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The methodologies of shadow economy estimation in the world and in Lithuania: whether the criteria fixing digital shadow are included?

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Abstract

The article covers an extremely topical but hardly researched problem of digital shadow economy estimation. Thus far, the phenomenon of digital shadow economy has not been universally defined either by scientists or by institutions responsible for the combat with shadow economy. Traditional shadow economy is commonly estimated applying direct and indirect methods possessing their strengths and weaknesses. As a result, final estimations of shadow economies are rather variant. For instance, with reference to Schneider (2014), the scope of shadow economy in Lithuania achieved 27 per cent rate in 2014 whereas the figure estimated by Lithuanian Department of Statistics composed 15 per cent rate. It can be presumed that the divergence of the results has been determined by application of different shadow economy estimation methods. The interviews with the experts of shadow economy have revealed that although the volumes of e-trade and e-transactions are increasing, indicators of digital shadow are not still included in the estimations of shadow economy.

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Keywords: shadow economy, digital shadow economy, methodologies of shadow economy evaluation, direct and indirect methods, Lithuania.

1. Introduction

Topicality of the problem. The phenomenon of digital shadow economy has been analysed in numerous scientific and information sources due to its specificity and depth of the problem. Thus far, the concept of shadow economy has not been precisely defined either in national or in international levels, which serves as the key reason for rather

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different scopes of shadow economy calculation and estimation. According to Zukauskas (2013), estimation of the real scopes of labour market shadow, as well as estimation of the other shadow economy activities, is complicated since shadow market operators are inclined to hide their activities.

For the purpose to describe shadow economy and estimate its scopes, at least roughly, the variety of methods is engaged. Following the statistics, the figures of shadow economy in European countries are significantly different. The scopes of shadow economies in the countries of Central, Eastern and Southern Europe are considered to be the highest. Transfer of business activities to electronic space alongside with increasing volumes of e-trade determine the need to establish which share of shadow economy has been transferred to remote (electronic) platforms. The fact that the concept of shadow economy has not been universally defined in any official documents, proposes that this sphere has been insufficiently researched.

Existence of the variety of shadow economy estimation methodologies raises the problem of data variance. Thus, it cannot be presumed that the methodologies engaged for estimation of traditional shadow economy are also suitable for estimation of digital shadow economy.

Following the information in the issue “Shadow economy. Control results and report for 2009-2014” (2015), the research of empty cigarette packets performed by the order of tobacco companies as well as the survey-based research of illegal market of alcohol beverages performed by the order of Lithuanian Free Market Institute, are attributed to the direct methods of shadow economy estimation.

Direct methods of shadow economy estimation (alongside with indirect ones) earn rather much scientific criticism. The main argument here is data unreliability since an ordinary respondent may falsify the information, especially if it is directly related to the shadow activities performed by the respondent himself. However, Pahl (1984) argues that questionnaire data on shadow economy can be considered reliable and reasoned. The author compared the results of suppliers’ and consumers’ answers, and the comparative analysis revealed the same scopes of shadow economy.

To fulfil the aim of the research and identify the features of digital shadow economy, two famous Lithuanian experts of shadow economy – Nerijus Genys, executive of the Department of Economic Development under the Government of the Republic of Lithuania and Vytautas Zukauskas, vice president of Lithuanian Free Market Institute – were interviewed. The interviewees were asked to specify the features that would enable to detect the performance of shadow economy in digital space.

The aim of this article is to establish whether there exist any criterions (indicators) of digital shadow economy, which would be included in the overall estimation of shadow economy.

To fulfil the defined aim, the following objectives were raised: 1) to analyse global methodologies of shadow economy estimation; 2) to present the statistical data on the scope of shadow economy in Lithuania, estimated engaging different methodologies; 3) to establish whether the indicators of digital shadow economy are included in currently available methodologies of shadow economy estimation.

The methods of the research include comparative and systematic analysis of the scientific literature, interview and statistical data analysis.

2. Global problems of shadow economy estimation methodologies: theoretical background

Estimation of the scopes of officially unrecorded economy as well as evaluation of the impact of various determinants on this phenomenon is a complicated task. For this purpose, scientific literature offers three types of methods: *indirect methods*, which enable to estimate the scope of shadow economy engaging quantitative indicators (Williams *et al.* 2007; Fethi *et al.*, 2006; Alanon, Gomez-Antonio, 2005; Sookram *et al.*, 2009); *direct methods*, which cover qualitative data collection techniques such as surveys, interviews or expert (Williams *et al.* 2007; Williams, Nadin, 2012b, 2012c; Putnins, Sauka, 2014) and *models* (Schneider *et al.*, 2010; Alanon, Gomez-Antonio, 2005; Dell’ Anno, Solomon, 2008, etc.). The issue “Shadow economy. Control results and report for 2009-2014” (2015) proposes slightly different classification of shadow economy estimation methods: direct (surveys and audit), indirect (engagement of the data from national accounts, monetary and expenditure methods) and mixed (collation) methods.

Indirect methods are based on the usage of numerical values, varying from non-monetary indicators, such as the number of small and medium enterprises or demand for electricity, to monetary indicators that cover turnover of high denomination banknotes, cash contribution ratio, the number of cash transfers, income/expenditure discrepancies (estimating in both household and national level), GDP, employment, tax rate. In the course of time, scientists (Organization for Economic Co-operation and Development (2002); Williams (2004); Williams (2006))

have started losing their interest in indirect methods since they have revealed themselves as comparatively inaccurate, with limited application opportunities, determined by data disparities. Such conclusion was made by the experts of OECD (OECD, 2002), European Commission in their report on undeclared job (Renooy et al., 2004) and scientists, who assessed and compared strengths and weaknesses of direct and indirect estimation methods (Williams, 2004; Williams, 2006; Williams, Windebank, 1998; Williams, 2009; Schneider, 2006).

With reference to Fethi *et al.* (2006), indirect methods lean on discrepancies of the statistical data while comparing manufacture and consumption records. These methods are otherwise known as macroeconomic or indicator methods, applying which the variety of economic indicators are engaged to calculate or estimate the scope of shadow economy. The methods can be composed of *GDP (or GNP) discrepancy approach, employment (or labour) discrepancy approach, the tax auditing approach, electricity consumption approach* and *cash/monetary approach*.

GDP (or GNP) discrepancy approach is applied involving the values of GDP. Calculations are based on three different methodologies – manufacture, income and expenditure. Despite engagement of multi-methodology, the results of all the calculations have to coincide. If there exists any surplus between the GDP (or GNP) calculated engaging the method of income (manufacture) and the GDP (or GNP) calculated engaging the method of expenditure, the surplus might be used as an indicator that shows the scope of officially unrecorded economy. Nevertheless, this approach was criticised (Pissarides, Weber, 1989) due to unreliable conclusions arising from discrepancy between the results obtained applying both methods. Moreover, the approach is considered to disclose all the errors and inaccuracies in statistics, including shadow economy.

Following employment (labour) discrepancy approach, the decrease in participation of the labour force in officially recorded labour market can be treated as an indicator of increased shadow economy since the overall labour force is considered to be a *constant*. This approach proposes that increases of employment rate in black markets determine decreases of population and the employed ratio as well as population and labour force ratio. Employment (labour) discrepancy approach enables performance of a simple ratio analysis for easier calculations and comparisons. Nevertheless, this approach has two key weaknesses. First, the fact that people may work two jobs, i.e. a full-time job in official economics and a part-time job in unofficial economics, is not considered. Second, the differences of participation in labour market might be determined by other reasons, for instance, demographical changes (increased women's unemployment or increased employment moving from villages to cities). According to Fethi *et al.* (2006), calculations may reflect unreliable results and misleading conclusions.

The tax auditing approach has been widely used in many countries during the last three decades. Taxpayers usually report their income rate to tax inspectorates. However, the information on income taxes or tax refunds may appear to be inaccurate due to tax evasion or circumvention of tax laws. Thus, to obtain the comprehensive data, tax officials often follow the conclusions of taxpayers' audit. If the officials identify any undeclared income, this amount may be treated as an indicator of shadow economy (Greenberg, 1984).

In their study, Fethi *et al.* (2006) state that electricity consumption approach goes back to 1979, when it was firstly applied by Lizzeri (1979). Later the approach was developed by Kaufman and Kaliberda (1996), and Lacko (1997; 1998). Following Kaufman-Kaliberda method, electricity consumption probably is the best indicator of both officially recorded and unrecorded economy. This approach covers estimation of unregistered GDP as well as unregistered consumption. It proposes that the difference between official GDP growth and electricity consumption growth is an indicator of shadow economy growth. However, electricity consumption approach was criticised by Lacko (1997; 1998), who argues that the scopes of shadow economy are related not only to electricity consumption in households, but also to production in households. Thus, the biggest disadvantage of this approach is that officially unrecorded economy is estimated leaning only on electricity consumption whereas consumption of any other kinds of resources, for instance, oil, gas, etc., is not considered.

The practice of cash/monetary approach has enabled to distinguish three varieties - *simple currency ratio approach, transaction method* and *currency demand method*.

Simple currency ratio approach is one of the most popular approaches while estimating the scope of shadow economy (Fethi *et al.*, 2006). The key principle of this approach is consideration that the increase of currency resources and payments is a reliable indicator of performed transfers, which are not declared to governmental institutions. Nevertheless, the approach is based on the restrictive presumption that unregistered transfers are always made in particular currency, i.e. checks are never used. Transaction method proposes that the difference between the overall volume of payments and the total amount of transfers reveals the overall volumes of unregistered transfers. In other words, transaction ratio increase is linked with the increase of officially unregistered economy. Finally, the

key principle of currency demand method is that the rise of shadow economy scope will determine the increase of the demand for money.

After the criticism towards indirect methods of shadow economy estimation, *indirect methods*, especially surveys, have earned more scientific attention (OECD, 2002; Renooy *et al.*, 2004; Williams, 2004; Williams, 2006; Williams and Windebank, 1998; Williams, 2010; Williams and Nadin, 2012 a). In answer to that, the European Commission assessed feasibility of direct surveys on the scope of undeclared labour all over the EU (European Commission, 2005). The main advantage of direct surveys while estimating the scope of shadow economy is acquisition of the data on its current scope and spread. Unfortunately, the biggest part of direct surveys are small-scaled, surveys are usually directed towards specific areas, and households become the basic units of such surveys (Williams, 2009; Williams and Nadin, 2013). According to Fethi *et al.* (2006), direct methods are actually micromethods that include the data obtained from voluntary answers, tax audit or other research methods (interview, expert evaluation). With reference to the issue “Shadow economy. Control results and report for 2009-2014” (2015), the research of empty cigarette packets performed by the order of tobacco companies as well as the survey-based research of illegal market of alcohol beverages performed by the order of Lithuanian Free Market Institute, are attributed to the direct methods of shadow economy estimation.

The same as the indirect methods of shadow economy estimation, *direct methods* also earned much scientific criticism. Unreliability of survey data was pointed as the basic disadvantage of these methods since an ordinary respondent may falsify the information, especially if it is directly related to the shadow activities performed by the respondent himself. However, Pahl (1984) argues that questionnaire data on shadow economy can be considered reliable and reasoned. The author compared the results of suppliers’ and consumers’ answers, and the comparative analysis revealed the same scopes of shadow economy. Similar results were obtained by MacDonald (1994), Williams (2004), Williams (2006), Williams and Windebank (1998), which proposes that although respondents are inclined to hide their shadow activities with a view to avoiding taxes or social insurance contributions, they are usually sincere during the surveys since they possibly are dissatisfied with the current situation. This argument was also supported by Fethi *et al.* (2006), who confirmed that questionnaire surveys allow to obtain accurate and detailed information.

With reference to Williams (2007), although respondents’ answers are sincere, direct methods have their drawbacks. On one hand, they are applied only for research in service sectors (especially domestic services) and estimation of final demand (consumer expenditure for goods and services) rather than for estimation of intermediate demand, surveying representatives of business enterprises. Since final demand covers only two-thirds of the overall expenditure, it is proposed that not only households, but also business enterprises must be involved in the surveys. On the other hand, the biggest part of direct surveys cover small-scale studies in particular sector, group or area. Thus, the map of shadow economy spread all over the country is difficult to be drawn following only the small-scale data. Another drawback was envisaged by Fethi *et al.* (2006), with reference to whom not all respondents are inclined to answer the questions. Even if they fill in the questionnaire, empty spaces are often left, which distorts final results. Herwartz *et al.* (2013) also speak up for inadequacy of direct methods for regional research of shadow economies, pointing at low suitability of these methods to accumulate wide-scale data. Indirect methods are recommended to be used for the research of this scale.

The main model designed and the most widely engaged for estimation of the scopes of shadow economy in Europe is MIMIC (Multiple Indicators Multiple Causes) model or so-called SEM (Structural Equation Model) (Schneider *et al.*, 2010; Alanon, Gomez-Antoio, 2005; Dell’ Anno, Solomon, 2008). The key purpose of SEM is to research the links between independent and dependent variables. In MIMIC model, dependent variable is shadow economy whereas independent variables may include, for instance, the size of government, share of direct taxes, overall tax burden, fiscal freedom index, business freedom index, economic freedom index, unemployment rate, GDP per capita, regulation quality, government efficiency, openness rate, inflation rate, etc., depending on the scope of calculations. The calculations also include particular indicators (the rate of labour force participation in the market, GDP per capita, currency, GDP growth rate). According to Alanon and Gomez-Antonio (2005), structural equation models (MIMIC model is one of them) are used for estimation of the influence between specific causal variables, i.e. engaging the models of this type, shadow economy is treated as linear combination of causal variables. As it was stated by Herwartz *et al.* (2013), MIMIC model estimates the causes of shadow economy scope, such as tax burden, regulation rate, unemployment, currency rate or participation of the unemployed in the labour market.

Schneider (2006) highlights the following key causes of shadow economy: the burden of direct and indirect taxes, which, while increasing and growing, serves as a strong incentive to act in shadow economy; excessive regulation

rate and “tax moral” (citizens’ attitudes towards the state), which reveals individual readiness to leave an official occupation for shadow activities. Fluctuating scopes of shadow economies are disclosed by the following indicators (Schneider, 2006): 1) Development of monetary indicators. If activities in the shadow economy rise, additional monetary transactions are required; 2) Development of the labour market. Increasing participation of workers in the hidden sector results in a decrease in participation in the official economy. Similarly, increased activities in the hidden sector may be expected to be reflected in shorter working hours in the official economy; 3) Development of the production market. An increase in the shadow economy means that inputs (especially labour) move out of the official economy (at least partly), and this displacement might have a depressing effect on the official growth rate of the economy.

3. The statistics of shadow economy scope in Lithuania by different methodologies

In Lithuania, the scope of shadow economy is estimated by Lithuanian Department of Statistics and Free Market Institute. It should be noted that the data on the existing scope of shadow economy in the country is extremely different. The basic reason of existing differences is that unequal scopes of shadow economy are estimated applying different methodologies. For instance, Lithuanian Department of Statistics (LDS) link the key macroeconomic indicator – GDP – with unrecorded economy (this term is proposed by Lithuanian Department of Statistics). Estimating the scopes of unrecorded economy, LDS concentrates on GDP estimation by *production* and *revenue* methods since international practice of national accounting shows that namely these indicators enable to reveal the cases of unrecorded economy whereas neither producers nor consumers are not inclined to conceal their expenditure (LDS, 2004). Estimating GDP by production method, the initial stage is to estimate the volumes of production and intermediate consumption of goods and services. As a result, value added created by producers is calculated. The total amount of value added by various economic activities stands for the estimated GDP. Applying revenue method, revenues generated during the process of production (wages, surplus of production activities or mixed revenue) are considered. Estimating the scope of officially unrecorded economy, LDS engages mixed methods of data acquisition: *direct* (survey of tax inspectors), *indirect* (publically available information announced by Enterprise Statistics Department on revenues per employee by different activity spheres and enterprise size groups). As it can be seen from the data presented in Fig. 2, during the period of 2011- 2014, LDS has captured the same 15 per cent scope of shadow economy in Lithuania annually. Since 2011, LDS estimations include drug trafficking, tobacco and alcohol smuggling, and prostitution.

Estimating the scope of shadow economy in Lithuania during the period of 2011- 2014, Lithuanian Free Market Institute (FMI) announces the figures that are by 10 – 13 per cent higher in comparison to the ones announced by LDS (comparing the same period of 2011 – 2014). FMI obtains this data performing non-representative surveys of market participants, i.e. direct estimation method is applied. Calculations include the following separate parts of shadow economy structure (FMI, 2014): smuggling of excise and other merchandise (cigarettes, alcohol, fuels), illegal production of this merchandise and trade in it, unofficial wages paid in “envelopes” and illegal labour, provision of goods and services without paying taxes, concealment of economic activities with a view of tax or legal regulation evasion, and trade in illegal goods or services.

Thus, it must be noted that the scopes of shadow economy calculated applying the methodologies of Lithuanian Department of Statistics (LDS) and Free Market Economy (FME) are significantly different. The methodology of FME enables to evaluate the structure of shadow economy with its particular segments, when the scopes of shadow economy are expressed in domestic currency, whereas the methodology of LDS enables to estimate the scope of shadow economy as a percentage of GDP, when the value added by all the segments of shadow economy is considered. Application of different estimation methodologies leads to different results. First, turnover data can significantly differ from the value added by shadow economy. Second, the efforts to transfer the data on the structure of shadow economy to the percentage of GDP may determine inaccuracies since particular segments of shadow economy may duplicate, i.e. they may overlap being estimated as a percentage of GDP.

Tax State Inspectorate does not perform any macroeconomic research on the scope of shadow economy in Lithuania. However, for the operational needs, they estimate the taxes, possibly concealed because of performance of particular shadow economy activities, and assess the efficiency of their work.

Another research that is designed for estimation of the scope of shadow economy in Lithuania is the research of “empty cigarette packets”, carried out by the research company “Nielsen” every six months. The research enables to estimate which part of cigarette packets found in rubbish bins are with non-Lithuanian marking.

Since the end of 2010, the situation in legal tobacco market has improved, which is confirmed by the decreased share of illegal cigarettes trade in illegal market. With reference to the data of “Nielsen” research, since 2010, illegal tobacco market in Lithuania has decreased to 19.7 per cent.

Following the data of the newest research (Schneider, 2015), the scope of shadow economy in Lithuania composes 25.8 percent of official GDP. This indicator has shown the tendency of decrease since 2006. The percentage was calculated applying MIMIC (Multiple Indicators Multiple Causes) method. Selected causal variables for Lithuania, 28 EU states and 3 non-EU states included tax burden, a regulation index, tax morale, trust in government, unemployment and self-employment rates. Cash per capita, the official labour force participation rate and GDP growth were engaged as indicators.

3. The features of digital shadow economy

The tendency that globalisation is inevitably transferring trade in goods and services into electronic space is evident. With reference to the report of State Audit (2015), e-trade, as fast spreading way to sell goods and services, has many advantages in comparison to traditional trade. Thus, in recent years, it this way of trade has become attractive to both business people and consumers. “During the period of 2013 -2014, every fourth resident of Lithuania made purchases by the Internet, the number being three times higher than in 2009” (The report of State Audit, 2015, p. 5.). Transfers of purchases/sales into e-space determine the increase of the scope of illegal transactions, which raises the necessity to analyse the phenomenon of shadow economy through the prism of digital technologies.

Scientific literature lacks the studies on the topic of digital shadow economy. Gaspareniene and Remeikiene (2015) identified the differences between traditional and digital shadow economies. The authors established that strive for profit and resources is characteristic to both traditional and digital shadow economy. The profits (revenues) earned in both economies are invested in merchandise, technics and other means that ensure business continuity. Another similarity is that in both traditional and digital shadow payments are and can be performed not only in cash.

In order to identify the features of digital shadow economy, two famous Lithuanian experts of shadow economy – Nerijus Genys, executive of the Department of Economic Development under the Government of the Republic of Lithuania, and Vytautas Zukauskas, vice president of Lithuanian Free Market Institute – were interviewed as experts. During the interview, the experts were asked to specify the features that would enable to detect the performance of shadow economy in digital space. According to Nerijus Genys, digital shadow economy is a part of shadow economy with the same features, for instance, anonymity, illegal operations in e-space, meager risk of being brought to liability while performing illegal activities, hardly defined and identified geographical area, good IT skills and abilities of a person who performs illegal activities (an intermediary), perfect English skills, faster speed of illegal transactions, ability to make transactions round-the-clock, making of payments engaging e-measures (payment systems, e-wallets/currencies), positioning and advertising of goods/services only in the Internet. During the interview, it was revealed that the distinctive feature digital shadow economy is that all activities are transferred to e-space without making any physical contact. Summarising the interview with Nerijus Genys, the following definition of digital shadow economy can be proposed: digital shadow economy is the phenomenon that is based on the processes occurring in both regulated and unregulated economy, violating the norms of legal regulation and seeking illegal material (economic, tax-related, financial) benefits while exceptionally using digital/Internet space.

According to another expert – Vytautas Zukauskas, shadow economy of both types shows such features as illegality, when a service is provided violating legal acts, and mutual benefits since an illegal transaction must be beneficial to both parties. The concept of digital shadow economy should not include the criminal activities (violations of legal acts) that damage one’s possession and violate property rights (e.g. thefts). Vytautas Zukauskas proposes that digital shadow could be defined including two comparatively different elements: digital nature services (e.g. programming) and sales on the Internet platform (e.g. sales of material goods via the Internet).

Following the results of the interviews, digital shadow economy is treated as a part of traditional shadow economy. Thus, it is not distinguished either in statistics or in estimations of shadow economy scope. Nevertheless, rapid business movement to e-space determines the necessity to define the concept and features of digital shadow economy, and estimate its share in the overall shadow economy by activity spheres. This would enable to invoke the measures for regulation and reduction of digital shadow.

4. Conclusions

It has been established that the scopes of shadow economy in Lithuania are basically estimated by two institutions - Lithuanian Department of Statistics (LDS) and Free Market Institute (FMI). The results of the estimations performed by both subjects show significant differences. LDS engages mixed methods of data acquisition: direct (survey of tax inspectors), indirect (publically available information announced by Enterprise Statistics Department on revenues per employee by different activity spheres and enterprise size groups). FMI announces shadow economy scope figures that are by 10 – 13 per cent higher in comparison to the ones announced by LDS (comparing the same period of 2011 – 2014). FMI obtains this data performing non-representative surveys of market participants, i.e. direct estimation method is applied. Calculations include the following separate parts of shadow economy structure (FMI, 2014): smuggling of excise and other merchandise (cigarettes, alcohol, fuels), illegal production of this merchandise and trade in it, unofficial wages paid in “envelopes” and illegal labour, provision of goods and services without paying taxes, concealment of economic activities with a view of tax or legal regulation evasion, and trade in illegal goods or services.

With reference to newest available estimation data, the scope of shadow economy in Lithuania reaches 25.8 per cent of official GDP. This figure has shown the tendency of decrease since 2006. The percentage mentioned above was estimated applying MIMIC (Multiple Indicators Multiple Causes) method.

Selected causal variables for Lithuania, 28 EU states and 3 non-EU states included tax burden, a regulation index, tax morale, trust in government, unemployment and self-employment rates. Cash per capita, the official labour force participation rate and GDP growth were engaged as indicators.

In order to identify the features of digital shadow economy, two famous Lithuanian experts of shadow economy – Nerijus Genys, executive of the Department of Economic Development under the Government of the Republic of Lithuania, and Vytautas Zukauskas, vice president of Lithuanian Free Market Institute – were interviewed as experts. The survey has revealed that digital shadow economy is a part of shadow economy with the same features such as anonymity, illegal operations in e-space, meager risk of being brought to liability while performing illegal activities, hardly defined and identified geographical area, good IT skills and abilities of a person who performs illegal activities (an intermediary), perfect English skills, faster speed of illegal transactions, ability to make transactions round-the-clock, making of payments engaging e-measures (payment systems, e-wallets/currencies), positioning and advertising of goods/services only in the Internet. The interviews have also enabled to establish that the distinctive feature digital shadow economy is that all activities are transferred to e-space without making any physical contact.

Summarising, it can be stated that digital shadow economy is treated as a part of traditional shadow economy. Thus, it is not distinguished either in statistics or in estimations of shadow economy scope. Nevertheless, rapid business movement to e-space determines the necessity to define the concept and features of digital shadow economy, and estimate its share in the overall shadow economy by activity spheres. This would enable to invoke the measures for regulation and reduction of digital shadow.

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