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Tax gap management: theory and practice

Abstract. *Introduction.* The focus of the study is determined by the urgency of the task to increase the budgetary income, which is one of prerequisites for successful breakthrough of Ukraine in military-political and socio-economic crisis. Purpose: to ground the concept of application of the gap-management for better sustainability of the budgetary system. *The research* subject is the views on tax gap prevention, and their effectiveness in domestic practice. We were reviewing theoretical, methodological and practical foundations of tax administration improvement. Methodologically research is based on gap-management theory. Results. Specific misbalances inherent to the tax systems are generalized by the authors, i.e. between the outcomes of progressive and flat taxation, between public income and expenses at different level of government, in foreign economic activity depending on the location of VAT taxation, in the internal processes of defining tax credit on VAT, and in the time gap between consolidation of the GDP and generation of tax income to the budget. Based on critical assessment of the tax risk management, five stages of process were defined: exposure of risks, their evaluation, determination and introduction of the counter-measures, efficiency assessment of the results. *Conclusion.* The results are grounded in the critical comparative analysis of the practice of tax management in Ukraine and of the established international practices. The international standards of introduction of fiscal transparency, sustainability, and tax risk management were analysed in their interconnection and mutual impact. We introduced the model which explained strategic mechanisms and principles of state tax management by the shift of emphasis in the system of tasks from achieving of the planned indicators of tax income to the budget, to the minimization of the tax gap. On the practical side, our research provides recommendations for long-term prognoses on the tax income and reporting on the fiscal risks.
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Gap-менеджмент в оподаткуванні: теоретичний і прикладний аспекти

Анотація. У статті узагальнено специфічні дисбаланси, притаманні податковим системам: між наслідками оподаткування за прогресивною та рівномірною шкалами; між доходами й видатками бюджетів різних рівнів через наявність трансфертів; у сфері зовнішньоекономічної діяльності залежно від місця обкладання ПДВ; у внутрішніх процесах побудови схем податкового кредиту з ПДВ для оптимізації оподаткування; у часових лагах між створенням ВВП і генерацією податкових доходів бюджету. У результаті критичної оцінки положень податкового ризик-менеджменту виділено п'ять етапів процесу: виявлення ризиків, їх оцінювання, визначення та застосування контрзаходів, оцінка отриманих результатів із погляду ефективності. Наукова новизна теоретичного дослідження полягає в обґрунтуванні стратегічних механізмів і принципів державного податкового менеджменту на основі зміщення акцентів системи цілей із забезпечення виконання планових показників податкових надходжень до бюджету на мінімізацію чистого податкового розриву. Практичну цінність результатів статті складають рекомендації із побудови довгострокових прогнозів щодо податкових надходжень і формування звіту про фіскальні ризики.
Ключові слова: теорія; методологія; засади; управління розривами; ризик; оподаткування.

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Gap-менеджмент в налогообложении: теоретический и прикладной аспекты

Аннотация. В статье обобщены специфические дисбалансы, присущие налоговым системам: между последствиями налогообложения по прогрессивной и равномерной шкалами; между доходами и расходами бюджетов разных уровней из-за наличия трансфертов; в сфере внешнеэкономической деятельности в зависимости от обложения НДС; во внутренних процессах построения схем налогового кредита по НДС для оптимизации налогообложения; во временных лагах между созданием ВВП и генерацией налоговых доходов. В результате критической оценки положений налогового риск-менеджмента выделено пять этапов процесса: выявление рисков, их оценка, определение и применение контрмер, оценка полученных результатов с точки зрения эффективности. Научная новизна теоретического исследования заключается в обосновании стратегических механизмов и принципов государственного налогового менеджмента на основе смещения акцентов системы целей по обеспечению выполнения плановых показателей налоговых поступлений в бюджет на минимизацию чистого налогового разрыва. Практическую ценность результатов статьи составляют рекомендации по построению долгосрочных прогнозов относительно налоговых поступлений и формированию отчетов о финансовых рисках.

Ключевые слова: теория; методология; принципы; управление разрывами; риск; налогообложение.

1. Introduction

One of the major preconditions to overcome military-political and socio-economic crisis in Ukraine is to increase its budget. To attain this aim, we need to expend focus of assessment of the sound tax system by the government, and to promote tax system transparency to better inform of public on the size of the tax gap.

The tax level in Ukraine is indeed one of the highest in the world, thus it is limiting development of the private business and growth of the number of wealthy people. Therefore the issue of transformation of the tax system already shifted from purely economic to rather political, and is instrumental for the survivals of Ukraine as sovereign European nation. To solve this issue we need to develop socio-economic model of people's capitalism, which is natural and mentally apt for Ukraine.

There are several steps necessary for such development: to launch instruments of fiscal and budgetary public policies; to ensure friendly environment for the domestic producer, especially for small and middle businesses; to pursue the structural reforms (Soskin, 2010) [1-2].

The leading principles of the Organisation of Economic Cooperation and Development (OECD) prescribe to make public long-term forecasts of current tax policy sustainability (OECD, 2017) [3]. Forecasts should provide foundations for the analysis and alternative scenarios, which are taking into account such threats as ageing of population, exhaustion of natural resources, changes in trade or technologies etc. For Ukraine the need for the development of long-term forecast of tax revenues under the EU aspirations should not be underestimated.

Fiscal policy in Ukraine has periodic or aperiodic impact on economic dynamics, and adoption of referendums on important tax reforms may increase their efficiency (Kapeliush & Zadorozhnia, 2017) [4].

2. Brief Literature Review

The analysis of the research sources shows scholars, who study taxation issues, use concurring approaches to determine the basic concepts and principles of tax risks. Thus, Prymostka (2002) develop complex methodology of gap-analysis that includes the system of indexes of the gap analysis around the indicators of percent risk, liquidity gap, currency exposures of the bank, duration etc., as well as recommendations on their calculation [5].

This will allow to forecast the influence of the financial risks on the structure of balance and income of the bank, including time factor, and to have invariant analysis for the respective strategies.

Tarnai (2004) examines gap management as a component of the assets management in the bank, and use monitoring of cumulative gap to measure the net interest margin against change of the market rate [6]. The principal elements of financial percent risk management are: supervision by the board and top management of the bank; development of the proper procedures for decision-making, monitoring and management; internal and external audit.

Shvarts (2012) offers methodical approach to the improvement of evaluation and management of bank assets of the bank based on their sensitiveness to the change of interest rates when gap method (financial risk hedging) is used to manage percent risk [7]. The method of gap analysis allows banks to avoid liquidity crisis, to hedge financial risks and to take advantage on the changes of economic situation in short- to long-term perspective (Voloshko, 2003) [8].

Gap imbalances are also inherent to regional investment policies (Kogatko, 2016) [9]. Nations large in territory, with harsh climate and terrain, as well as urbanized nations with deep gap between more modernised cities and under-developed rural areas, often struggle to overcome territorial disproportions.

Volynskyi (2008) identifies gaps between the aggregate investment potential and resources, attracted by the financial institutions and the stock market, as well as between the size of potential and real investment resources [10]. Limitations of the tax transfer mechanism role produce the gap between primary and final income of Ukrainian population, leading to the differentiation of income tax rates on individual labour and capital, as well as the reduction of corporate income tax (Frolova, 2011) [11].

Iaroshenko (2014) analyses the EU experience and its adaptation for Ukraine in building tax charts, criteria for smoothing, identification of troublesome regions, which requires individual approach for each nation [12]. Gap method is aimed to reduce the gap between socio-economic indices of development of different countries, regions, and local communities.

Didyk (2016) elaborates on the evaluation of tax competitiveness of the enterprise with the analytic hierarchy process to identify the initial tax position of the enterprise and gap actual state of its tax system and capabilities of the tax environment [13].

Many scholars focus on the principles of taxation (Jones & Rhoades-Catanach, 2004) [14], analysis of enterprise exposure to the gap (La Cava & Nanetti, 2000) [15], gap impact on the corporation's cost of capital (ECLAC, 1997) [16], and the gender aspects of employment and salary (FAO, 2010; Chen, Huang & Su, 2017) [17-18]. In Fedulova (2016) we found comparison of the economies innovativeness in Ukraine and in the EU with regard to the means to overcome the existing gap between the two, especially through the review of small and middle enterprises taxation [19].

Hyz & Gikas (2012) study the situation in post-crisis Greece, where enterprises complain about lack of stability in the tax system, growing tax burden, limited access to the financial resources [20].

While the above mentioned scholars made profound insight to the subject, there are still plenty of unsolved issues in the domain of taxation imbalances, capable of negative influence on budget revenues.

3. Research purpose is to elaborate on conceptual principles of the use of gap management techniques to ensure budgetary system sustainability in the part of tax revenues.

We used risk management as a method of our research, applying it to the tax administration.

4. Results

The systems of taxation across the world have various classifications, based on different criteria: i.e. with respect to the dependence of tax rates on the object of taxation, progressive and flat taxation systems could be distinguished. The tax systems based on progressive scales are typical to many European countries. They prescribe higher payments by those tax payers who have bigger personal income, which is instrumental to smoothing inequalities in income of the members of society.

At the same time, progressive tax systems are complex and require stability of tax law, development of precise mechanisms for administration of taxes, and increased transparency. Progressive tax system has natural limits to its use: the volume of endogenous investment in the human capital is defined by the capacities of the economy to finance public expenditures in health protection and education, as well as by the size of private insurance (Heathcote, Storesletten & Violante, 2017) [21].

Taxes and principles of taxation are crucial factors which define the behaviour of individuals and organizations, thus having impact on neutrality of the tax system.

Therefore, the use of progressive scales has ambiguous influence on the budget revenues: from one side, while taxpayers are scrupulous in delivering due tax payments, the ability of the state to finance public goods is growing; on the other hand, the risk of opportunistic behaviour is surging, leading to the concealment of objects of taxation, transfer of business activity of the taxpayer into informal economy, use of other forms of tax avoidance (Rosengard, 2012) [22].

Flat approach to the tax system is based on the distributed-neutral methodology of taxation, and is widespread because it is more clear and transparent to the taxpayers and is relatively easy administrated (Kaplow, 2011) [23]. The most important principles of the flat taxation are: wide reach of respective tax payers; the choice of such goods and services for the objects of taxation which are less vulnerable to the price surges; rejection of the overstated tax rates.

Ukrainian practice of the revenue generation for the consolidated budget has its sound peculiarities: non-tax revenues constitute a considerable part of income, manifesting limitations of the market mechanisms in the budget policy. Ukraine also has flat system of taxation («flat rate»). The main sources of the budget revenues are: direct taxes (corporate income tax and personal income tax); indirect taxes within price of the products (excise duties, VAT).

The share of tax revenues of the budget is steadily growing: while in 2015 it equalled 77.85%, in 2017 it reached 81.43% (see Table 1). The share of tax revenues of the budget is steadily growing: while in 2015 it equalled 77.85%, in 2017 it reached 81.43% (see Table 1). Tax burden is highest on the end consumers of good, services and works. Their share in the structure of taxes paid grew in 2015-2017 from 49.1% to 52.77%, while the shares of VAT raised from 35.15% to 37.91%, and for excises - from 13.95% to 14.66%. During the period under analysis we witnessed the shift of tax burden on private taxpayers as the share of taxes paid by them in the general amount of taxes grew from 19.7% to 22.42%. The share of corporate income tax settled down at 7.69%-9.25%.

To ensure the corporate income tax will raise to more prominent role in budget revenues there are several possible measures to be taken: revision of the object of taxation (to switch income tax to taxation of the owners interests of investment in other enterprises); tax rate cuts; establishment of corporate capital reserves to compensate on tax losses (Menezes, 2012) [24]; differentiated tax rates to tackle innovative objects of taxation and to stimulate their production and implementation (Gillitzer, Kleven & Slemrod, 2017) [25].

Elasticity of taxable corporate income (ETI) is a key index for the analysis of income tax efficiency and of the revenues from the income tax (Matikka, 2018) [27]. Changes of the fixed income tax rates are instrumental for the changes in the marginal tax rates. ETI instrument is not the function of individual income, and its estimation is less exposed to the slip caused by the differentiated trends in income distribution.

Policy of tax competition can indirectly influence on taxation efficiency through the change of ability of companies to transfer the tax burden on the end consumer. Total effective maximum tax rate depends on the maximum taxes on every element of production, and on the degree of their complementarity and on probability of mark-up in the final price comparing to the marginal production costs (Keen, Klemm & Perry, 2010) [28]. Unreasonable income tax rates are the reason for the tax inflation: they produce financial leverage effect due to the effects by tax corrector and differential of financial leverage (the latter constitutes the difference between economic efficiency and weighted average interest rate on the credits generated by the enterprise).

Tax risks are inherent to the tax systems worldwide, they could not be minimized, but they are manageable. Risk-oriented mechanisms of the adaptive tax management are

Tab. 1: **Consolidated budget of Ukraine revenues, 2015-2017**

Year	Total revenue	Including							
		Tax revenues							Non-tax revenues
		All tax	*Including*						
			Personal income tax and charge	Corporate profit tax	Value-added tax	Excise tax	Local taxes and charges	Other taxes and charges	
million UAH									
2015	652,031.0	507,635.9	99983.2	39,053.2	17,8452.4	70,795.2	27,041.3	92,310.6	140,154.4
2016	782,859.5	650,781.7	138,781.8	60,223.2	23,5506.0	101,750.7	42,261.6	72,258.4	125,502.9
2017	1,016,969.5	828,158.8	185,686.1	73,396.8	31,3980.6	121,449.4	53,282.3	80,363.6	154,552.1
structure, %									
2015	100.0	77.85	15.33	5.99	27.37	10.86	4.15	14.16	22.15
2016	100.0	83.13	17.73	7.69	30.08	13.00	5.40	9.23	16.87
2017	100.0	81.43	18.26	7.22	30.87	11.94	5.24	7.90	18.57
structure, %									
2015	X	100.0	19.70	7.69	35.15	13.95	5.33	18.18	X
2016	X	100.0	21.33	9.25	36.19	15.64	6.49	11.10	X
2017	X	100.0	22.42	8.86	37.91	14.66	6.43	9.70	X

Source: Ministry of Finance of Ukraine (2018) [26] focused on proper identification of the negative factors, capable to impact economic interests of the tax payers: (1) challenge - ambitions of the subjects of the economy to pursue their own interests; (2) alertness - potential to limit economic interests because of growing probability of negative outcome and potential vulnerability; (3) insecurity - moderate probability of negative influence on the interests of the subjects; (4) threat - most significant negative factor, defined by the high level of possible negative outcomes and their high probability (Romanenko, 2014) [29-30].

The existence of the tax risks is manifested in the tax gap, which is defined as a difference between the total amount of taxes, that should be paid in theory, the total amount of taxes actually paid (Vdovychenko & Zubrytskyi, 2013). This definition is grounded on the purpose of the very concept of tax gap - to evaluate basic threats to the tax base [31]. Theoretical assessment of the total amount of taxes, that should be paid, takes account of the level of economic activity, and is based on the assumption that all tax payers are acting in full compliance with the letter and the spirit of law.

A gross tax gap allows to quantitatively measure the non-compliance with the tax legislation of all types: direct violations of the tax legislation (absence of tax report, fraud, negligence, errors, defaults, undue payments), as well as tax avoidance.

A net tax gap is a gross tax break minus the amount of taxes exacted by the control authorities.

Today three main techniques are used to measure tax gaps: «top down approach» for the indirect taxes, «bottom up approach» for the direct taxes, and expert evaluation.

The general aim of the gap management as a system is to enable strategic management of imbalances in the process of taxation, in line with the chosen tax policy. Gap management sub-systems share same object - tax risks, but have different subjects of management, and their own specific aims in line with subject. The aim of the state gap management is to generate maximum revenues to the budget, according to the existing parameters of the tax system. Gap management is focused on the formalization of tax risks of the enterprises - taxpayers, on the estimation of their tax burden, on the exposure of problem areas, and on their consideration in the planning of paper audits Bakker & Kloosterhof, 2010) [32].

In 2010 the European Commission issued the «Compliance of risk management guide for tax administrations» (European Commission, 2010) [33], which present generalized experience of all 25 countries of the EU. Risk-management in taxation, according to this Guide, is the process of increase of the efficiency of tax administration in the risk-full environment. The government has to publish regularly reports on the long-term state of public finances, against the expected tax gaps, and to present measures to overcome these gaps.

The aim of the tax gap management for the enterprises is to ensure their long-term sustainable development on the basis of tax risks management, to optimize the tax burden and to execute in full taxpayer's obligation to the budget. Tax strategy of the enterprise has to consider all aspects of its economic activity, methods of financing, location and corporate structure (Bragg, 2011) [34]. This strategy is issued by the internal regulations, such as Provisions on Risk Management - a document which is defining key elements of the internal system of management, necessary for the chief executives to examine if the measures taken are sufficient to reduce risk to the enterprise. Provisions also should regulate on some important issues: formalize policies and procedures for the management of major risk; determine rights, duties, plenary powers, communicative connections risk-manager; regulate the use of the security instruments, both internal (limitations, diversification) and external (insurance). For the management of tax imbalances risk manager should elaborate on the efficient tax policy of the enterprise, in accordance with the accounting standards (Goerke, 2008) [35].

The gap management include following stages: detection of risks, their assessment and analysis (perception, elimination, and counter-measures), monitoring, and evaluation of the results. While the risks are assessed, they are distributed to the baskets of financial (probability of loss of revenues) and non-financial (probability of moral harm) risks. The risk could be excepted if these probabilities are low. On the other hand, if the probabilities of negative scenarios are high, the relative risks require further improvement of the operations (business processes, reporting practices etc.), and personnel training. Thus, against high probability of risks we should apply full counter-measures.

To immediately minimize risks, different methods could be applied: diversification, additional information on choices and outcomes, limitations, insurance and self-insurance, tax consulting. There are also methods which could be applied against risks not associated with criminal or administrative liabilities. Such methods are limited to the optimization of business activity and include business agreement optimization, method of division, tax payment delay, direct reduction of the object of taxation, offshoring, use of tax deductions.

International standards preclude the practice of prospective plans for tax revenue collection by the tax authorities, because such an approach is limiting budgetary process transparency, and undermines trust to tax policy. Instead, the emphasis is made on the expansion of sustainability assessments, thus providing government and civil society with better insight on the volume of the tax gap to be expected. State Fiscal Service of Ukraine must obtain formal legal protection from any politically motivated policy intervention, and has to ensure rights of the tax payers and orderly reporting on its activity to the general public. Information on tax and budget activities should be the matter for external audit. State Statistics Service of Ukraine should have institutional and legal independence in its audit of fiscal data.

In Ukraine we still see considerable vertical and horizontal tax gaps. Local budgets' expenditures are substantially exceeding revenues, and this margin is covered by the budget transfers. The share of transfers from the central budget of Ukraine in the local budgets grew from 11.01% in 1993 to 62.12% in 2015 (see Figure 1). Only in 2016-2017 we saw some redaction of the share, to 55.75% and 54.95% respectively. They could be described by the polynomial function of the second kind with quadratic determination coefficient $R^2 = 0.9555$, and shows strong trend to the growth, whose turn was defined by the launch of decentralization reform. Tax reform has positive impact on the role of local taxes and duties as the important source of revenue for the local budgets.

The share of local taxes in the consolidated budget of Ukraine grew in 2015-2017 from 5.33% to 6.43% (see Table 1). Thus real estate tax, which is the prerogative of the local government, has substantial financial potential in budgetary terms.

Export-import may present another potential cause of tax gaps, if symmetrical imbalance in two-way models of tax competition exists, with taxed goods continuum in the country [36]. To remove such a gap, only two tax rates on different goods could be applied: positive or zero. The choice of taxation mode in the country will depend on the balanced tax rules, in order to ensure positive level of revenues from the total amount of taxed good. According to the country

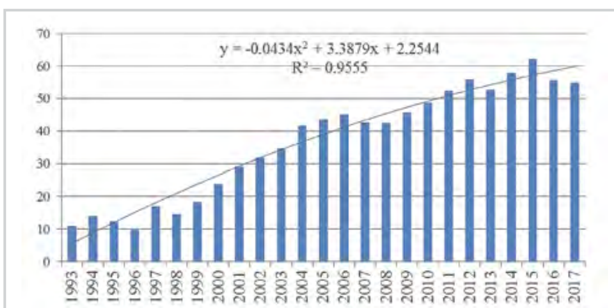

Fig. 1: **Share of transfers from the central budget of Ukraine in local budgets expenditures, 1993-2017, %**
Source: Ministry of Finance of Ukraine (2018) [26]

of consignment concept, goods and services are the subject to VAT in the country of their end consumption. All exported goods are not the subject to the taxation due to the zero rate applied, while imported goods are taxed in full, according to the local tax rates. Goods are subject to VAT in the country they are imported to, and not in the country of origin. Under the place of origin concept goods or services are taxed in the country of origin, and the administration of VAT is considerably simpler because there is no use of control of foreign economic related taxation. Under the place of origin concept tax base is narrower, while under the place of consignment concept the tax base is optimal.

Theory of national accounts provides the way for improvement of VAT taxation based on the estimate of statistical tax rates; the latter equal current tax rate multiplied by the share of goods (services) that require export compensation in GDP. «Input-output» balance approach to calculation of VAT can be used for the analysis of compliance with contemporary legislation, and minimization of cases of tax fraud and valuation of tax deductions [37].

VAT provides steady and substantial budget revenue in the EU nations, yet its role in the national economy depends heavily on the efficiency of tax collection (Mihóková & Andrejovská, 2014) [38]. The evaluation of total non-payments volume on VAT in Slovakia were conducted with indirect method based on principle of top-down analysis of the spreadsheets of resources and «expense on production» (Mihóková, Andrejovská & Buleca, 2016) [39]. Results show that an average gap on VAT is about 40%, roughly equal to the results by the Centre for Social and Economic Research (Warsaw, Poland). Nowadays the European Commission pays much attention on the increase of VAT collection and counteraction to tax avoidance, and is pushing for the shortening of gap between expected VAT and its actual revenue (Voronkova & Kosova, 2016) [40].

Evaluation of the tax gap on VAT, which is one of the main sources for the budget revenue, was conducted on the basis of evaluation of budget losses as shown by the return of tax credit on declarations (State Fiscal Service of Ukraine, 2011, 2012) [41-42]: beneficiary here is the enterprise which produce tax credit with transitors and «tax holes»; a transitor is an enterprise taking part in VAT movement, seal fake agreements for its illegal refund, whose tax credit can equal its tax obligations; a «tax hole» is an enterprise which is used by other tax payers for the sake of «tax benefit» - tax avoidance or illegal VAT refund from the budget (Kosova & Polzikova, 2017) [43]. In the structure of tax gaps on VAT, more than a half of gaps are due to beneficiaries, while transitors and «tax holes» splitting the other half in two between each other.

State Statistics Service of Ukraine provides data on gross national income and taxes except for subsidies on production and import on quarterly basis. Median values calculated based on data for 2014-2017, are growing quarter after quarter (see Figure 2):

- taxes - from 77,731.5 mln UAH to 94,565.3 mln UAH,
- GDP - from 424,889.3 mln UAH to 658,990.8 mln UAH.

Seasonal tax values fluctuate substantially: we have the following minimum and maximum values on quarters (see Figure 3):
1Q (87.93% in 2014 and 106.93% in 2017),
2Q (94.98% in 2017 and 106.27% in 2014),
3Q (95.17% in 2016 and 99.24% in 2015),
4Q (99.21% in 2014 and 102.94% in 2017).

Graphic visualization of seasonal components in taxes and GDP is provided in Figure 4-5.

B 1. Original series
Total: 13583e2 Mean: 84891.5 St.Dv: 24970.5
TAX

Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Total
2014	40723.0	52439.0	51522.0	59509.0	204193.0
2015	70765.0	76128.0	83552.0	85470.0	315915.0
2016	82340.0	93922.0	90570.0	102512.0	369344.0
2017	117098.0	105250.0	115694.0	130770.0	468812.0
Avg	77731.5	81934.8	85334.5	94565.3	0.0

(a) taxes

B 1. Original series
Total: 88540e2 Mean: 553376, St.Dv: 160866
GDP

Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Total
2014	314676.0	376414.0	434089.0	443593.0	1568772
2015	366862.0	449841.0	566151.0	581415.0	1964269
2016	443463.0	541259.0	657240.0	719548.0	2361510
2017	574556.0	666480.0	827017.0	891407.0	2959460
Avg	424889.3	508498.5	621124.3	658990.8	0

(b) GDP

Fig. 2: **Taxes and GDP median values, 2014-2017, mln UAH**
Source: Own calculations

D 8. Final unmodified SI ratios
Table total: 1591.30
TAX

Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Avg
2014	87.9307	106.2749	95.88346	99.2133	97.3256
2015	103.2003	98.6566	99.24427	101.4661	100.6418
2016	97.2085	104.6914	95.18643	99.6466	99.1832
2017	106.9305	94.9785	97.85611	102.9372	100.6756
Avg	98.8175	101.1503	97.04256	100.8158	

(a) taxes

D 8. Final unmodified SI ratios
Table total: 1600.83
GDP

Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Avg
2014	81.95278	96.67517	110.5523	109.7166	99.7242
2015	84.00153	94.40283	111.4386	111.3555	100.2996
2016	82.50260	95.83141	109.4079	111.8307	99.8932
2017	84.02903	93.68578	109.8134	113.6319	100.2900
Avg	83.12148	95.14880	110.3030	111.6337	

(b) GDP

Fig. 3: **Taxes and GDP median values, 2014-2017, %**
Source: State Statistics Service of Ukraine (2018) [44]

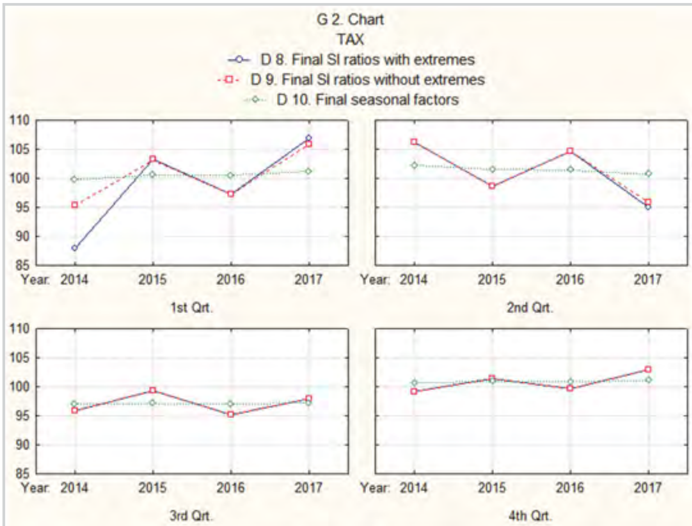

Fig. 4: **Graphic visualisation of seasonal tax components, %**
Source: Own calculations

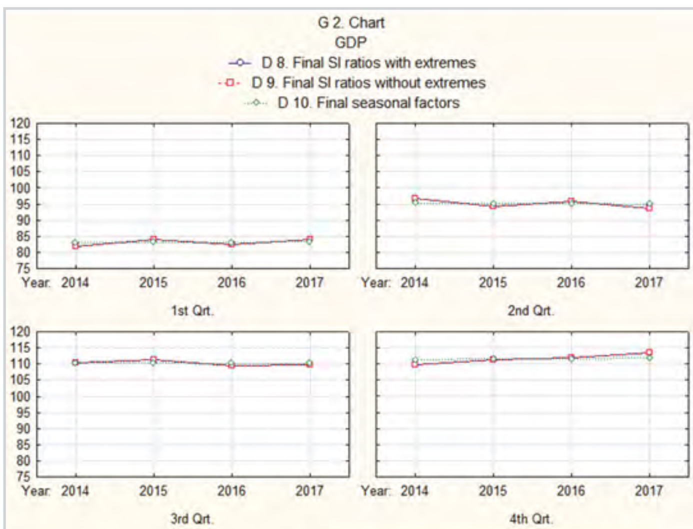

Fig. 5: **Graphic visualisation of seasonal GDP components, %**
Source: Own calculations

GDP distribution on quarters is more even which is obvious from the very visual overlap of GDP graphs with extremum, without extremum, and of final trend.

Seasonal tax and GDP trends are shown in Figure 6.

Seasonal tax components in 1Q and 4Q exceed 101%, in 2Q they equal annual medium value, and in 3Q they slightly larger than 97%. Forecasted GDP distribution on quaters for 2018 (estimated based on 2014-2017 data) is:

- 83.33%,
- 94.79%,
- 110.2%,
- 111.91%.

Thus, in first and second half-years we see the gap between tax revenue and GDP. Quarterly relative tax-to-GDP ratio (estimated based on forecasted seasonal trends) is:

1Q: 1.22;
2Q: 1.06;
3Q: 0.88;
4Q: 0.90.

See Table 2 for formalised trends of quarterly tax volumes, based on 2014-2017 data.

D 10. Final seasonal factors, 3x5 moving average
Table total: 1599.74 TAX

Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Avg
2014	99.7939	102.1951	97.02164	100.6245	100.0
2015	100.6041	101.4903	97.12487	100.9013	100.0
2016	100.5194	101.4544	97.04364	100.8149	100.0
2017	101.1655	100.7309	97.21198	101.0448	100.0

D 10a. Seasonal factors one year ahead
TAX

Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Avg
2018	101.4885	100.3691	97.29616	101.1598	100.0

(a) taxes
(2018 - forecast)

D 10. Final seasonal factors, 3x5 moving average
Table total: 1600.14
GDP

Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Avg
2014	82.97609	95.31536	110.3355	111.3229	100.0
2015	83.13156	95.13819	110.2561	111.5495	100.0
2016	83.08612	95.10831	110.2347	111.5344	100.0
2017	83.25500	94.89466	110.2107	111.7873	100.0

D 10a. Seasonal factors one year ahead
GDP

Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Avg
2018	83.33943	94.78783	110.1987	111.9137	100.0

(b) gross domestic product
(2018 - forecast)

Fig. 6: **Final seasonal tax and GDP trends, %**
Source: Own calculations

Tab. 2: **Formalisation of quarterly tax trends in Ukraine, 2014-1017**

Function type	Function equation	Multiple determination ratio R^2
Logarithmic	$y = 30,547\ln(x) + 26,333$	0.8737
Exponential	$y = 45,806e^{0.0669x}$	0.9295
Step	$y = 37,005x^{0.4081}$	0.9493
Linear	$y = 5,301.1x + 39,832$	0.9577
Polynominal	$y = -33.016x^2 + 5,862.4x + 38,148$	0.9583

Source: Own calculations

Dynamics of the tax revenue with high multiple determination ratio R^2 is formalized in five presented functions, and the most accurate way to determine it is by the parabola. Despite different properties of the function, they all demonstrate strong trend to the growth of tax volume.

5. Conclusion

The results of our research are based upon critically generalized overviews of the current practices of taxation on management in Ukraine and worldwide. An approach based on systematization of international standards of fiscal transparency, stability, and tax risks management provides the optimal insight into practical issues of tax management.

Within the generalized picture of specific imbalances inherent to the tax systems we distinguished the following: among the outcomes of progressive and flat taxation; among revenues and expanses of the budgets at different levels of government (due to the application of the transfers); in the foreign economic activity depending on the location where VAT is applied; in the internal structure of tax credit for VAT in order to optimize taxation; in time gaps between generation of GDP and generation of tax revenue for the budget. Five stages of the tax risk management were defined: detection of risks, their assessment, determination and application of the counter-measures, and evaluation of the results.

To ground the strategic mechanisms and principles of public tax management the change in emphasis in the aims of implementation process for attaining of planned tax revenue which was shifted towards the minimization of net tax gap. Based on the results of our research we also elaborated recommendations on long-term prognoses on tax revenue and generation of the reports on fiscal risks.

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