

Digital shadow economy an extension of shadow economy in Algeria: Definition, causes and consequences.

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Abstract

The aim of this paper is to shine light on Digital shadow economy and its reality in Algeria. According to the latest estimation of Medina & Schneider (2018) the size shadow economy in Algeria is very important 30.86 % of the official GDP. However, this estimation did not consider the rise of digital shadow economy which can be an important factor in the evolution of this phenomenon in Algeria. Accordingly, an important part of the reality of the shadow economy in Algeria is not accounted for. This can affect the Algerians authority's intentions to invest in Digital economy as a way to development and the rise of quality of life. It also has a significant impact on official statistics and furthermore the dissuasions made by policy makers.

Keywords: Digital shadow economy, Digital economy, shadow economy, estimation approaches, estimation.

1. Introduction

The rapid development of technology has made it easier for us as consumers to access various goods and services quickly and at a lower cost, which is called e-commerce. However, this cyberspace made it also easy to access wide range of illegal goods and services. According to Amasiatu & Shah (2014) "with online business transactions hugely reliant on trust and identity validation/authentication, there are so many avenues for dishonest financial gains" and what is known with Digital shadow economy.

In the Algerian case, this phenomenon is spreading. Individuals are engaged in Digital shadow economy activities due to many factors such as the rapidity of access; low cost; no regulations especially that the copyright laws are violated in addition to other causes. Scholars consider Digital shadow economy as an extension of shadow activities and it facilitates the spread of unobserved activities leading to a much bigger size of unregistered economy. The Algerian economy suffers of the existing of shadow economy and there is a relatively small amount of research devoted to study this phenomenon (Adair 2002; Bounoua et al 2014; Bennihi & Bouriche 2019). Despite the government's efforts to combat this phenomenon in the recent years. It still exists and now it found its way to the virtual world which made it more challenging to limit its existing and growth.

The purpose of this paper is to shine light on the Digital shadow economy in Algeria and raise the question about the reality and extension of traditional shadow economy because this topic has not been studied before in the Algerian case. Thus the paper tries to answer the following questions:

What is Digital shadow economy? What are its determinants? And how can we measure it?

In order to answer these questions, the paper first presents a theoretical background on traditional shadow economy and Digital shadow economy, in section two a literature review on the main determinant of shadow economy and can they be the same to Digital shadow economy, in section three a survey of the known approaches to estimate the shadow economy and the used methods to estimate Digital shadow economy, in the last section a discussion on the Algerian Digital shadow economy and we conclude.

1.1 Theoretical background

In the last half decade, there is a growing literature devoted to study the shadow economy around the world (Hart 1974; ILO 1993; Schneider 2002; Adair 2009; Dell'anno 2016). Over this period scholars and researchers called it with several terms such as informal economy; shadow economy; underground economy and many others. Colin and Schneider (2016) counted 44 adjectives and 10 nouns to describe this phenomenon and every term is related to specific definition. In most cases, the definitions and concepts adopted depends on the chosen approach to estimate the shadow economy by the author.

The definition of shadow economy depends on purpose and an object of the study, i.e. if researchers are interested in analyzing illegal activities related to prostitution, drug trafficking, etc., they are tending to use such terms as "black labour" or "underground economy"; if the aim of a study is to estimate the size of taxes are evaded by entrepreneurs, the terms of "shadow economy", "unofficial economy" or "non-observed economy" are used. It must be noted that the

terms of “shadow economy” and “non-observed economy” are the most widely used in this context [Startienė & Trimonis \(2009\)](#). According to [Feige \(1990\)](#) he distinguished between four underground economies and named them:

- 1- The Illegal Economy: consists of the income produced by those economic activities pursued in violation of legal statutes defining the scope of legitimate forms of commerce;
- 2- The Unreported Economy: consists of those economic activities that circumvent or evade the institutionally established fiscal rules as codified in the tax code. A summary measure of the unreported economy is the amount of income that should be reported to the tax authority but is not so reported;
- 3- The Unrecorded Economy: consists of those economic activities that circumvent the institutional rules that define the reporting requirements of government statistical agencies. A summary measure of the unrecorded economy is the amount of unrecorded income, namely the amount of income that should (under existing rules and conventions) be recorded in national accounting systems (e.g. National Income and Product Accounts) but is not recorded;
- 4- The Informal Economy: comprises those economic activities that circumvent the costs and are excluded from the benefits and rights incorporated in the laws and administrative rules covering property relationships, commercial licensing, labor contracts, torts, financial credit and social security systems.

[Schneider & Enste \(2002\)](#) proposed a detailed structure of shadow economy. The table below summarizes this structure

Table 1: Classification of shadow economy

Criteria	Sectors			
	Household	Informal	Underground	Criminal
Production/Distribution	legal	legal	illegal	illegal
Transfers in the market	no transfers	are conducted	are conducted	are conducted
Result (products/services)	legal	legal	legal	illegal
Example	To do everything by oneself; an office at home; barter; child care.	Neighbors' assistance; advisory centers; self-help organizations; honorary activities; network activities.	Illegal work: violations of the regulations on trade, craft, distribution; tax evasion; abuse of social benefits.	Trade in stolen goods and drugs; forbidden gambling; fraud; smuggling; hiding of stolen goods.
Categories	Self-sufficient economy		Shadow economy	

Source: Schneider and Enste (2002) p11

As it can be seen in Table 1, Work at home, childcare, self-help organizations, advisory centers and network activities compose the informal sector of economics. tax violations, illegal employment and abuse of social benefits make the basis of shadow economy, while drug trafficking, forbidden gambling, trade in stolen goods, smuggling, etc. are attributed to the criminal sector of economics and with technological advance those activities found their way to the virtual world.

Due to the volatility and rapid advance of technologies, tracking and understanding of digital shadow economy is extremely difficult. For this reason, different interpretations of digital shadow economy can be found in literature, depending on the aim, object and nature of the certain studies. In the start The studies done on this topic are mostly limited with the studies in cybercriminal activities, such as the motives of the consumers to get involved in digital piracy ([Williams, Nicholas, & Rowlands, 2010](#); [Yu, Young, & Ju, 2015](#) and others). breaking into online banking systems or decryption of PIN codes ([Yip, et al., 2012](#); [Holz, et al., 2012](#)), and forms of e-fraud. According to [Holz et al. \(2012\)](#), this growing scope of activities have led to the rise of digital shadow economy.

As stated before there is no unified definition nor a unified terminology of digital shadow economy. accordingly, researchers use the terminology like digital underground economy, digital black market. The latter is defined in Investopedia dictionary as a segment of a country's economic activity that is derived from the sources falling outside the country's rules and regulations regarding e-commerce. It is noted that digital black economies typically emerge as a result of restriction of economic activities either by making a transaction illegal or by taxing an item so much that it becomes cost-prohibitive. However, Considering the illegal nature of digital shadow economy, its concept is closely related to the concept of cybercrime, which is interpreted as Internet-based crime. According to [Herley & Florencio \(2010\)](#) digital shadow economy as Internet-based crime, which is profit driven, and the nature of this activity exceeds the capacity of a closed group. Also Moore, Clayton and Anderson (2009) defined it as the online trading, performed in the blatant manner with no need to hide. According to [Castro et al. \(2009\)](#) the concept of digital shadow economy exceed the illegal activities of online traders and service providers. It also includes product or service consumers as the active contributing subjects. Consumers' illegal activities online are often aligned with the terms of “e-piracy” and “e-fraud”.

2. Determinants, indicators of traditional and digital shadow economy

2.1 Determinants and indicators of the shadow economy

Tax burden:

The most widely accepted and important cause in academic literature affecting the size of the shadow economy is the tax burden [Aspilaire \(2014\)](#). The common accepted hypothesis is that an increase in the tax burden provides a strong incentive to work in the shadow economy, and thus a positive sign is expected.

Unemployment rate:

The effect of this variable on the shadow economy is still ambiguous despite the large literature and the studies made in this matter. According to [Macias & Cazzavillan \(2010\)](#) an increase in unemployment should encourage dismissed workers to try fortune in the informal markets. However, on the other hand, high rates of unemployment are usually a sign for a generalized adverse economic situation, which should or could affect equally both sectors, the formal and informal.

Human development index:

We find in the literature that researchers pay attention to the impact of development level on the shadow economy, but there is not a general agreement on one variable to reflect the impact of development level, in the first study ever to estimate the shadow economy using the MIMIC model [Frey & Weck-Hannemann \(1984\)](#) tried to study the relation between the level of development and the shadow economy using real personal to study the relation and sign between it and the shadow economy. [Schneider \(2002\)](#) used GNP per capita to approximate this variable.

Institutional Quality:

Various authors have studied the quality of public institutions as a determining variable of the shadow economy, [Loayza \(1996\)](#) found a significant relation between institutional quality and people's motivations to participate in the shadow economy. In the case of Algeria, the researchers did not pay attention to this variable and its relation and impact on the shadow economy.

Indicators:

[Aigner, Schneider & Ghosh \(1988\)](#) stated that the size of the shadow economy can be reflected in three markets:

Development of the production market:

An increase in the shadow economy over time means that inputs (especially labor) move out of the official economy (at least partly); this might have a depressing effect on the officially measured growth rate of the economy. (On the other hand, the growth rate in GNP may be positively related to X_t under the notion that the official and underground economies act as complements.)

Development of monetary indicators:

If shadow economy activities rise over time, additional monetary transactions are demanded. As monetary indicators.

Development of the labor market:

An increasing participation of workers in the hidden sector results in a decrease in participation in the official economy, as measured by the participation rate. Similarly, increased activity in the hidden sector may be expected to be reflected in shorter working hours in the official economy.

2.2 Determinants and indicators of the Digital shadow economy

Although the research in digital shadow economy is still in its beginnings researchers ([Gasparèniènè et al 2017; 2018](#)) have proposed a number of causes and indicators for the digital shadow economy such as:

Determinates:

household access to the Internet and IT:

since having an access to advanced technologies, households provide themselves with the necessary technical equipment to operate in digital space.

non-cash payments:

[Gasparèniènè and Remeikienè \(2015\)](#) found that both economies share one distinctive feature in both traditional and digital shadow economies payments are performed not only in cash. Although non-cash payments for the purpose to avoid detection. Hence, the volumes of non-cash payments can be viewed as one of the causal variables of digital shadow economy.

introduction of financial innovations:

International finance markets have started to accept payment cards (e.g. Revolut), which allow to cash money for free. And it obligates the participants to uncover their identity only if a purchase exceeded a 1000 euro. Which allows for making activities on line without being identified.

indicators:

unlike the indicators of the shadow economy which can be observed in three markets the digital shadow economy can be observed in the monetary market of currency and cryptocurrencies such as:

volumes of payments in cryptocurrencies

non-cash transfers via online payment platforms;

monetary value of the parcels for which no custom duties are paid.

3. Estimating approaches of traditional and digital shadow economy.

3.1 existing approaches to estimate shadow economy

The different estimating approaches can be categorized into direct, indirect and model approaches.

The direct approaches: include sample survey estimation, the estimation of tax audits based on survey data, and audit measurements of undeclared taxable income to measure the size of the shadow economy. [Wang, Lin, & Yu \(2006\)](#)

The Indirect approaches: It tries to determine the size of shadow economy, by measuring the “traces” that it leaves in official statistics. They are often called “indicator” approaches and using mainly macroeconomic data. This strategy includes five categories: (1) Discrepancy between national expenditure and income statistics; (2) The discrepancy between the official and actual statistics of labor force; (3) The transaction approach; (4) The currency demand (or cash-deposit ratio) approach; (5) The physical input (e.g. electricity) method. [Dell’Anno \(2003\)](#)

The model approach: The methodologies described so far were designed to estimate the size of the shadow economy through one indicator that is assumed to capture all effects of the shadow economy. However, it is obvious that its effects show up simultaneously in the production, labor and money markets. An even more important critique is that the causes that motivate activity in the shadow economy are taken into account only in some of the monetary approach studies, and even then only one or two of these causes are usually considered. The model approach explicitly considers multiple causes leading to the existence and growth of the shadow economy over time. The empirical method used is quite different from those used so far. It is based on the statistical theory of unobserved variables, which considers multiple causes and multiple indicators of the phenomenon to be measured. For the estimation, a factor-analytic approach is used to measure the hidden economy as an unobserved variable over time. The unknown coefficients are estimated in a set of structural equations within which the ‘unobserved’ variable cannot be measured directly [Bajada & Schneider \(2005\)](#).

3.2 proposed methods to estimate Digital shadow economy

When analyzing the existing studies on the estimation of digital shadow economy two main approaches were employed. The direct approach in a form of e-survey [Gasparyniene & Remeikiene \(2016\)](#). And in another study made by the previous authors they used the model approach specifically MIMIC model applied on Lithuanian digital shadow economy. This two studies are to our knowledge are the only studies how attempted to estimate the size of the digital shadow economy in the world.

4. Discussion

After addressing the problem of definition of the digital shadow economy and determining its causes and indicators in literature and the important role it have in the evolution of the shadow economy. The important question is what’s the reality of this phenomenon in the Algerian case. And before we can have an answer to this problem we need first to estimate it. In Algeria the lack of official statistics it will reduce the possibility to estimate this phenomenon and to study its interaction with other economic and social phenomena. Accordingly, we cannot adopt an indirect method to estimate the size of digital shadow economy. However, one can use e-survey to estimate it. After the estimation we can scientifically analyses the relationship between digital shadow economy and digital economy. One can argue that the expansion of digital economy is modest in comparison with digital shadow economy. However, the impact of the later on quality of life for Algerian citizens is ambiguous. On one hand we can argue that digital shadow economy raises the quality of life by making some goods and services available at lower cost or with no costs at all. On the other hand the violation of Property rights hinders enterprises leading them to bankruptcy thus negatively effecting the official economy And therefore reducing quality of life.

5. Conclusion

The aim of this paper is to shine light on Digital shadow economy and its reality in Algeria. And to provide a theoretical background about this phenomenon by introducing a survey of definitions of shadow economy and digital shadow economy to better understand the similarities and differences between the two. Also, the paper provides the main determinants and indicators of the traditional and digital shadow economy. The paper also rises the problem of the estimation of digital shadow economy in Algeria and the importance of knowing what determine this phenomenon in addition to how it react and impacts the official economy and non-official economy. In last the authors propose a method to estimate the Algerians digital shadow economy considering the Algerian proprieties.

References

1. Adair P, (2002). Production et financement du secteur informel urbain en Algérie : enjeux et méthodes. *Revue Economie et Management*,1, 1-23.

2. Adair P, (2009). Economie non observée et emploi informel dans les pays de l'Union européenne, *Revue Economique- Paris : Presses de la Fondation Nationale des Sciences Politiques*, 5 (7), 1117-1154.
3. Amasiatu, C. V., & Shah, M. H. (2014). First party fraud: A review of the forms and motives of fraudulent consumer behaviours in e-tailing. *International Journal of Retail & Distribution Management*, 42(9), 805-817.
4. Aspilaire, R. (2014). Economie informelle en Haïti : Un impact contracyclique sur le PIB ?. *Mondes en Développement*, 166 (2), 101-112.
5. Bajada, C., & Schneider, F. (2005). THE SHADOW ECONOMIES OF THE ASIA-PACIFIC. *Pacific Economic Review*, 10 (3), 379–401.
6. Bennihi, A.S, & Bouriche, L. (2019). The impact of shadow economy on non-oil GDP growth: in Algeria from 1991 to 2017. *Recherchers economiques manageriales*. 13(2), 495-512.
7. Bounoua, c., Sebbah, F., & Benikhlef, Z. (2014). L'économie informelle en Algérie: analyse de l'évolution du phenomene et evaluation macroeconomique (1990-2009). *Les cahiers du cread*, 110(1), 35-52.
8. Castro, D., Bennett, R. & Andes, S. (2009). Steal these policies: Strategies for reducing digital piracy. The Information Technology & Innovation Foundation.
9. Colin C. W., & 8.Schneider, F (2016). Measuring the global shadow economy, The Prevalence of informal work and labour.
10. Dell'Anno. (2003). Estimating the shadow economy in Italy: a structural equation approach. Denmark: University of Aarhus, *Department of Economics, DK. Working paper 2003–7.1-37*.
11. Dell'Anno, R., Davidescu, A., & Balele, N. (2016). Estimating shadow economy in Tanzania: an analysis with the mimic approach. *Journal of Economic Studies*, 1-24.
12. Feige Edgard L. 1990. Defining and Estimating Underground and Informal Economies, *The New Institutional Economic Approach, World Development*, 18 (7), 989 – 1002.
13. Frey, B., & Weck-Hannemann, H. (1984). The hidden economy as an “unobserved” variable. *European Economic Review* 26 (1), 33-53.
14. Gasparèniènè, L.; Remeikiènè, R. (2015). Digital shadow economy: a critical review of literature, *Mediterranean Journal of Social Sciences*, 6(5), 402–409.
15. Gasparenienea, L, & Remeikiene, R. (2016). Economic and Demographic Characteristics of the Subjects, Operating in Digital Shadow Economy. *Procedia Economics and Finance*, 39, 840-848.
16. Herley, C.; Florencio, D. (2010). Nobody sells gold for the price of silver: dishonesty, uncertainty and the underground economy. *Economics of Information Security and Privacy*.
17. Holz, T., Engelberth, M., Freiling, F. (2012). Learning more about the underground economy: A case-study of keyloggers and dropzones. *In ESORICS Proceedings*, (9), 1-18.
18. ILO .(2003). Scope of the Employment Relationship: Report IV, International Labor Conference, *91st Session. International Labor Office*, Geneva.
19. Keith Hart. 1974. “Informal income opportunities and Urban employment in Ghana “, *Journal of Modern African Studies*, 11(1), 61-89.
20. Loayza , N. (1996). The economics of the informal sector: a simple model and some empirical evidence from Latin America. *Carnegie-Rochester Conference Series on Public Policy* 45, 129–162.
21. Macias, J. B., & Cazzavillan, G. (2010). Modeling the informal economy in Mexico. a structural equation approach. *The Journal of Developing Areas*, 44(1), 345-365.
22. Medina, L., & Schneider, F. (2018, January). Shadow Economies Around the World: What Did We Learn Over the Last 20 Years? *International Monetary Fund*. 1-76.
23. Schneider, F. (2004). Shadow Economies around the World: What do we really know? IAW-Diskussions papiere, No. 16, Tübingen: Institut für Angewandte Wirtschaftsforschung (IAW). 1-69.
24. Schneider, F., & Enste, D. (2002). The Shadow Economy an International Survey, *Cambridge university press*.
25. Schneider. (2002, june). The Size and Development of the Shadow Economies of 22 Transition and 21 OECD Countries. *Discussion Paper No. 514*, 1-52.
26. Startienè, G.; Trimonis, K. (2009). The size of non-observed economy. *Economics & Management*, 976-983.
27. Wang, D. H., Lin, J. Y., & Yu, T. H. (2006). A MIMIC approach to modeling the underground economy in Taiwan. *Physica A Statistical Mechanics and Its Applications* 371(2), 536–542.
28. Williams, P.; Nicholas, D.; Rowlands, I. (2010). The attitudes and behaviours of illegal downloaders. *Aslib Proceedings*, 62(3), 283-301.
29. Yip, M., Shadbolt, N., Tiropanis, N., & Webber, C. (2012). The digital underground economy: A social network approach to understanding cybercrime.
30. Yu, C. P., Young, M. L., & Ju, B. C. (2015). Consumer software piracy in virtual communities: An integrative model of heroism and social exchange. *Internet Research*, 25(2), 317-334.