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PERSONAL INCOME TAX IN UKRAINE: DETERMINANTS` ANALYSIS

Abstract. Further reforming of the Ukrainian tax system in order to improve the mechanism of personal income taxation (PIT) and filling local budgets points out the relevance of the research. The article considers the determinants of personal income tax as an important component of the tax system of Ukraine.

The authors analyzed the PIT revenues to the consolidated budget of the country and identified a positive trend of its growth. Determinants and indicators of impact on PIT revenues are highlighted in the study. These factors are divided into following groups: economic, political and legal, demographic, socio-cultural and individual. The influence of main factors (GDP, Employment Rate, Inflation Rate, Average PIT Rate) on the PIT revenue component is considered.

Regression and correlation analyses were performed using STATA program, and linear regression was calculated. In order to assess the dependence, countries were clustered according to key factors of their economic development for the period 2009—2019. According to the analysis results, it is determined that PIT revenues are closely dependent on the general macroeconomic situation in the country, and the average tax rate has a significant impact on its revenues.

Keywords: tax system, personal income tax, factors, analysis, GDP, inflation, budget.

JEL Classification H20, H30

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ПОДАТОК НА ДОХОДИ ФІЗИЧНИХ ОСІБ В УКРАЇНІ: АНАЛІЗ ДЕТЕРМІНАНТ

Анотація. Подальше реформування податкової системи України з метою вдосконалення механізму оподаткування доходів фізичних осіб (ПДФО) і наповнення місцевих бюджетів свідчать про актуальність дослідження. Розглянуто детермінанти податку на доходи фізичних осіб як важливої складової податкової системи України.

Проведено аналіз надходжень ПДФО до Зведеного бюджету країни і визначено позитивну тенденцію до його зростання. Виділено фактори і показники впливу на надходження ПДФО. Серед факторів впливу виокремлено економічні, політико-правові, демографічні, соціально-культурні та індивідуальні групи. Розглянуто вплив основних факторів: ВВП, зайнятість населення, інфляція, середня ставка податку на складову надходжень ПДФО.

Здійснено регресійний і кореляційний аналіз за допомогою програми STATA, а також розраховано лінійну регресію. Для розрахунку залежності було проведено кластеризацію країн за ключовими факторами економічного розвитку за період 2009—2019 рр. За результатами аналізу визначено, що надходження ПДФО мають тісну залежність від загальної макроекономічної ситуації у країні, а середня ставка податку має істотний вплив на його надходження.

Ключові слова: податкова система, ПДФО, фактори, аналіз, ВВП, інфляція, бюджет.
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НАЛОГ НА ДОХОДЫ ФИЗИЧЕСКИХ ЛИЦ В УКРАИНЕ: АНАЛИЗ ДЕТЕРМИНАНТ

Аннотация. Дальнейшее реформирование налоговой системы Украины с целью совершенствования механизма налогообложения доходов физических лиц (НДФЛ) и наполнения местных бюджетов свидетельствуют об актуальности исследования. Рассмотрены детерминанты налога на доходы физических лиц как важной составляющей налоговой системы Украины.

Проведен анализ поступлений НДФЛ в Сводный бюджет страны и определена положительная тенденция их увеличения. Выделены факторы и показатели влияния на поступление НДФЛ. Среди факторов влияния выделены экономические, политико-правовые, демографические, социально-культурные и индивидуальные группы. Рассмотрено влияние основных факторов: ВВП, занятость населения, инфляция, средняя ставка налога на составляющую поступлений НДФЛ.

Осуществлен регрессионный и корреляционный анализ с помощью программы STATA, а также рассчитана линейная регрессия. Для расчета зависимости была проведена кластеризация стран по ключевым факторам экономического развития за период 2009—2019 гг. По результатам анализа был сделан вывод, что поступление НДФЛ напрямую зависит от общей макроэкономической ситуации в стране, а средняя ставка налога оказывает существенное влияние на его поступления.

Ключевые слова: налоговая система, НДФЛ, факторы, анализ, ВВП, инфляция, бюджет.

Формул: 1; рис.: 1; табл.: 4; библи.: 15.

Introduction. The efficiency of economic development ensuring of any country is directly dependent on its tax system. Tax, acting as the main source of funds available to the central and regional governments, is an important regulator of economic processes both at the state and local levels. An important component of tax system of any country is the taxation of personal income. In Ukraine, the procedure, rates and rules of personal income tax (PIT) are set exclusively at the national level, but through the mechanism of redistribution, this tax goes to local budgets, the formation of which is both a condition and a result of socio-economic development.

Nowadays, the problem of further tax system reforming in Ukraine in order to improve the mechanism of personal income taxation and filling local budgets does not lose its relevance, as evidenced by the lack of significant financial support and inability of local governments to address socio-economic issues.

Literature Review. PIT is an important budget source in many countries around the world. Its dominant role has been demonstrated in a number of studies covering general issues, revealing the peculiarities of development and tax issues in separate countries.

Thus, in particular, Irena Szarowská (2014) explores the importance and disparities of personal income taxation in a context of a tax structure. The attention is focused on single worker taxation with the average wage in 21 selected European countries: OECD as well as the European Union members. The author argues that increasing PIT share on total taxation by 1 percentage point increases the PIT rate by 0.57 percentage point.

A. Zellner, J. K. Ngoie (2015) investigate how various tax rate reductions PIT may help stimulate the U.S. economy while not adversely affecting aggregate U.S. debt.

T. Piketty, E. Saez (2012) review recent developments in the theory of optimal labor income taxation. They emphasize connections between theory and empirical work that were initially lacking from optimal income tax theory.

J. Mirrlees, S. Adam, T. Besley, R. Blundell, S. Bond, R. Chote, M. Gammie, P. Johnson, G. Myles and J. Poterba (2011) discuss the impact that tax system has on people's behavior and the resulting trade-offs that policymakers have to make between the various and often conflicting objectives that they might wish the tax system to achieve.

The national peculiarities of personal income taxation have been studied by well-known Ukrainian scientists.

Thus, in particular, L. Demydenko, M. Tiurina (2017) deal with the issues of calculation and payment of personal income tax due to changes in Ukrainian legislation.

N. Dutova, E. Lesik (2019) deal with the peculiarities of payment of the personal income tax in Ukraine and in European countries, the prospects for its development.

A. Slavkova, M. Stepura (2012) assess the impact of the tax burden on personal income, the necessity of its redistribution to people with higher incomes.

L. Zadorozhnia (2017) explores an understanding of the economic content and methodological approaches to the concept of regulatory efficiency of the PIT and the approaches of its implementation in Ukraine.

Methods. The calculations performed in STATA are based on the methods of regression and correlation analyses.

The regression analysis is based on the constructed regression equation and determines the contribution of each independent variable to change of the studied (predicted) dependent variable. Regression analysis is the main statistical method of constructing mathematical models of objects or phenomena from experimental data.

In its turn, the method of correlation analysis is associated with linear regression analysis, which is a statistical approach to assess the relationship between the resulting variable and one or more factor variables.

Problem statement and research analysis. The problem of insufficient funding is always relevant, and therefore attention should be paid to the analysis of the sources of these funds. At the local level, PIT also has a significant impact, as compensation costs from its payment are reimbursed in the form of sectoral subventions, which are distributed between medical, educational, personnel areas. Such redistribution reduces the flexibility of using such revenues, but increases the efficiency of targeted use. Thus, this situation creates the conditions for targeted solutions to the problems of the region, but increases the likelihood of facing the problem of insufficient funding, because the funds are targeted and do not have a wide range of replenishment sources [11].

Given the important role of personal income tax in filling local budgets and at the same time the lack of significant financial support, the inability of local governments to address socio-economic issues alone indicates the need for further development of theoretical and methodological bases of local taxation and more detailed study of the role of personal income tax in the system of local finance.

The analysis shows that in the tax system of Ukraine personal income tax occupies one of the most important places, as it is one of the main budget-generating taxes of the country. *Table 1* shows the revenues of the three main taxes to the consolidated budget of Ukraine.

Table 1

Amounts of deductions of the three main taxes in Ukraine for 2009—2019

Year	Type of tax						Consolidated budget revenue
	VAT collection		Income tax		Corporate income tax		
	UAH million	%	UAH million	%	UAH million	%	UAH million
2010	126 988	45,75	51 029	18,38	40 359	14,50	277 573
2011	172 873	47,13	60 225	16,42	55 097	15,00	366 770
2012	184 786	46,98	68 092	17,31	55 793	14,20	393 344
2013	181 717	46,05	72 151	18,28	54 994	13,90	394 613
2014	189 241	46,65	75 202	18,54	40 201	9,91	405 644
2015	246 858	42,85	99 983	17,36	39 053	6,78	576 041
2016	329 911	44,27	138 781	18,62	60 223	8,08	745 187
2017	434 041	45,77	185 686	19,58	73 397	7,74	948 219
2018	506 168	45,52	226 771	20,34	91 109	8,19	1 111 636
2019	417 676	37,58	270 474	24,37	105 464	9,48	1 112 425

According to the *Table 1* PIT is growing steadily and does not have such significant fluctuations as VAT, while its share in budget revenues is growing. As we can see, over the past 9 years, the absolute amount of PIT in the consolidated budget revenues has increased by UAH 219,474 million and in 2019 exceeded 24%. These facts indicate that PIT revenues have a positive upward trend and point out the need to control and improve the taxation system for the effective functioning of the budget system.

PIT has its factors of influence. Factors of direct influence are the factors, the change of which leads to a change in the amount of budget revenues. Let`s consider the impact of these factors on the component of PIT revenues.

The factors of direct influence are as follows: economic, political and legal, demographic, socio-cultural and individual (*Fig.*).

Economic factors such as inflation, GDP, money and stock markets, interest rates on loans and deposits, exchange rate dynamics, etc. affect the economic interests of businesses and the level of business activity in the country. For example, moderate tax rates together with the stability of the macroeconomic situation contribute to an increase in the number of enterprises, increase sales, reduce unemployment, and attract foreign investment, which has a positive effect on budget revenues.

To calculate the factors of influence it is necessary to determine the studied factors. For the reliability of the study, we will identify the four that, in our opinion, have the greatest impact and use statistical and mathematical methods to examine their impact.

GDP, as the main macroeconomic indicator, reflects the volume of output in the country. It is an indicator of total production, and its increase reflects changes in the composition and distribution of products, which, in turn, may impact the income tax of individuals to the budget.

The level of inflation or the rate of inflation has a significant impact on the assessment and forecast of PIT revenues, as it reflects the real value of the currency in the current year, relative to the past. High inflation rates indicate a reduction in production, which is a general decline in business activity and consumer demand, which in turn leads to a reduction in PIT revenues. If inflation stops at the basic level, then tax revenues will be relatively proportional.

Among the political and legal factors, the main one is the average personal income tax rate, as it plays a major role and determines the tax revenue.

The object of personal income tax is wages paid by employees, which, in turn, indicates the demographic dependence of revenues from this tax. If macroeconomic indicators are stable, then with an increase in the number of employed there is a probability of a proportional increase in budget revenues from personal income tax. Therefore, the employed population will be the next chosen factor.

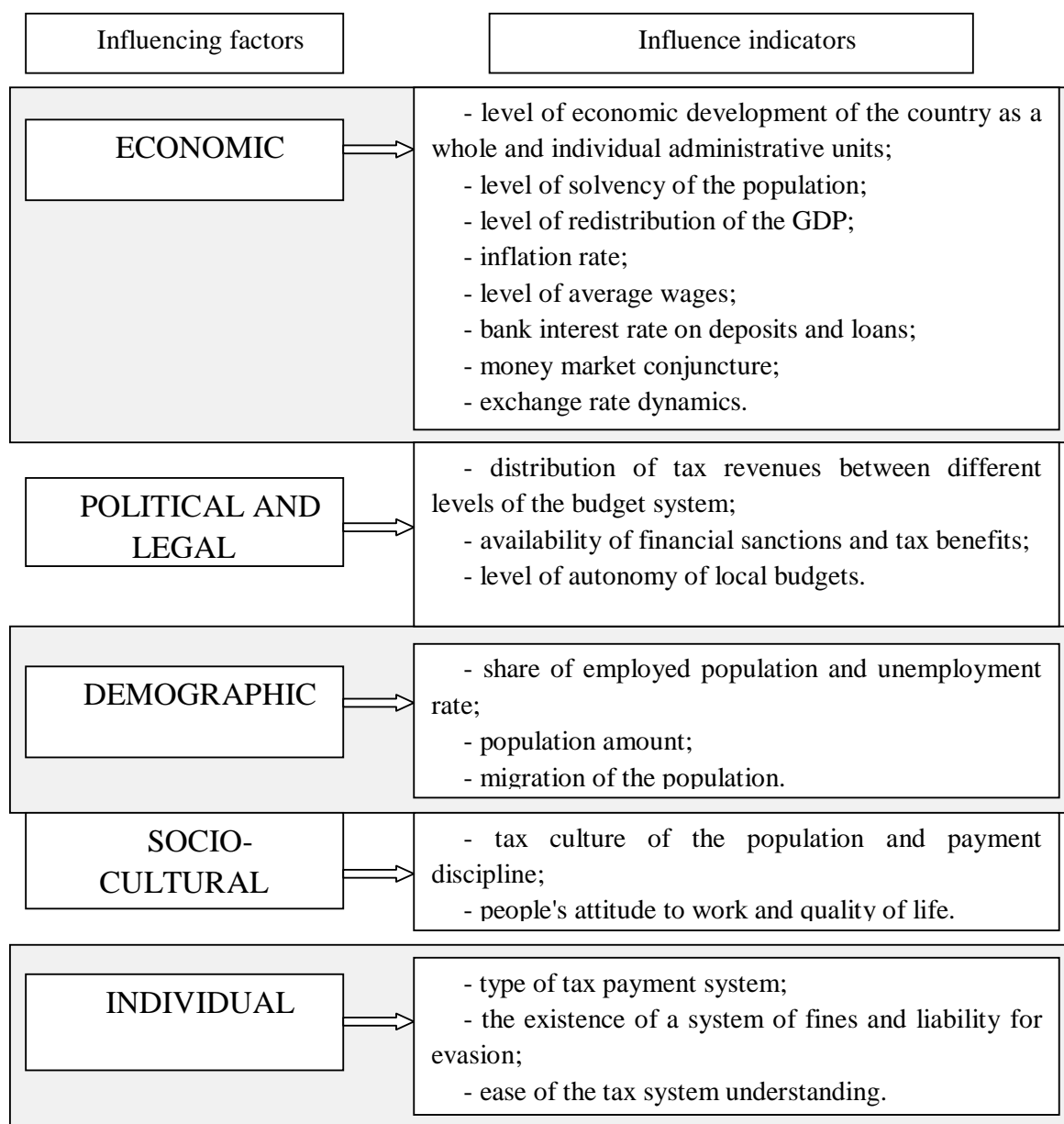


Fig. Factors and indicators of impact on PIT revenues

Source: Author's development considering [11].

In the world practice, many scholars also consider as important factor the existence or percentage of informal or unregistered employment. A study conducted by the European Commission indicates that unregistered employment in the EU is 16.4% of GDP, with the largest share of the shadow sector in countries with the lowest economic development [12].

Demographic and socio-cultural factors mainly have an indirect impact on the dynamics of local budget revenues.

Individual factors deserve special attention, in particular type of tax payment system, the system of fines and liability for evasion, the simplicity of the tax system for citizens, etc., and are characterized by the level of consciousness of employees and employers.

Results. To perform regression analysis using the STATA program, the resulting variable *Y* was selected *PIT Revenues*, which is associated with the explanatory variables *X*: *GDP*, *Employment rate*, *Inflation rate*, *Average PIT rate*. To calculate the relationship between these factors, countries were clustered by key factors. The cluster of Ukraine includes such countries as

Romania, Hungary, the Czech Republic and the Slovak Republic. Input data for the period 2009-2019 on the receipt of personal income tax in the budgets of the cluster countries and the tax rates required for the calculation were obtained from officially published statistical reports. Data such as GDP and inflation were obtained from the World Bank website [13]. Information on the number of employed population is obtained from the EU Statistics Service and the Statistics Service of Ukraine [14; 15]. The results of regression analysis are shown in *Table 2*.

Table 2

The results of the regression analysis of the impact of factors on PIT revenues for the sample countries for the period 2009—2019

PIT	Coef.	St.Err.	p-value
X1 (GDP)	0.079	0.005	0.000
X 2 (Employment)	0.0016	0.001	0.014
X3 (Inflation)	-2137.339	1738.25	0.082
X4 (Avg. PIT rate)	4776.951	2157.115	0.031
Constant	138000.0	62375.137	0.064
Overall r-squared	0.975	Number of obs.	65.000
Chi-square	812.557	Prob. > chi2	0.000

From the results of regression analysis, the following conclusions can be drawn: considering the p-value, it can be argued that variables such as GDP and employment have a statistically significant effect on the confidence interval of 99%, the average confidence rate factor of 95%, while inflation has a confidence effect on intervals of 90%.

R-sq has a score of 0.975, which indicates that 4 independent variables can explain 97.5% of the results of the dependent variable. It proves that the data are comparable, and the factors, in general, are quite high significance for the result for the entire sample of countries.

The obtained data of regression analysis allow to determine the equation of linear regression and estimate each parameter. Linear regression analysis is performed to predict a dependent variable based on one or more independent variables.

The equation obtained by regression analysis is as follows:

$$PIT = 138000 + 0,079 * X1 + 0,0016 * X2 - 2137,339 * X3 + 4776,951 * X4,$$

where X1 — GDP, billion UAH;

X2 — Employment rate, mln.;

X3 — Inflation rate, %;

X4 — average PIT rate, %.

From this equation the following conclusions should be made:

- if the factor variable «GDP» increases by 1%, the resulting variable «PIT revenues» increases by 0.079%;
- if the factor variable «Employment rate» increases by 1%, the resulting variable «PIT revenues» increases by 0.0016%
- if the factor variable «Inflation rate» increases by 1%, the resulting variable «PIT revenues» decreases by 2137.339 thousand UAH;
- if the factor variable «Average PIT rate» increases by 1%, the resulting variable income of PIT increases by 4776.951 thousand UAH.

To assess the strength of the relationship between the two factors, we perform a correlation analysis of the factors. A high correlation means that two or more variables have a strong relationship with each other, while a weak correlation means that the variables are almost unrelated.

The results of the correlation analysis of the factors are shown in *Table 3*.

Table 3

Correlation analysis of factors

Variables	(1)	(2)	(3)	(4)	(5)
(1) PIT	1.000				
(2) GDP	0.982	1.000			
(3) Employment	0.884	0.895	1.000		
(4) Inflation	-0.675	-0.729	-0.671	1.000	
(5) Avg. PIT rate	0.108	-0.008	-0.089	-0.389	1.000

The results of the correlation analysis indicate that all factors except inflation have a positive impact on PIT revenues to the budget. Thus, GDP and Employment rate have a fairly significant impact, while the tax rate is relatively small. Rising inflation, as a negative factor, reduces GDP, employment and PIT revenues.

For the reliability of the obtained results we make the linear regression. The data of the calculations of the results of linear regression are shown in *Table 4*.

Table 4

The results of linear regression

PIT	Coef.	St.Err.	p-value
X1 (GDP)	8.234	1.687	0.000
X 2 (Employment)	0.006	0.001	0.000
X3 (Inflation)	-4894.794	4298.628	0.074
X4 (Avg. PIT rate)	28324.463	7987.864	0.001
Constant	212274.457	17894.461	0.234
R-squared	0.984	Number of obs	65.000
F-test	815.431	Prob > F	0.000

According to the above data, one can conclude that the variation of the result variable by 98.4% is due to the variation of the selected factor variables, which is quite high and indicates a high dependence of the result variable on factors. P-value indicates a significant influence of all factors.

The results of regression and correlation analyses, together with the calculated linear regression indicate that PIT income is closely dependent on the overall macroeconomic situation in the country. The average tax rate has a significant impact on tax revenues.

Conclusion. The problem of further reforming the tax system of Ukraine in order to improve the mechanism of personal income taxation and filling local budgets is quite relevant, as evidenced by the lack of significant financial support and the inability of local governments to address socio-economic issues.

The important role of personal income tax is in filling local budgets, lack of significant financial support and inability of local governments to independently address socio-economic issues indicates the need for further development of theoretical and methodological bases of local taxation and more detailed study of the PIT role in the local financial system.

The performed analysis demonstrates that personal income tax is growing steadily, while its share in budget revenues is growing, and this proves the need to pay more attention to key factors of influence. Over the past 9 years, the absolute amount of PIT in the consolidated budget revenues increased by UAH 219,474 mln. and exceeded 24 % in 2019. These facts indicate that PIT revenues tend to increase and indicate the need to control its administration.

The factors influencing the personal income tax are as follows: economic, political and legal, demographic, socio-cultural and individual.

To perform regression analysis using the STATA program, the resulting variable Y was selected PIT Revenues, which is associated with the explanatory variables X: GDP, Employment rate, Inflation rate, Average PIT rate. The results of the analyses indicate that PIT revenues are closely dependent on the overall macroeconomic situation in the country, and the average tax rate has a significant impact on tax revenues.

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