^2* =0.99 *DW*=1.82 *F*=3425**

We have tried to investigate the dependence of these two indicators (**N, NR)** on investment, but we have achieved a negative effect. As we can see, remittances have a more influence on the development of small businesses in Moldova.

The number of employees in the Republic of Moldova (in total per RM and in SME) is presented by two equations: the number of employees wor-

king in small and medium-sized enterprises and the total number of employees in enterprises.

The number of employees from small and medium-sized enterprises is calculated in terms of the number of main macro indicators: **GDP**, **IPC** (inflation), **REM** (remittances), **TR (**year number in considered period), **N** (number of small and medium-sized enterprises in Moldova) and is determined according to the relationship:

NSP = 0.0029*GDP + 0.0542*REM - 3.8952*IPC -
(8.74) (3.79) (-9.0)
20.335*TR - 15.0141*N + 1.0151*D11 - 26.501*D15 +
(-5.2) (-6.68) (0.35) (-6.49)
19.2225*D19 + 1138.1315 (4)
(4.87) (14.25)
***R^2*=0.99 *DW*=3.25 *F*=91.22**

The total number of employees in enterprises is calculated in terms of the main macro indicators: **GDP**, **NR (**total number of enterprises in Moldova), **NSP (**the number of employees from small and medium-sized enterprises) and will be determined:

NS = 1.02*NSP - 0.0003*GDP + 2.704*NR +
(8.24) (-2.61) (2.13)
18.758*D15 - 11.231*D16 + 112.927 (5)
(2.87) (-2.51) (1.48)
***R^2*=0.96 *DW*=1.37 *F*=25.59**

The sales revenues in the Republic of Moldova (in total on RM and SME) are presented by two equations: sales revenues from small and medium-sized enterprises; total sales revenues from all companies in Moldova.

Sales revenues from small and medium-sized enterprises are calculated according to the main indicators: **NSP, GDP, KD, N,** and is determined according to the relationship:

CA = 0.845*NSP + 9.5378e-05*GDP +
(102) (4.37)
3.9753*KD + 3.0812*N + 16.7203*D11 + 3.6273*D12 +
(32.6) (18.6) (52.3) (12.2)
2.7766*D17 + 4.407*D18 - 394.1925 (6)
(9.12) (12.5) (-44)
***R^2*=0.99 *DW*=2.8 *F*=248**

Total sales revenues in Moldova are calculated on the basis of indicators: **GDP, KD, N, NS**, and is determined:

CAT = -8.0959*N + 0.0025*GDP - 4.4367*KD -
(-61) (150) (-42.9)
0.1735*NS - 14.382*D10 + 10.805*D11 + 11.4761*D14 -
(-17.7) (-92.1) (52.2) (90.2)
2.1127*D17 + 17.8949*D19 + 489.9413 (7)
(-18.9) (105) (45)
***R^2*=0.99 *DW*=2.97 *F*=937**

Profit (+), losses (-) before taxation in the Republic of Moldova (total per RM and in SME) are shown from two equations: Profit (+), losses (-) before taxation from small and medium-sized enterprises; Profit (+), losses (-) before taxation from total companies in Moldova.

Profit (+), losses (-) before taxation from small and medium-sized enterprises are calculated on the basis of the main indicators: **REM, N, NSP,** and are determined according to the relationship:

VP = -0.009*REM + 0.534*N + 0.1142*NSP +
(-4.03) (5.63) (4.49)
4.23*D11 - 2.67*D16 – 44.6063 (8)
(3.53) (-2.17) (-5.23)
***R^2*=0.96 *DW*=2.2 *F*=27**

Profit (+), losses (-) before taxation from enterprises in total in the Republic is calculated on the basis of the main indicators: **GDP, IPC, NR, NS,** and is determined by the relationship:

VPT = 0.0003*GDP - 2.2534*NR + 0.5122*NS +
(18.4) (-10.64) (16.9)
1.6706*IPC + 11.9169*D11 + 2.8031*D12 -
(11.41) (12.9) (3.3)
13.5474*D15 - 3.1537*D19 - 357.6195 (9)
(-14.35) (-3.35) (-11.9)
***R^2*=0.99 *DW*=2.49 *F*=203**

It is considered the functioning of the model using for the development of the SME development forecast for the years 2020-2023. Table 1 provides the information on the main macro indicators (GDP, IPC, KE, KD) of the IMF forecast [5, p.55] and Table 2 provides information on the growth of the world GDP and its growth rate [5, p.2].

Table 1

The main macro indicators in the period 2020-2023

	GDP mil. lei,	%	CPI	KE	KD
2020	200885,205	-4.8	104.7	18.9	17.6
2021	223585,233	4.0	104.6	20.9	18.2
2022	248179,609	4.0	105.0	21.5	18.4
2023	267041,259	3.9	105.0	22.1	18.6

Source: ***Developed by author based on IMF forecast***

Table 2

Indicators of the world economy

	World	
Years	GDPM, mil., dol.,	ME,%
2020	83211371,904	-4.4
2021	87455151,871	5.1
2022	91827909,465	5
2023	96235649,119	4.8

Source: ***Developed by author based on IMF forecast***

Based on the data presented in Tables 1, 2 and the statistical information for the years 2009-2019 [1] for the following indicators:

- ✓ Remittances (**REM);**
- ✓ *Number of enterprises* in total Moldova and in SME (**NR, N);**
- ✓ *Number of employees* in Moldova total and in SME (**NS, NSP);**
- ✓ *Revenues from sales* in Moldova and in IMM (**CAT,CA);**
- ✓ *Profit (+), losses (-) to tax* in Moldova total and in IMM (**VTP, VP).**

Nine equations have been developed which formed the basis of the econometric model for forecasting the main SME indicators in the short and medium term. The results of the calculations using the econometric model of the remittances for the years 2020 to 2023 are presented in Table 3.

Table 3

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Years	remittances
2020	946,295
2021	648,538
2022	1214,761
2023	1266,712

Source: ***Developed by the author on the basis of the model developed***

Table 4

Evolution of the main indicators of economic units activity

	Economy, thousands of units			Number of employees, thousands of people			Sales income, Mrd. lei			Profit (+), losses (-) before taxation, Mrd. lei		
Years	Total	IMM	IMM,%	Total	IMM	IMM,%	Total	IMM	IMM,%	Total	IMM	IMM,%
2009	44.6	43.7	98.0	539.2	316.2	58.6	146.5	57.5	39.2	3.7	2.2	61.3
2010	46.7	45.6	97.6	526.2	309.4	58.8	177.5	65.3	36.8	13.2	5.5	41.4
2011	48.5	47.3	97.5	510.2	294.2	57.7	207.7	71.9	34.6	14.4	5.2	35.9
2012	50.7	49.4	97.4	519.9	300.2	57.7	211.8	73.1	34.5	4.7	1.1	22.9
2013	52.9	50.9	96.2	524.5	298.4	56.9	231.6	77.4	33.4	4.1	2.0	48.6
2014	53.7	52.3	97.4	510.8	291.7	57.1	263.1	83.7	31.8	3.7	3.0	82.3
2015	51.2	49.8	97.3	510.3	281.4	55.1	282.4	85.8	30.4	3.5	3.0	86.8
2016	52.3	51.6	98.7	512.5	313.5	61.2	300.7	124.5	41.4	15.0	5.9	39.1
2017	54.3	53.6	98.7	528.6	323.3	61.2	331.0	137.5	41.5	24.6	10.6	42.9
2018	56.5	55.7	98.6	540.3	328	60.7	356.7	144.2	40.4	23.1	11.2	48.6
2019	56.7	55.9	98.6	544.8	335.8	61.6	397.9	157.4	39.5	24.1	12.4	51.4
2020	46.4	44.3	95.3	469.2	292.5	62.3	202.5	76.4	37.7	18.0	3.3	18.5
2021	59.9	59.0	98.6	552.4	338.2	61.2	403.4	166.0	41.2	30.9	14.7	47.7
2022	65.6	65.5	99.0	587.1	368.6	62.8	473.9	205.9	43.4	47.3	23.6	49.8
2023	70.4	69.6	98.9	609.0	388.0	63.7	511.7	234.4	45.8	57.6	28.9	50.2

Source: ***Elaborated by the author based on the data of the national Bureau of Statistics of the Republic of Moldova and the model developed***

As we can see in Table 3, the decrease in remittances was expected over the two years period, but only in 2022 to attend the level of 2019 year and in 2023 starts increasing by 4.3% comparing with previous year.

The results of the calculations of the main SME indicators by the dynamic econometric model are presented in Table 4.

As can be seen in Table 4, the values of all SME indicators decrease in 2020 due to the impact of the COVID-19 pandemic. But in 2021 their growth starts again. However, it should be mentioned that the indicators related to SMEs have decreased more. *This tells us that small and medium-sized enterprises are more vulnerable.*

Also should be mentioned that in 2020 year: the number of SMEs will decrease by 23.1%, the number of employees in these companies will decrease by 12.9%, and the volume of sales revenues will decrease by 51.4% and the profit by 75.3 %.

The growth of all SME values is projected in 2021. For example, a 33.3% increase in the number of businesses compared to the previous year, the increase of employees is forecasted to be 15.6%, and the volume of sales revenues is expected to increase by 117.2% and the profit by 14.7%.

The growth in all SME values is projected also in 2022-2023, but with a lower % than in the previous year:

– the number of businesses with 11.7% and 5.5%;
– the number of employees by 9% and 5.3%;
– sales revenue volume of 24 % and 13.9 %;
– profit of 23.6% and 28.9%

Conclusions:

1. The model described is used for the forecast of the main small and medium-sized enterprise indicators in the short and medium term. The information basis for regression is from 11 observations. This model can be used by professionals, because the dependence of factors is well structured here.

2. Small and medium-sized enterprises are the most precious part of the production factors, which any government should protect and accompany with all sorts of incentives and developed infrastructure.

3. The obvious model of economic growth that would be most characteristic for us is a model by developing entrepreneurship - small and medium-sized enterprises, which would create new well-paid and well-equipped jobs. That is, that added value will be created, about which so much is being said.

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ABSTRACT

The Econometric Model for SME Development in the Republic of Moldova. The econometric model and forecast of the main indicators of the development of small and medium-sized enterprises in the Republic of Moldova for the medium term are presented. It is based on a set of behavioral equations and group identities that describe the relationships that are characteristic for small business development in the republic. The model includes five large groups of the economy, namely: remittances (from Moldovans working abroad), number of enterprises, number of employees, value of sales revenue and profit (+), losses (-) before taxation.

Keywords: *Small and medium-sized enterprises ('SME'); sales revenue; profit (+); loss (-) to tax; remittances; COVID-19 pandemic.*

REZUMAT

Model econometric pentru dezvoltarea IMM-urilor în Republica Moldova. Sunt prezentate un model econometric și o previziune a indicatorilor principali ai dezvoltării întreprinderilor mici și mijlocii în Republica Moldova pe termen mediu. Analiza se bazează pe un set de ecuații comportamentale și identități de grup care descriu relațiile caracteristice dezvoltării întreprinderilor mici în republică. Modelul include cinci mari grupuri ale economiei, și anume: remitențele (de la moldovenii care lucrează în străinătate), numărul de afaceri, numărul salariaților, volumul veniturilor din vânzări, profitul (+), pierderile (-) până la impozitare.

Cuvinte-cheie: *întreprinderi mici și mijlocii (IMM); venituri din vânzări; profit (+); pierderi (-) la impozitare; remitențe; pandemie Covid-19.*