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List of acronyms

CPI	Consumer Price Index
EBRD	European Bank for Reconstruction and Development
EC	European Commission
ESA	European System of Accounts
ETF	European Training Foundation
EU	European Union
GDP	Gross Domestic Product
GNP	Gross National Product
GVA	Gross Value Added
IBRD	International Bank for Reconstruction and Development
ICLS	International Conference of Labour Statisticians
IFC	International Finance Corporation
ILO	International Labour Organization
IMF	International Monetary Fund
IRS	Internal Revenue Service
ISIC	International Standard Industrial Classification of All Economic Activities
ISTAT	Italian National Institute of Statistics
KIIS	Kyiv International Institute of Sociology
LFS	Labour Force Survey
LIM	Labour input method
MEDTU	Ministry of Economic Development and Trade of Ukraine
MHES	Mixed Household-Enterprise Surveys
MIMIC	Multiple Indicators Multiple Causes Model
NaUKMA	National University of Kyiv-Mohyla Academy
NOE	Non-Observed Economy
OECD	Organization for Economic Cooperation and Development
RLMS	Russian Longitudinal Monitoring Survey
SFMSU	State Financial Monitoring Service of Ukraine
SFSU	State Fiscal Service of Ukraine
SNA	System of National Accounts
SSSU	State Statistical Service of Ukraine
SWTS	School-to-work transition survey
TAMPEP	European Network for HIV/STI Prevention and Health Promotion among Migrant Sex Workers
UAH	Ukrainian hryvnia (state currency)
ULMS	Ukrainian Longitudinal Monitoring Survey
UN	United Nations
UNECE	United Nations Economic Commission for Europe
UNSD	United Nations Statistics Division
USA	United States of America
USD	US Dollar
UUDWS	Ukrainian Undeclared Work Survey
WB	World Bank

Introduction

Informality of all its forms of expression, being legal or illegal, voluntary or involuntary, supply-side or demand-side incidence, will always attract interest due to the opportunities or obstacles that it stipulates. It evolves by the “principle of running water” and adjusts to changes in regulations, punishment and even moral perceptions (Mogensen et al., 1995). There will always be a group of those who would like either to take advantage of informal labour market, or to penalize it, or to make it a research question. This thesis made informal employment our research question, our point of curiosity and our needle in a haystack.

With this research, we target a group of transition countries. They include about one-third of the world’s population (Soubbotina & Sheram, 2000), experience high growth rates of wages and are more prone to be classified as informal, shadow or undeclared (Medina & Schneider, 2017; Williams et al., 2017). In fact, global wage growth rate in past years was caused mainly by the dynamics of wages in emerging and developing countries (ILO, 2014). The comparison of average wages in the Global Wage Report (ILO, 2014) suggests that in transition countries they are three times less than in developed economies, although the former are slowly converging to the latter. That is, wages, labour market conditions and informal employment are the second component of our research question.

Informal employment is a widespread phenomenon in transition countries as workers are often faced with possibilities to circumvent labour market regulations (World Bank, 2007; Lehmann, 2014). In point of fact, such “hidden” activities are of great influence in transition countries, but may not be on the agenda in developed countries (OECD, 2002). Schneider (2009) substantiates this point by adding that the government of a developed economy may not have an interest in reducing the shadow economy, first, because the income from shadow economy is spent in official economy, second, informal income improved the standard of living of at least one third of the working population, and third, because shadow activities distract people from “other things like going to demonstrations”. Well, this did not happen in Ukraine that outlived two revolutions in past fifteen years.

The existence of a large share of informal employment in transition countries has its roots in early or mid-1990s, when big number of small economic agents arose. As some of them were

about to enter the market economy (after the collapse of the Soviet Union) and due to the lack of business experience, no regulations of the labour market relations were foreseen at this first stage. Second, labour markets were burdened with high taxes and registration procedures that were difficult to comply with. The existence of an informal sector in transition economies is significantly caused by imperfections of economic policy of the government, in particular by the disputes in the legislation that regulates economic activities (Shumska & Nezhyvenko, 2013).

All informal activities are alike: the actors that operate informally perceive the benefits of doing so to outweigh the costs of formalization (Djankov et al., 2002). Prior research generally confirms that the most common factors that attract employees and entrepreneurs into the shadows are the level and administrative complexity of taxation (Schneider & Enste, 2000; Djankov et al., 2002) and the prevalence of burdensome and costly government regulations (Johnson et al., 1997; Johnson et al., 2000; Djankov et al., 2002). As the worst case scenario, the unwillingness to conquer a substantive informal economy (or “tilt at windmills”) by adoption of respective policies and implementing them, generates the “undetermined effectiveness” of the country management which may aim to simply strip the state assets and focus on short-term turnover rather than the longer-term view (Kaufmann & Kaliberda, 1996).

At the same time, there is something that attracts to informal economy; something that drives individuals to make a voluntary choice to go informal and to pay the “price for shadow” instead of paying the safer “price of legality”. De Soto (1990) regards informal firms as a source of entrepreneurial zest that was constrained under formal regulations, but will flourish on its own. Asea (1996) claims that informal sector increases economic development by creating markets, generating financial resources and transforming institutions. Finally, it is up to an individual to make a choice to join either the formal or the informal sector by weighting the “opportunity costs” (Baumol, 1990).

The countries in transition represent the main type of the economy that we want to concentrate on in this research. Our first task is to investigate their wage differentials and determinants with respect to informal employment. Because of the fact that men and women have different behaviour at the labour market, we consider gender divide as well. Later, we focus on one country, Ukraine, and pay attention to its economic development stressing attention on informal employment. For this empirical part of our research, we believe that the Mincer model that contends that education and experience most fully explain income distribution has the strongest

explanatory power. Once we see a general picture and one country, we lay emphasis on one activity that stands on the edge between formality and informality, namely prostitution. Our goal is to approximate the number of sex workers in order to gauge the scope of this activity and to discuss a controversial policy of legalizing prostitution.

In order to tackle the above-mentioned tasks, we first need to establish a clear definition of informal employment and about ten other definitions (such as informal economy, underground economy, informal sector, etc.) that are used to substitute or complement it, and often with wrong connotation. Second, we pose a question about the size and dynamics of informal employment and informal economy. What will be the indicators of “informality”? Moreover, what methods exist to estimate it?

The European Commission (1994) adopted the “exhaustiveness” principle, according to which within the production boundary, national accounts provide an exhaustive measure of production when they cover production, primary income and expenditure that are directly and not directly observed in statistical or administrative files. In order to ensure that all the economic activities are captured by the System of National Accounts (SNA), the national accounts should be kept according to this principle. In other words, the value of all production activities should be included in the accounts. That is, the remuneration of the workers of informal, hidden or illegal activities must be reflected the labour statistics (as worker compensation or mixed income). Thus, when comparing labour statistics and production output, it is possible to detect the misreported activities (SNA, 2008).

In trying to identify activities undertaken by informal enterprises within the national accounts, three steps are necessary. The first is to identify those unincorporated enterprises within the whole of the SNA households sector that are candidates to be included. The second is to consider national practices in establishing the households sector to see if any adjustment to the first step is necessary. The third step is to provide a breakdown by type of activity so that common exclusions according to type of activity can be made (SNA, 2008).

Up to this point, different methods and methodologies were developed by various researchers in their attempts to study what is intentionally or not intentionally related to “informality”. This brought us today to the point when we claim that we can catch a glimpse of some part of this hidden iceberg.

In the *First Chapter*, we tackle the definitions, scope and typology of the main components of informality.

The *Second Chapter* is devoted to the indirect estimation methods of the NOE and shadow economy, such as electricity consumption method, income – expenditure difference method, currency demand method, labour force participation rate, labour input method and structural model. It follows with an overview of how these methods are applied to measure the NOE and the shadow economy of Ukraine.

The *Third Chapter* presents direct measurement methods and their application to estimate the informal employment of Ukraine. This Chapter also demonstrates the results of the first Ukrainian Undeclared Work Survey (UUDWS), recently conducted in Ukraine as well as compares its results with the Eurobarometer-2013. We confirm the prevalence of undeclared work and envelope wages in Ukraine and in the European Union and these are the necessity driven reasons that push workers to undeclared work prevail both in the EU and in Ukraine.

In the *Fourth Chapter*, we analyse wages differentials in a set of nine EU transition countries with respect to informal wage employment. European Survey on Income and Living Conditions for the years 2009-2013 is used to study wages and their determinants, thanks to pooled OLS, fixed effects panel, quantile and wage decomposition regressions. There is a significant wage penalty for informal employment that proves always higher for females than for males. More than half of wage penalty for both males and females is explained by individual and job characteristics. Fixed effects models and quantiles support previous findings as regards wage penalty. A wage decomposition suggests that the difference between formal and informal employees is better explained on the demand side of the firms than on the supply-side of the workers characteristics.

The *Fifth Chapter* discusses the informal employment of Ukraine that became a serious challenge for the Ukrainian economy during its adjustment to market conditions as the trend of informal workers has been rising over time. We provide extensive literature review on labour market heterogeneity in Ukraine. We present the current state of informal employment in Ukraine according to standards of the ILO and we pay detailed attention to distribution across and within four categories of workers: formal employees and self-employed as well as informal employees and self-employed. We use the data of the Ukrainian Longitudinal Monitoring Survey (ULMS) for 2007 and 2012. We design a Mincer earnings distribution function in order to investigate the factors that determine the income of individuals. Human capital theory proves

robust in as much as educational attainment is a major explanatory factor for formal workers, although it is not as robust regarding informal workers.

In the *Sixth Chapter*, we tackle the controversial issue of prostitution in the European Union and Ukraine from both the demand side and the supply side, employment and the illegal value added included in the national accounts. We sketch a typology of regimes in the EU – the prohibition *vs.* regulation *vs.* abolition of prostitution. We review the data sources on the demand-side and the supply-side in order to gauge how large is the sex market and informal employment for sex workers. We calculate Estimate 1, thanks to data from an international NGO we checked against other miscellaneous sources. HIV prevalence among sex workers provides Estimate 2. We focus upon sexual exploitation trafficking patterns and calculate Estimate 3 from victims of sexual exploitation. We design an OLS model to test Estimates 1, 2 and 3 for prostitution according to legislation, GDP per capita, supply-side and demand-side variables and an ordered probit to shed light upon the distribution of countries as for employment figures. Last, we assess prostitution as regards GDP enhancement in 2010, with respect to National Accounts adjustment for illegal production as well as from consumption expenditure. Our conclusion discusses what might be the most plausible Estimates according to adjusted National Accounts figures.

Chapter 1

Definitions, scope and typology

1.1. Introduction

In the *First Chapter*, we address the definitions that delineate informality both exhaustively and overlapping. The decision was to present this topic through the historical development and emergence of new meanings that all together define informality. Correspondingly, we discuss the terms such as underground economy, shadow economy, informal sector, non-observed economy (NOE), informal employment, employment in the informal sector, informal employment outside the informal sector, informal wage employment, informal economy, employment in the informal economy and undeclared work.

1.2. Definitions, scope and typology: shadow economy, informal sector, non-observed economy, informal employment, informal economy, undeclared work

This is easier to find a needle in a haystack rather than to comprehend a pile of terminology associated with “informality”.

In Ghana, Hart (1973) discerns that some members of urban settlements were seeking “informal means of increasing their incomes”. Four years later, Gutmann (1977, p. 28) is the first to claim, “*we must stop sticking our heads in the sand, pretending it doesn’t exist*” and to raise this unending discussion with a notion of “**subterranean economy**”. He studies an extra-legal economy of the United States of America for the year 1976 and estimates it at the level of 10 percent of GDP (or \$176 billion).

Tanzi (1983) defines it as an “**underground economy**” and measures underground economy of the USA for the period of 1930-1980. He assumes that underground activities are caused by burdensome taxes and that currency is used mainly to participate in underground economy and to hide wealth. To put it simply, the main distinction between underground and non-

underground (or official) economy is that the latter requires compliance with the laws, and the former does not (Ott, 2002).

In 1986, OECD (1986) recognizes the existence of “**concealed employment**” and explains it as “*employment (in the sense of the current international guidelines on employment statistics) which, while not illegal in itself, has not been declared to one or more administrative authorities*” (OECD, 2004, p. 232).

In the 1990s commonly used by researchers is the term “**shadow economy**” and defined as all currently unregistered economic activities that contribute to the officially calculated (or observed) GDP (Feige (1994), Schneider & Enste (2000), Frey & Pommerehne (1984), and Lubell (1991)). During the next decades a massive avalanche of terms were added to define the notion of what is “informal”: black, cash, dual, hidden, informal, irregular, marginal, moonlight, non-observed, parallel, twilight, shadow, unobserved, unofficial, unrecorded, etc. Overall, this wide variety of terms has often different conceptual disparities and may result in difficulties in interpretations (Ahmad, 2007; Blades, 2011) and there is no common understanding if these terms mean the same (OECD, 2002).

The System of National Accounts (SNA) unites the international standard for the national accounts. It is a statistical framework that provides a comprehensive, consistent and flexible set of macroeconomic accounts for policy making, analysis and research purposes. SNA was elaborated by the United Nations Statistical Commission under the auspices of the United Nations, the European Commission, the Organization for Economic Co-operation and Development, the International Monetary Fund, and the World Bank Group (SNA, 2008).

In 1993, the System of National Accounts (SNA, 1993), adopted at the Fifteenth International Conference of Labour Statisticians (ICLS), put forward two main definitions:

- **underground economy** – activities which may be both productive in an economic sense and also quite legal (provided certain standards or regulations are complied with) but which are deliberately concealed from public authorities (e.g. to avoid the payment of taxes and/or social security contributions or to avoid meeting certain standards or administrative requirements);
- and **informal sector** – comprising units that operate on a small scale and at a low level of organization, with little or no division between labour and capital as factors of production, and with the primary objective of generating employment and income for the persons concerned. Operationally, the sector is defined on a country specific basis

as the set of unincorporated enterprises owned by households which produce at least some products for the market but which either have less than a specified number of employees and/or are not registered under national legislation referring, for example, to tax or social security obligations, or regulatory activities. Informal sector units have the characteristic features of household enterprises.

For statistical purposes, informal sector is operationalized and consists of unincorporated enterprises with market production that are (SNA 1993):

- informal own account enterprises (household enterprises owned and operated by own-account workers, either alone or in partnership with members of the same or other households, which may employ contributing family workers and employees on an occasional basis, but do not employ employees on a continuous basis);
- enterprises of informal employers (household enterprises owned and operated by employers, either alone or in partnership with members of the same or other households, which employ one or more employees on a continuous basis).

What was specifically changed in this concept is that the attention was concentrated at the *institutional unit*, portrayed as “an economic entity that is capable, in its own right, of owning assets, incurring liabilities and engaging in economic activities and in transactions with other entities” (SNA, 1993, p. 103). In this respect, *institutional unit* may occur as persons or groups of persons in the form of households and legal or social entities whose existence is recognized by law or society independently of the persons, or other entities, that may own or control them. *Institutional units* are then grouped into *institutional sectors*, the latter are defined as “resident institutional units that make up the total economy”. There are five mutually exclusive institutional sectors: non-financial corporations, financial corporations, general government, non-profit institutions serving households and households (SNA, 1993). We should note that a “sector”, under the SNA 1993, is different from the “industry”, which is a group of establishments engaged on the same, or similar, kinds of production activity (OECD, 2002).

It is important to point out that with this, the concept of informal sector was introduced to separate it from the concept of underground economy. The principal idea was that the actors of informal sector may not have a deliberate intention of avoiding tax payments and/or social security contributions, or violating the legislation, including labour norms. At the same time, in the national accounts, informal sector was represented as an autonomous entity, which was considered crucial to further quantify its contribution to GDP (ILO, 2016a).

Informal sector, according to the SNA 1993, consists of “informal own-account enterprises” and “enterprises of informal employers”; in other words, it is based on the notion of an “enterprise”. The definition of “enterprise” in this respect is rather broad as it includes both the individuals who work on their own (own account workers or self-employed, who may work alone or with the help of unpaid family members) and units that employ labour force.

A household taxonomy also proposed an idea of informal (household) establishment as a firm with less than five (paid and unpaid) full-time worker equivalents and which belongs to an ISIC-category with low skill- and (other) capital-intensity (Figure 20.1., SNA 1993). To conclude, according to the SNA 1993, the informal sector is considered to be a sub-sector of the household sector: “*production units of the informal sector have the characteristic features of household enterprises*” (SNA, 1993, p. 135).

Nevertheless, in order not to lose the focus in the definitions, we group the main landmarks in **Table 1.1.**

In 1997 an international expert forum on informal sector statistics was set up by the United Nations Statistical Commission known as the Delhi Group. The Delhi Group was holding meetings almost annually until 2010 and actively collaborated with the ILO Department of Statistics to produce the most comprehensive and timely consultations on the measurement system on informality (Williams & Lansky, 2013). Among its first objectives were to try to identify internationally comparable measurement of informal sector and recommend measures for improving the quality and comparability of informal sector statistics (United Nations Statistics Division, 2018). In 1999, the Delhi Group, proposed a broad definition of “informal sector” to have it harmonized in different countries.

Handbook for Measuring the Non-Observed Economy (OECD, 2002) defines activities that belong to the NOE if they are underground, illegal, belong to informal sector, or undertaken by households for their own final use. Activities may also be missed because of deficiencies in the basic statistical data collection programme.

“Informal sector” is defined following the definition of the SNA 1993, in terms of the enterprises where the activities occur, rather than with respect to the characteristics of the persons involved or their jobs. Accordingly, persons employed in the informal sector are those who, during a given reference period, were employed in at least one informal sector enterprise, irrespective of their status in employment and whether it was their main or a secondary job (OECD, 2002).

Table 1.1. Landmarks of the main definitions

Year	Landmark	Definition
1993	Definition of the <i>informal sector</i> (ILO) at the 15th ICLS; and SNA (1993)	Units engaged in the production of goods or services with the primary objective of generating employment and incomes to the persons concerned. These units typically operate at a low level of organisation, with little or no division between labour and capital as factors of production and on a small scale. Labour relations – where they exist – are based mostly on casual employment, kinship or personal and social relations rather than contractual arrangements with formal guarantees.
1998	Definition of the <i>undeclared work</i> (EC, 1998)	Any paid activities that are lawful as regards their nature but not declared to the public authorities, taking into account the differences in the regulatory systems of Member States.
2002	Definition of the <i>NOE</i> (OECD, 2002)	Activities that are underground, illegal, undertaken by households for their own final use, informal or missed because of deficiencies in the basic data collection program.
2003	Definition of <i>informal employment</i> (ILO) at the 17th ICLS (ILO, 2003a)	Total number of informal jobs, whether carried out in formal sector enterprises, informal sector enterprises, or households, during a given reference period; including employees holding informal jobs; employers and own-account workers employed in their own informal sector enterprises; members of informal producers' cooperatives; contributing family workers in formal or informal sector enterprises; and own-account workers engaged in the production of goods for own end use by their household (See Figure 1.1).
2008	SNA (2008)	<i>NOE</i> – activities that, for one reason or another, are not captured in regular statistical enquiries. The reason may be that the activity is informal and thus escapes the attention of surveys geared to formal activities; it may be that the producer is anxious to conceal a legal activity, or it may be that the activity is illegal. <i>Employment in the informal sector</i> – all persons who, during a given reference period, were employed in at least one informal sector unit, irrespective of their status in employment and whether it was their main or a secondary job. <i>Informal employment</i> – informal jobs in formal enterprises, informal jobs in informal enterprises and in other unincorporated enterprises
2010	ESA and inclusion of the illegal component in GDP	Added within a production boundary: prostitution, the production and trafficking of drugs and the smuggling of alcohol and tobacco.
2013	Measuring Informality: a Statistical Manual on the Informal Sector and Informal Employment (ILO)	<i>Employment in the informal sector</i> – a group of production units (unincorporated enterprises owned by households) including “informal own-account enterprises” and “enterprises of informal employers” (based on 15 th ICLS). <i>Informal employment</i> – total number of informal jobs, whether carried out in formal sector enterprises, informal sector enterprises, or households (based on 17th ICLS).

Source: Elaborated by the author

Accordingly, to reduce the incidence of non-measured activities, the system of the measurement of NOE should:

- Introduce improvements to the indirect measurement of activities during the collection and aggregation of national accounts,
- And, at the same time, enhance the direct measurement of the data collection programme (OECD, 2002).

At the same time in the early 2000s, it became clear to the labour statisticians that there is part of informality that does exist outside of informal sector, because an individual may work in enterprise outside of informal sector but have an informal contract; this individual with therefore be excluded from the accounts. This gave rise to the framework of “**informal employment**” (persons employed in informal jobs), with the goal to complement the enterprise-based concept with a job-based concept (Central Statistical Organisation/India, 2001). However, informal employment is still not covered by the Handbook for Measuring the Non-Observed Economy.

Husmanns (2004a) further develops these definitions and suggests the main argument to distinguish them – different observation units. In case of the informal sector, an enterprise is the observation unit, whereas in case of informal employment – a job.

In 2003, at the Seventeenth ICLS the term “informal employment” was officially introduced to comprise the total number of informal jobs carried out in formal sector enterprises, informal sector enterprises, or households, during a given reference period (ILO, 2004).

Figure 1.1. Conceptual Framework: Informal Employment

Production units by type	Jobs by status in employment								
	Own-account workers		Employers		Contributing family workers	Employees		Members of producers' cooperatives	
	Informal	Formal	Informal	Formal	Informal	Informal	Formal	Informal	Formal
Formal sector enterprises					1	2			
Informal sector enterprises ^{1(a)}	3		4		5	6	7	8	
Households (b)	9					10			

Source: Husmanns (2004a)

(a) As defined by the Fifteenth International Conference of Labour Statisticians (excluding households employing paid domestic workers).

(b) Households producing goods exclusively for their own final use and households employing paid domestic workers.

¹ Defined as “household unincorporated enterprises with some market production” by the Eurostat (2014).

Black cells – jobs do not exist by definition.

Green cells – formal jobs.

Un-shaded cells – various forms of informal jobs.

Informal employment thus encompasses (See **Figure 1.1**):

- (i) Contributing family workers, irrespective of whether they work in formal or informal sector enterprises (cells 1 and 5);
- (ii) Employees holding informal jobs in formal sector enterprises, informal sector enterprises, or as paid domestic workers employed by households (cells 2, 6 and 10);
- (iii) Own-account workers employed in their own informal sector enterprises (cell 3);
- (iv) Employers employed in their own informal sector enterprises (cell 4);
- (v) Members of informal producers' cooperatives (cell 8);
- (vi) Own-account workers engaged in the production of goods exclusively for own final use by their household (cell 9), if considered employed.

Not mentioned in **Figure 1.1**, but will also belong to informal employment the following:

- (vii) Producers' cooperatives, if they are not formally established as legal entities and meet the other criteria of informal sector enterprises specified in the resolution concerning statistics of employment in the informal sector adopted by the 15th ICLS.
- (viii) Employees, if their employment relationship is, in law or in practice, not subject to national labour legislation, income taxation, social protection or entitlement to certain employment benefits (advance notice of dismissal, severance pay, paid annual or sick leave, etc.). This is the case if a job or an employee is not declared, a job is casual or of a limited short duration, a job requires work hours below a specified threshold (e.g. for social security contributions), a person is employed by unincorporated enterprises or by a household, a work is done outside of the enterprise (outworker without an employment contract), or a job for which labour regulations are not applied, not enforced, or not complied with for any other reason (ILO, 2004).

Employment in the informal sector comprises own-account workers, employers, contributing family workers, both formal and informal employees, and members of producers' cooperatives that operate in the informal enterprises, irrespective whether this was a main or secondary job (cells 3 to 8).

Finally, **informal employment outside the informal sector** covers contributing family workers within the formal sector, informal employees in the formal sector, own-account workers employed by households, and informal employees working for households (cells 1, 2, 9 and 10).

At the 15th ICLS “**Informal sector enterprises**” were defined as small-scale private unincorporated enterprises engaged in non-agricultural sectors owned by individuals or households with no financial separation of the production activities of the enterprise from the other activities of the owner of the household and with a condition that at least some part of the goods or services are produced for sale or barter. These entities are not registered and have a size of less than five employees (Husmanns, 2004b).

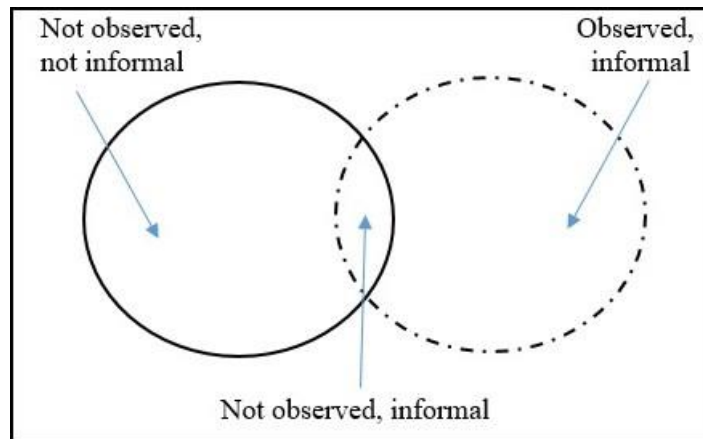
Within informal employment, a subset of **informal wage employment** may be distinguished comprising “*all employee jobs characterized by an employment relationship that is not registered, not subject to income taxation, social protection or entitlement to certain employment benefits*” (ILO, 2013b, p. 5).

The SNA 2008 (2009), mentioning that informality is no more viewed as an issue of only developing countries, but also transition and developed countries, devoted a separate chapter to the “informal aspects of economy” with a definition of “**non-observed economy**” (NOE) as “*activities that, for one reason or another, are not captured in regular statistical enquiries*” (SNA 2008, 2009, p. 100). This may be, on the not only due to the reason that they are informal and will not be reflected in surveys featuring formal activities, but also because the producer is willing to mask an illegal activity or hide a legal activity. We should note that the “informal sector” is again mentioned, and its definition has not changed since the SNA 1993.

The NOE and the informal sector are designed as different concepts. That is why none of them is a complete sub-set of the other, and both the NOE and the informal sector should overlap.

As shown in **Figure 1.2**, while there are activities a) not observed but not informal and b) activities that are observed and informal, there is also an overlap – c) both not observed and undertaken informally. The size of these three mutually exclusive segments of the economy, as well as the policy interest in identifying them, differ from country to country (SNA 2008, 2009). Finally, to ensure the principle of “exhaustiveness” in national accounts, all these elements of economy should be thoroughly investigated.

Figure 1.2. The Non-Observed economy and the informal sector



Source: System of National Accounts (2008)

It is possible, at the same time, that a formal enterprise has informal employees and vice versa, an informal firm may also provide terms of employment for some of their employees, which can be classified as formal employment.

A principle of “a job vs an employee” is also advocated, because employees may have several jobs, work for several employers, on their own or as self-employed. A job, in contrast, is an agreement between an employee and an employer, or the occupation of a self-employed individual. That is, one employee may be holding several jobs (SNA 2008, 2009). The ILO defines five main (excluding non-classifiable) categories of jobs, or statuses in employment (ILO, 1993):

1. Employees.
2. Employers.
3. Own-account workers (or self-employed in the SNA).
4. Members of producers’ cooperatives.
5. Contributing family workers.
6. Workers not classifiable by status.

Unlike in the SNA 1993, in the SNA 2008 systematic attention is paid to the notion of “**informal employment**”, as well as “**employment in the informal sector**” (the same as “employment in informal enterprises”). To illustrate these concepts, see **Figure 1.3**.

Figure 1.3. Informal employment and employment in the informal sector

	Formal jobs	Informal jobs
Formal enterprises		
Informal enterprises		
Other household unincorporated enterprises		

Source: System of National Accounts (2008)

In *formal enterprises*, there is a scope for informal practices in the form of hiring informal employees or contributing family workers. *Informal enterprises* may acquire any of the five types of employment statuses, but also formal. *Households* hire informal jobs as own-account workers, employees and family workers; some domestic workers may have formal work arrangements. The **employment in the informal sector** is the area within the heavy border in **Figure 1.3**. It does not take into account informal jobs in formal enterprises, or informal jobs in the household sector, it does take into consideration only formal and informal jobs in informal enterprises. Similarly, **informal employment** would correspond to the blue area, or informal jobs in formal, informal enterprises and in the other household unincorporated enterprises.

The ILO (2012b, p. 27) refers to **informal employment** meaning the “*total number of persons whose main job was informal. A job is informal when it lacks basic social or legal protections or employment benefits and may be found in the formal sector, informal sector or households*”. So, within informal employment are (i) own-account workers employed in their own informal sector enterprises; (ii) employers employed in their own informal sector enterprises; (iii) contributing family workers, irrespective of whether they work in formal or informal sector enterprises; (iv) members of informal producers’ cooperatives; (v) employees holding informal jobs in formal sector enterprises, informal sector enterprises or as paid domestic workers employed by households; (vi) own-account workers engaged in the production of goods exclusively for own final use by their household, if considered employed given that the production comprises an important contribution to total household consumption. This definitions reflects the same as in **Figure 1.1**.

NOE is a complex concept and is composed of five broad elements: *Underground, Illegal, Own-account, Informal, and Statistical deficiencies*. **Figure 1.4** categorises them.

Figure 1.4. Non-Observed Economy categories and types

Observed Economy	<i>Non Observed Economy</i>	Current nomenclature (Eurostat tabular approach)	Former nomenclature
Registered/reported activities	<i>Underground activities</i>	N1 (Producers deliberately not registering) + N6 (Producers deliberately misreporting)	T1 (non-response to surveys) T2 (out of date registers) T3 (non-deliberate unregistered units) T4 (misreporting of production) T5 (intentionally not registered)
	<i>Illegal activities</i>	N2 (Producers deliberately not registering)	T7 (unregistered units)
	<i>Own account activities</i>	N3 (Producers not required to register)	
	<i>Informal activities</i>	N4 (Legal persons not surveyed) + N5 (Registered entrepreneurs not surveyed)	T6 (unregistered small scale units)
	<i>Statistical deficiencies</i>	N7 (Other statistical deficiencies)	T8 (other types of under coverage: own account, wages in kind and tips)

Source: Adair (2018) from UNECE (2008) and Eurostat (2014)

Underground activities (N1 + N6) are legal but deliberately concealed from public authorities. *Illegal activities* (N2) generate goods and services forbidden by law as well as those carried out by unauthorised producers. *Own account activities* (N3) as household production for own final use should not be registered. *Informal activities* (N4 + N5) performed by small enterprises that do not comply with labour market regulations. Finally, incomplete, not collected or incorrectly handled data belongs to the category of *Statistical deficiencies* (N7) (Adair, 2018).

As regards the notion of “**informal economy**”, we rely on the *Resolution Concerning Decent Work and the Informal Economy* (ILO, 2002b, p. 25/53) (as well as the *Decent Work and the Informal Economy* (ILO, 2002a)), stating that the term “informal economy” is used to indicate the conceptual framework of informality comprising both production and employment relationships and is defined as “*all economic activities by workers and economic units that are – in law or in practice – not covered or insufficiently covered by formal arrangements*”. Informal economy thus includes:

- own-account workers in survival-type activities (e.g. street vendors, shoe shiners, garbage collectors etc.); paid domestic workers employed by households; homeworkers and workers in sweatshops who are “disguised wage workers” in production chains; and the self-employed in micro-enterprises operating on their own or with contributing family workers or sometimes apprentices/employees;
- criminal activities (such as drug trafficking, human trafficking and money laundering) and illegal activities (such as deliberate tax evasion).

Nevertheless, the majority of activities in the informal economy, although hidden and not regulated, are legal. Interestingly, individuals engaged in informal economy create and support their own “political economy” in terms of social norms and informal regulations, even institutions and structures, but these do not ensure social protection of the participants of this market (ILO, 2002a).

Another term “**employment in the informal economy**” was proposed by Hussmanns at the 17th ICLS (ILO, 2004) and comprising the enterprise-based concept of employment in the *informal sector* with a broader, job-based concept of *informal employment*, respectively this would encompass both the blue and the heavy border areas at the **Figure 1.3**. However, this term was not endorsed by the 17th ICLS and the ILO prefers to use the terms “informal sector” (as it became part of the SNA) and “informal employment” (as a production unit) (ILO, 2013a).

GDP is aimed to measure all economic activities, both declared and undeclared (which includes illegal) activities need to be taken into account in order to have a full and accurate picture of the value of production/consumption in a given period (EC, 2014a, p. 3). That is why, an important statistical modification was introduced in 2010, when the ESA (Eurostat, 2013a) in order to harmonise the methodology across the EU included illegal activities in GDP in all EU Member States. Eurostat (2013a, p. 15) acknowledged, “illegal economic actions shall be considered as transactions when *all units involved enter the actions by mutual agreement*. Thus, purchases, sales or barter of illegal drugs or stolen property are transactions, while theft is not”. Respectively, if there is no mutual agreement, the activity shall not be included in the production boundary. For this, special methodological guidelines that concern prostitution, the production and trafficking of drugs, and alcohol and tobacco smuggling were developed. This introduction resulted in a 0.4 % increase of the EU-28 GDP estimate (Eurostat, 2015).

Finally, in 2013 the ILO published *A Statistical Manual on the Informal Sector and Informal Employment* (ILO, 2013a) where summarised the debates around terminology and agreed on the definition of informal employment adopted at the 17th ICLS.

A definition quite often used by the European Commission is “**undeclared work**”, which stands for “*any paid activities that are lawful as regards their nature but not declared to the public authorities, bearing in mind that the differences in the regulatory system of Member States must be taken into account*” (EC, 1998, p. 2). This definition was adopted in 1998 at the Communication from the Commission on Undeclared Work (EC, 1998) and was used at the Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions (EC, 2007b), which developed in the European Parliament Resolution of 9 October 2008 on Stepping Up the Fight Against Undeclared Work (European Parliament, 2008). The definition of “undeclared work” shifts from the enterprise-centred approach (in case of informal sector) and the job-centred (in case of informal employment) to activity-centred.

Regarding the operational definition of undeclared work, it includes (Williams et al., 2017):

- Hidden and underground activities where the transactions themselves are not illegal, but are unreported to avoid official inspection (e.g. envelope wages)
- “Informal” activities, where no business records are kept (e.g. cash in hand transactions provided to households or individuals).

Undeclared work, therefore, does not include illegal activities.

We should mention the view of the ILO on this notion. The ILO recognized undeclared work a “social dumping” that distorts competition (ILO, 2010) and stated that all European institution lack the consistency in defining “undeclared work” (Robert, 2011),

The ILO views “undeclared work” through the lens of informal economy. In this respect, “informal economy” includes “undeclared work” (as defined by the EC), also covering workers who sometimes falls outside of the coverage of labour legislation (e.g. domestic or agricultural workers) (ILO, 2010).

The ILO Glossary (2018a) identifies the three ultimate reasons for not declaring otherwise lawful activities, such as:

- to avoid payment of income, value added or other taxes;
- to avoid payment of social security contributions;

- to avoid having to meet certain legal labour standards (minimum wages, maximum hours, safety standards, etc.)

This concept of “undeclared work” relates closely to what Schneider defines as a “shadow economy”, as the latter denotes “*all legal production and provision of goods and services that are deliberately concealed from public authorities*” Schneider (2017a, slide 5). This is done for the following reasons:

- to avoid payment of income, value added or other taxes;
- to avoid payment of social security contributions;
- to avoid having to meet certain legal standards such as minimum wages, maximum working hours, etc.;
- to avoid complying with certain administrative procedures.

According to the ILO (2018b), basic and most relevant manifestations of undeclared work in Ukraine are as follows:

- 1) informal employment in the formal sector;
- 2) employment in the informal sector;
- 3) underreported actual working hours and wages “in envelopes”;
- 4) disguised employment (substitution of employment contracts with commercial or independent contractor contracts, as well as misuse of distant and outsourcing mechanisms to hide the hired labour);
- 5) unreported secondary employment of persons who are fully and officially employed elsewhere.

Finally, we will add another definition to this list, especially important in cases of transition economies. “**Under-declared employment**” is understood as intentional illegal practice of formal employers of reducing their tax and social security payments, and therefore labour costs, by paying their formal employees two salaries: an official declared salary and an additional undeclared (“envelope”) wage which is hidden from the authorities for tax and social security purposes (Williams & Horodnic, 2017a). This agreement usually takes place at the job interview. Such behaviour of under-reporting employee’s salary establishes fraudulent labour contract where written contract and verbally agreed condition do not match. Williams (2010), for instance, estimates that in South-East Europe about 60 percent of gross salary is received as “envelope payments”, thus under-declared.

Under-declared employment either allows formal employers to save money to keep for themselves, or to pay higher salary to the employee who consents to this deal, which in turn is accompanied by additional conditions that are discussed in the unwritten form, like working longer hours, performing tasks outside of the responsibilities, or not taking full holiday allowance (Williams & Horodnic, 2017c).

1.3. Conclusions

In the *First Chapter*, we presented the system of definitions that help grasp all the miscellaneous nuances of informality.

The genesis of the system of terms that define informal economy has origins back in 1973 and exhaustively while overlapping incorporates the definitions such as underground economy, shadow economy, informal sector, non-observed economy (NOE), informal employment, employment in the informal sector, informal employment outside the informal sector, informal wage employment, informal economy, employment in the informal economy and undeclared work.

The framework of “*non-observed economy*” is considered as the broadest definition *and stands for activities that are underground, illegal, undertaken by households for their own final use, informal or missed because of statistical deficiencies in the basic data collection process.*

The concept of “informal economy” gathers both production and employment patterns of informality; the same applies to “shadow economy”. “Informal sector” is based on the “enterprise” concept and defines an *enterprise* as the one that *belongs to the informal sector if it operates at a low level of organisation and on a small scale, at the same time with little or no division between labour and capital as factors of production.* “Informal employment”, on the contrary, focuses on the employment (“job”) concept and not the production relationship that arise from it. *A job is informal when it lacks basic social or legal protections or employment benefits and may be found in the formal sector, informal sector or in households.* The approach of “undeclared work” addresses the level of neither the enterprise, nor the job, but the activity-level and defines its formal vs. informal status based on the registration of the activity: *the activity is undeclared if it is not declared to the public authorities and given that it is lawful by the nature.*

Chapter 2

Measuring “informality”. Indirect methods

2.1. Introduction

We devote the *Second Chapter* to define the characteristics of indirect estimation methods of the NOE and the shadow economy, like electricity consumption, income-expenditure discrepancy, currency demand, labour force participation rate, including labour input method, and structural modelling (on the example of MIMIC) methods. Second, we illustrate how indirect methods are applied to measure the NOE and the shadow economy of Ukraine.

2.2. Indirect methods

Indirect measurements are macroeconomic methods based on the available data to capture NOE. *The Handbook for Measurement of the Non-Observed Economy* (OECD, 2002) provides an overview of the most widely used measurement methods of the NOE and the challenges associated with applying them. European Commission (2007b) recognizes the difficulty to measure undeclared work and to obtain trustworthy estimates, because the undeclared work is either not observed or not registered, may be defined differently in national legislation. Nevertheless, it is essential to dig into this issue and develop corresponding policy measures.

Indirect methods are usually based on one indicator, for example, currency demand, electricity consumption rate or labour activity (Adair, 2018). Bhattacharyya (1999) states that due to the distortions that hidden economy has on standard economic relations and its unobservable nature it is advisable to use indirect estimates to make economic policies more effective. *The Handbook for Measurement of the Non-Observed Economy* (OECD, 2002) recommends, however, to avoid employing macro-models explaining that they are usually “too crude” and produce inaccurate results, which in turn cannot be integrated with other data. Feige & Urban (2008) question the reliability of GDP as a macroeconomic monetary measure of a country wealth and therefore – the accuracy of macroeconomic models in measuring the NOE, in particularly in transition countries. If the main instrument of reflecting the welfare of the

country is flawed, how can we estimate the hidden part of something imprecise? Blades (2011) adds that macroeconomic models tend to overestimate the size of underground economy, which is similar to macro methods as regards undeclared work (EC, 2007b).

Below we present five macroeconomic methods: electricity consumption model, income - expenditure difference model, currency demand, labour force participation rate, and structural (MIMIC) model.

2.1.1. Electricity consumption method

Electricity consumption (or physical input) model acts as a proxy for the increase of economic activity. Highly criticized, it is considered to “*produce even larger estimates of the shadow economy than those based on currency demand models*” (Blades & Roberts, 2002, p. 6) and to be of questionable reliability and too sensitive to initial conditions and tends to produce “anomalous negative estimates of unrecorded income for transition countries” (Feige & Urban, 2008, p. 3).

Kaufmann & Kaliberda (1996), following the paper of Dobozi & Pohl (1995), apply the ECM (as they call it “macroelectric approach”) to derive the share of unofficial economy as a difference between the growth of electricity consumption used as a proxy for overall GDP growth, and the growth of official GDP. The case study of Ukraine (from 1989 to 1994) is tested empirically for the applicability of this method. Kaufmann & Kaliberda assume that the share of the unofficial economy in 1989 was 12% of GDP. The numbers they obtain reveal that the share of unofficial economy reaches, according three different scenarios in the range of 15-16% of GDP in 1990, 32-35% in 1992 and 44-49% in 1994. While the official economy declined due to political and economic crisis after the collapse of the Soviet Union, the unofficial economy has tripled in size. The authors also hypothesize the relationship between the evolution of unofficial economy in sixteen Post-Soviet and Central and Eastern European countries.

Johnson, Kaufmann, & Shleifer (1997) study the sample of 25 transition economies (countries of Eastern Europe and the Former Soviet Union (FSU)) and apply the ECM to come up with the share of unofficial economy. The regression analysis shows that unfair taxation and heavy regulation are the determinants of unofficial economy. As the next step, the authors calculate the total output (official + unofficial) and test the effect of different policy measures on the total economic output. Finally, the strategies and reforms are proposed, in particular liberalization,

privatization, tax fairness, fighting crime and corruption, providing fair regulation, effectiveness of legal rules, fiscal balance, ensuring political rights, political process and civil liberties.

Alexeev & Pyle (2003) take the models of Kaufmann & Kaliberda (1996) and Johnson, Kaufmann, & Shleifer (1997) as a basis and emphasize that the institutional factors have more weight in explaining the size of the unofficial sector of economies in transition, for instance governance and country's traditions and norms. Alexeev & Pyle (2003) estimate the share of the unofficial economy in 1989 at the level of 25.3% and in 1995 as striking 56.5% of GDP.

Lacko (1999) uses macroeconomic, as well as meso-level residential household electricity consumption, data for 18 Post-Socialist countries to show that variation in aggregate electricity consumption, assuming electricity-GDP elasticity approximately close to one, is not necessarily an indicator of growth in the unofficial economy of mentioned countries. The author shows that residential electricity consumption (as per capita household electricity consumption) method provide better results in estimating hidden economy size in both the Post-Socialist and developed market economies.

In her later paper, Lacko (2000) uses household electricity method to estimate the share of the hidden economy in 20 Post-Socialist countries during 1989-1995. Ukraine is positioned second with the highest share of the hidden economy with it being estimated at 55% in 1994 and 53% of GDP in 1995. The research showed that mentioned countries could be divided to two distinct groups. The first group was comprised of the countries with the largest share of hidden economy, slow pace of Post-Socialist reforms and high corruption, while the second included countries with lower share of hidden economy and fast, uninterrupted advancement of reforms. The first group consisted of predominantly CIS countries. According to Lacko findings, the share of hidden economy initially grew in both groups, but over the course of transition period the first group's hidden economy has diminished substantially. This was not the case for countries from the second group, as the share of hidden economy showed stagnation or further increase.

Missiou & Psychoyios (2017) apply ECM, as well as Final Energy Consumption Model (FECM) and Modified ECM, to a dataset of 19 EU countries over the period of 2008-2013 in order to estimate the size of their shadow economy. The logic behind applying the FECM consists in the substitution effect, so the authors exclude real oil price and electricity price from the regression. The findings (reported in Table 4 of the corresponding paper) show that Eastern

Europe countries have a more sizeable shadow economy comparing to Western Europe countries and while estimated shadow economy in the countries of Western Europe has decreased during the evaluation period, the trend for the majority of Eastern EU countries was reverse, as the size of their informal sectors has increased. The authors observe a shift of shadow economy from West of EU to South and East, which they attributed to the fact that the many Eastern EU countries are new members of the EU and have only recently completed the transition phase.

2.1.2. Income – expenditure difference method

This approach, to put it simply, searches for contradictions between the income and expenditures of population in national accounts, as one can hide income from the taxpayer, but it is not possible to hide the expenditures (Thomas, 1999). The gap between incomes and expenditures can serve as a measure of shadow economy.

Dilnot & Morris (1981) compare income and expenditures of households. For this, they use the income data from the tax forms and expenditures were retrieved from the 1977 UK Family Expenditure survey. Hidden income, respectively, would be viewed as “black” economic activities.

Petersen (1982) on the example of the macroeconomic data for Germany claims that the negative correlations between the growth rate of real GNP on the one hand and public expenditure and tax ratios on the other hand represent the shadow economy of the country.

This method is questioned for at least two reasons, first, national income and national expenditures are not statistically independent, which is a supposition of the model. Second, national income if higher than expenditures (e.g. Switzerland), will result in negative shadow economy (Thomas, 1999).

2.1.3. Currency demand method

Currency demand model (CDM) is anchored on the idea that transactions in the hidden economy are undertaken as cash payments. Demand for currency is correlated with tax burden, and higher taxes will cause individuals to go informal. Therefore, underground economy will increase the demand for currency.

First introduced by Cagan (1958), the model assumed that the fluctuations of the ratio of currency to the total money supply were caused by income tax rates and concludes that “attempts to conceal income payments in order to evade high tax rates seem capable of creating enough additional demand for currency” (Cagan, 1958, p. 25).

Gutmann (1977) used the ratio of currency to bank demand deposits with the assumption that for both legal and subterranean activities the ratio of value added to money is the same. The author also discusses labour market contortions due to subterranean economy, such as deliberate non-recording of work activities by those who are a) unemployed, b) discouraged, or c) not in the labour force, which distorts employment statistics.

Internal Revenue Service (1979) was among the first to acknowledge the problem of unreported income in the USA and employ two alternative approaches to measuring it. The first is direct that is discussed in the corresponding section (“tax audits”). At the same time, Internal Revenue Service (IRS) mention that currency serves as a “vehicle for savings”, in some countries with unreasonable explanations why individuals hold so much in cash. In the USA only, as of April 1979, there was about \$100 billion of currency in notes and coins outside of the Treasury, the Federal Reserve and commercial banks. That is why, the Internal Revenue Service (1979) states that currency holding by the US citizens exceed any rational needs for cash. The second was indirect currency-related method, under which the possible unreported income was estimated according to historical time series on outstanding currency. The currency-related method proved to be too complicated technically that is why, was not applied.

Tanzi (1983) measures underground economy of the USA for the period of 1930-1980 and used econometric estimates of the CDM. On a four variable model – real GDP per capita, interest rate paid on time deposits, ratio of wages and salaries in national income and an income tax – and with the assumptions that a) underground activities are caused by burdensome taxes, b) the income velocity of money in official and underground economies is the same, and c) currency is used mainly to participate in underground economy and to hide wealth, Tanzi estimated the underground economy of the USA in 1980 between 4.5 and 6.1 percent of GNP and showed that it had been increasing since the mid-1960s.

Schneider & Enste (2000) calculates the shadow economy with the help of CDM alongside ECM and compare their estimates with the results of Lacko (1999) and Johnson, Kaufmann, & Zoido-Lobaton (1998). In this study, Schneider & Enste estimate a currency demand function to analyse the driving forces for the shadow economy with four variables: direct taxation,

indirect taxation, complexity of the tax system and intensity of government regulations. The authors group the countries into three categories: developing, transition and OECD countries. They show that among European countries, the highest rate of shadow economy is calculated for Former Soviet Union and some Central European countries.

Ahumada, Alvaredo, & Canavese (2007) aggregate the numerous studies in which CDM was applied (for Argentina, Bolivia, Australia, Norway and Tanzania) and provide critical assessment of this method. The authors discuss the reliability of the CDM if the income elasticity of the demand for currency is not one and proposes solutions when income elasticity of the demand for currency is not one.

Feige & Urban (2008) apply two currency approaches to the years prior to 2002 for a group of countries, including transition economies. They estimate the shadow economy of Ukraine in 2001 at the level of 41.1% according to the currency demand model and define Ukraine as one of the countries with the highest degree of currency substitution and dollarization, to avoid the costs of inflation and exchange rate depreciation that is especially true for transition economies.

Dybka, Kowalczyk, Olesiński, Rozkrut, & Torój (2017) have recently addressed the critique of CDM as regards its misspecification. They extend the currency demand approach equation by taking into account the development of an electronic payment system. Second, they discard the controversial assumption of a zero share of the shadow economy in the total economy and use a benchmark of a “natural level” of the shadow economy based on the best observed levels of the shadow-economy-related variables in OECD countries. The final list of variables consists of shadow economy determinants (the share of taxes in GDP, number of days that are necessary to pay taxes, rule of law and unemployment rate) as incentives or disincentives of the economic agents to operate in the shadow economy, payment card system variables (number of payment cards per capita and ratio of the number of point of sale terminals to the number of payment cards) as impediments to the development of the shadow economy, and other control variables that demonstrate the economic development of a country (real GDP per capita in Purchasing Power Standards, inflation rate, real interest rate on deposits, the share of domestic credit to private sector in GDP, agriculture share in employment, etc.).

2.1.4. Labour force participation rate

This method implies that, assuming that the labour force participation rate is constant, *ceteris paribus*, any negative fluctuation of the labour force participation rate supposedly reveals a growth in the underground activities.

Bovi (2007) supposes that employment in shadow economy affects the overall productivity of the country, and if the number of employed population exceeds the number of jobs available at the labour market, this discrepancy is considered as informal employment.

Schneider (2011) uses the informal employment data and estimates of shadow economy labour force to calculate the total GDP per capita for different countries. The research showed that in all the countries under investigation GDP was on average 40% higher than the official data implied. Schneider assumes that productivity in shadow and formal economies are similar, and shadow economy labour source has a substantial share of the total labour market both in developed OECD countries and in developing countries

The researchers (Giles (1999), Schneider & Enste (2000)) agree on the idea that this method produces erroneous results that may be overestimated, since one of the assumptions of the method is that the VAPUE (value added per unit of unemployment) in official and informal economies is the same. Frey & Pommerehne (1984) argue that this is not the case and informal workers are more productive as there are no government restrictions. On the contrary, because most of the workers in informal economy are less educated, less experienced or do not possess necessary equipment, the labour productivity in underground economy should be lower (Adair (2018)).

Frey & Pommerehne (1984) also doubt the assumption of a constant labour participation rate for some country or region, which is often applied. On the contrary, the labour participation is influenced by many factors. The authors point out another questionable assumption that the labour participation rate of one country may be derived from comparison with other countries.

2.1.4.1. Labour input method

Labour input method (LIM) was introduced by the ISTAT in the 1980s and considers labour supply (or labour input) as the main determinant of labour participation. Application of LIM is required by the Decision on Exhaustiveness (EC, 1994).

The labour input is usually estimated based on survey data. The survey data may be supplemented or substituted (if not available) by demographic or administrative registers. To

approximate labour input, OECD (2002) considers household based surveys more trustworthy than enterprise based surveys, because the former cover more types and sizes of enterprises, and the latter may hide information. The estimates of labour input are derived from household surveys (in terms of employment, usually LFS) and enterprise survey data (in terms of jobs, if enterprise survey is not available, company declarations to tax or social security institutions or reports to national statistics offices), and are then converted to the same units (hours worked of full-time equivalent employment) so as to provide more accurate information on labour input. When the labour input is estimated, it is multiplied by per unit ratios of labour input for corresponding economic activity and firm size so that the two data sources (household and business surveys) were reconciled. The discrepancy between both reflects the magnitude of non-observed activities. Finally, contribution to GDP is estimated based on product of labour and ratios.

Calzaroni (2000) justifies the use of LIM as an approach that reduce the non-observed component. The author provides detailed analysis of this method explaining the concept of a “productive unit” (in comparison with “physical entity”) and discusses the information system where the economic data from national accounts is combined with social data from surveys.

To ensure the principle of exhaustiveness, special surveys of expenditures, income, labour, time use, and opinion may be conducted. When surveys are sensitive, relate to hidden activities, underground income, the cooperation with the interview is of special consideration to ensure lower non-response (Eurostat, 2005).

Williams et al. (2017) applied the Labour Input Method (LIM) to 27 EU countries (excluding Malta) based on data of the Labour Force Surveys and Enterprise surveys as for year 2013. The study reveals that as for weighted averages, 9.3% of total labour input in the private sector of EU is undeclared, and undeclared work constitutes 14.3% of GVA in the private sector (see **Table 2.1**).

As regards country ranking, Poland, Romania and Lithuania represent the countries with the highest undeclared work, new EU Member States tend to have undeclared work above EU average. Only the Czech Republic stands on the opposite side among EU transition countries with 7.7% of total labour input undeclared.

Table 2.1. Share (%) of Undeclared GVA according to the Labour Inputs Method (LIM) in the EU (2013)

Austria	10	Estonia	21.3	Italy	17.2	Romania	26.2
Belgium	15.4	Finland	11.8	Latvia	22.3	Slovakia	16.4
Bulgaria	19.2	France	11	Lithuania	25.2	Slovenia	14.7
Croatia	17.1	Germany	7.1	Luxembourg	9.1	Spain	17.9
Cyprus	17.9	Greece	22.5	Netherlands	11.9	Sweden	9.7
Czech Rep.	16.9	Hungary	23.2	Poland	27.3	UK	9.6
Denmark	14.3	Ireland	13	Portugal	15.5	EU Average	16.43

Source: Williams et al. (2017)

The authors break down undeclared work amongst different groups of employment and show that undeclared wage employment ranges from 25.3% in Poland and 18.5% in Lithuania to 13.1% in Slovakia and 7.9% in the Czech Republic. The proportion of undeclared work among self-employed ranges from 77.6% in Latvia and 73.2% in Romania to only 5.3% in Bulgaria and 2.5% in Poland. Undeclared family work ranges from 89.8% in Latvia and 69.4% in Estonia to 6.2% in Slovakia and 5.7% in Poland. Overall, 61.8% of the whole undeclared labour market is within employment relationship, 37.3% within self-employment and just 0.3% within family works (Williams et al., 2017).

Finally Williams et al. (2017) test the relationship between the size of undeclared work and different factors and show that the undeclared work is associated with GDP per capita, the quality of government, corruption perception, trust in authorities, social transfers for poor, public expenditures on labour market, the migration rate, the Gini coefficient and income inequality.

Although LIM is the “principal global verification method for compilation by the output approach” (Eurostat, 2005, p. 1), its estimates lack the assumptions on the size of businesses and labour productivity, second, there are loopholes in the coverage of business data bases (Adair, 2018). Third, LIM strongly depends on the quality of labour force surveys; some labour input could be missing from both household and enterprise surveys (OECD, 2002).

2.1.5. Structural (MIMIC) model

MIMIC model represents a type of structural equation modelling applied in social sciences and is grounded on the statistical theory of unobserved causal variables, observed indicators and the use of a latent estimator approach (Schneider & Buehn, 2013). MIMIC model is rather

confirmatory than explanatory in a sense that it represents the effect of several causes on a latent variable (shadow economy), and the effect of the shadow economy on macroeconomic indicators (Medina & Schneider, 2018).

Zellner (1970) introduced a model with unobservable independent variables that, however, not dealing with anything related to “informality”, is believed to give birth to latent models. Frey & Weck-Hanneman (1984) develop one of the first structural model to estimate the hidden economy of the OECD countries over the period of 1960-1978. The model has origins from factor analysis of psychometrics and had four determinants – tax burden, tax morality, unemployment rate and level of economic development – and two indicators – growth rate of (official) real GDP and labour market participation rate.

Giles (1999) finds structural (latent variable) models to be most precise as they take into account both causes and indicators of hidden economy. He applies probably the most famous MIMIC (multiple indicators, multiple causes) structural model and calculates a non-stationary time-series index of hidden economic output. As causes, Giles uses average and marginal tax rates, inflation, real income and degree of regulation in economy. As indicators, the author uses changes in (male) labour force participation rate and changes in the cash/money supply ratio.

To estimate the shadow economy of Portugal, Dell’Anno (2007), and later Barbosa, Pereira, & Brandao (2013) apply the MIMIC model and define as causes the weight of the public employment in the labour force as a proxy of economic freedom, tax burden, subsidies, social benefits paid by the government, rate of self-employment and unemployment rate; and as indicators to measure the development of the shadow economy are used real GDP index and labour force participation rate.

The MIMIC model of Schneider (2017b) consists of a set of causes (share of direct taxation, share of indirect taxation, share of social security burden, burden of state regulation, quality of state institutions, tax morale, unemployment quota, GDP per capita) and indicators (employment quota, change of local currency and average working time). Although criticized to produce questionable estimates (Breusch, 2005) or overestimate the size of shadow economy (Schneider & Williams, 2013) compared, for example, to the labour market surveys (Schneider, 2009), this method permits us to make comparison between countries and over time.

The DYMIMIC model (dynamic multiple indicators multiple causes) (Schneider & Klingmair, 2004), extends the MIMIC model and additionally applies Currency Demand method with the help of a currency demand equation to calibrate the magnitude of the shadow economy.

However, when calibrating, these estimates risk to oversize the real numbers because the scope of the shadow economy is restricted to underground (N1 + N6, see **Figure 1.4**), informal (N4 + N5) and own account (household) activities (N3), in contrast currency demand covers all NOE categories. Adair (2018) points out that this calibration should exceed the scope; at the same time, in order to avoid the issue of initial conditions, the DYMIMIC model should not be applied to the short-run data.

In this respect, among the advantages of structural models are that they allow to consider different factors and data sources and as many components as possible may be tested. Second, latent variable models enable us to compare obtained estimates over time and between countries (Adair, 2018).

Blades (2011) looks at the contribution of illegal activities (narcotics, prostitution, smuggling cigarettes and alcohol, and human trafficking) to GDP in a set of transition and few developed economies. The author claims to apply microeconomic approach, in particular he utilizes informal surveys of taxi drivers and escort services, police records, expert opinion, etc. On a set of assumptions, Blades calculates the estimates of supply and/or demand side of these activities for different countries.

Gyomai & Van de Ven (2014) also rejects the logic of the MIMIC method pointing that this method only works on an aggregated level. The authors question the robustness of the model provided the strong assumptions it relies on. Additionally, the variables of MIMIC may influence official economy, thus the estimates of shadow economy would contain the un-shadow economy as well. Another argument is the calibration (with the help of CDM) that is used to re-scale the obtained “latent” variable of shadow economy into percentage of GDP. Finally, Gyomai & Van de Ven compare the estimates of the NOE from the SNA and the estimates of the shadow economy by Schneider and discover that Schneider’s estimates are, on average, 3.6 times as large as the estimates of the NOE. The authors conclude that these impressive discrepancies are affected by non-realistic assumptions and calibration.

In addition, Gyomai & Van de Ven (2014) in their paper present the estimates of the NOE from the SNA for sixteen European countries and Schneider (2017b) compares these numbers with his estimates of corrected MIMIC model. Indeed, this comparison demonstrates that the MIMIC corrected produces the estimates on average 2.5 percentage point higher than the NOE estimates, and the macro MIMIC – on average twice as big as the NOE from the SNA. We add these estimates to **Table 2.2**.

Dybka, Kowalczyk, Olesiński, Rozkrut, & Torój (2017) add several corrections to the MIMIC model, such as solving the problem of identification by designing the scale and unit of measurement, circumventing “obscure ad hoc corrections” and constructing reasonable confidence intervals. These corrections were used by Medina & Schneider (2018) in the latest paper that applies MIMIC model. They discuss the critique on the “double counting” problem of the MIMIC model, like including do-it-yourself activities, neighbours’ or friends’ help, legally bought materials and smuggling are counted twice, and decide to solve it by decomposing the shadow economy activities. They start with the estimated size of the shadow economy and deduct these elements proportionally to their share depending on country type. Thus, they come up with the correction factor of 0.65 for Estonia and 0.642 for Germany. We should point out that this technique was used by Hassan & Schneider (2016) to correct the size of the shadow economy so as to reduce them. Following the technique proposed by Dybka et al. and using the correction factor, Medina & Schneider (2018) recalculate the size of the shadow economy of 158 countries up to 2015. We add these new numbers to the **Table 2.2** as *MIMIC Adjusted*. Another improvement offered by Medina & Schneider was using night lights intensity approach (as an indicator variable, instead of GDP) as a proxy for economic activity in solving the endogeneity and avoiding to use of GDP as a cause and indicator variable. Final advancement to the MIMIC model by Medina and Schneider was in applying predictive mean matching technique to match the countries for which the data is available with the countries for which data is missing by the characteristics relevant to the shadow economy. The authors conclude that the advantage of MIMIC adjusted model is its interdisciplinary approach to economics that is particularly relevant to study the shadow economy.

2.1.6. A comparison between indirect methods

In **Table 2.1** and **Table 2.2** we gather the estimates of the non-observed economy, undeclared work and shadow economy for European countries obtained with different methods. Except for column 1 (“NOE”), the data is presented for 2013, for NOE we use the data for 2012 from Gyomai & Van de Ven (2014). The data for all the countries for NOE estimates and the FECM are not available, as well as for Malta for LIM.

Table 2.2. Share (%) of Undeclared GVA (LIM) and Shadow Economy in EU GDP (2013)

Country	NOE, 2012, OECD	Labour Input Method (LIM)	Shadow economy				Average by all methods
			(MIMIC Macro), Schneider	(MIMIC Corrected), Hassan	(MIMIC Adjusted), Medina	(FECM), Missiou	
Austria	7.5	10	10.13	6.58	8.68	6.8	8.3
Belgium	4.6	15.4	25.34	16.47	18.81	12.1	15.5
Bulgaria		19.2	35.55	23.11	22.37		25.1
Croatia		17.1	31.61	20.55	25.28		23.6
Cyprus		17.9	33.79	21.96	34.66		27.1
Czech Rep.	8.1	16.9	18.47	12	11.79	14.5	13.6
Denmark		14.3	19.91	12.94	15.24	11.6	14.8
Estonia		21.3	22.94	14.91	17.97	31.1	21.6
Finland		11.8	20.68	13.44	13.08	11.1	14.0
France	6.7	11	15.03	9.77	12.41	8.5	10.6
Germany		7.1	15.96	10.37	9.22	14.8	11.5
Greece		22.5	39.39	25.6	27.78	25.2	28.1
Hungary	10.9	23.2	23.88	15.52	21.63	25	20.0
Ireland		13	15.56	10.11	11.14		12.5
Italy	17.5	17.2	32.01	20.81	24.49		22.4
Latvia		22.3	19.92	12.95	16.68	38.9	22.2
Lithuania		25.2	21.95	14.27	18.30		19.9
Luxembourg		9.1	13.47	8.76	10.65		10.5
Malta			21.62	14.05	27.15		20.9
Netherlands	2.3	11.9	16.38	10.65	8.44	7.2	9.5
Poland	15.4	27.3	26.62	17.3	18.86	26.1	21.9
Portugal		15.5	26.42	17.17	20.38	19.6	19.8
Romania		26.2	30.65	19.92	23.97		25.2
Slovakia	15.6	16.4	19.85	12.9	11.75	15.4	15.3
Slovenia	10.2	14.7	29.49	19.17	23.02	21.4	19.7
Spain		17.9	28.11	18.27	24.35	15.6	20.8
Sweden	3	9.7	18.95	12.32	6.56	10.1	10.1
UK	2.3	9.6	13.78	8.96	9.57	5.6	8.3
EU Average	8.68	16.43	23.12	15.03	17.65	16.9	16.3

Source: Adair (2018) from Hassan & Schneider (2016) and Williams et al. (2017), Gyomai & Van de Ven (2014) Missiou & Psychoyios (2017), Medina & Schneider (2018)

For eight countries out of twenty eight, the estimates by LIM and MIMIC methods are quite close, for instance Austria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland and Slovakia. For the majority of countries, LIM and the corrected MIMIC more correspond to each other, like Belgium, Croatia, Cyprus, France, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Slovenia, Spain and Sweden. This method of correcting MIMIC suggested by Hassan & Schneider (2016) uses a 0.65 coefficient to reach a “true” value, that

is why the gap shrinks, but the distribution of countries do not match. The estimates of MIMIC corrected for six countries relate closer to the LIM estimates: Bulgaria, Denmark, Finland, Germany, Romania and the UK. If we compare these methods with the Final Energy Consumption Method (FECM) proposed by Missiou & Psychoyios (2017), we observe that FECM in six out of seventeen cases come in quite close range to MIMIC corrected, for five countries relates to LIM, in four cases corresponds to MIMIC and for two countries (Estonia and Latvia) provides significantly higher estimate. The sample average of MIMIC adjusted is closer to LIM, but we should take into account that different number of countries compose these averages, since the data is not available for all them.

If we consider the size of the shadow/undeclared economy, the countries with the highest share of it from the current list are Greece, Cyprus, Romania, Bulgaria, Croatia, Italy and Latvia; and with the lowest – Austria, the UK, the Netherlands, Sweden and Luxembourg.

2.3. Indirect methods in estimating the non-observed economy and the shadow economy of Ukraine

The State Statistics Service of Ukraine (SSSU) is responsible for estimating the **non-observed economy** (NOE) of Ukraine. The definitions and concepts used by the SSSU are in line with the recommendations of the OECD Handbook on Measuring NOE (2002) and the 1993 International Conference of Labour Statisticians' definition of informal sector. Indeed, the guidelines for the SNA in Ukraine define a “non-observed economy” as activities that, for one reason or another, are not captured in regular statistical enquiries, quoting the SNA 2008 (6.39-6.40) (SSSU, 2013b). The three types of illegal economy that are included to the NOE of Ukraine are production and distribution of drugs, prostitution, alcohol and tobacco smuggling.

UNECE (2008) acknowledge that the estimation methods that are applied in Ukraine to measure the non-observed activities were improved since the early 1990s to correspond to the international standards, in particular regarding carrying out structural enterprise statistics, household surveys and employment statistics. Several special surveys were conducted on some particular sectors (taxis, markets, etc.). A survey of experts was established in 2004 to provide evaluation on the magnitude of non-observed economic activities in agriculture, industry, construction, trade and transport.

The data for estimating non-observed activities comes from:

- structural statistics of enterprises in the non-financial corporations sector (volumes of products sold, composition of expenditure and number of employees, with detailed breakdown by types of economic activity and size of enterprise, and with information on the reasons for non-response);
- household surveys (expenditure on goods and services with detailed breakdown by place of purchase);
- labour statistics (wages and number of employees);
- sample surveys of population (households) on economic activity (number of persons employed and time worked by types of economic activity and categories of employment);
- sample surveys of markets and taxis;
- statistics of agriculture (volume of output and gross value added of the households sector, output of products for own final consumption);
- administrative data (registers of legal entities and individual entrepreneurs, licenses for construction issued to individuals, balance of payments).

Another guidelines focused on the measurement on the NOE of Ukraine (SSSU, 2004) defines four elements that constitute it:

1. Underground (T1+T5), from both economic and statistical reasons;
2. Informal (T6), conducted by households;
3. Illegal (T7);
4. and Other (T8).

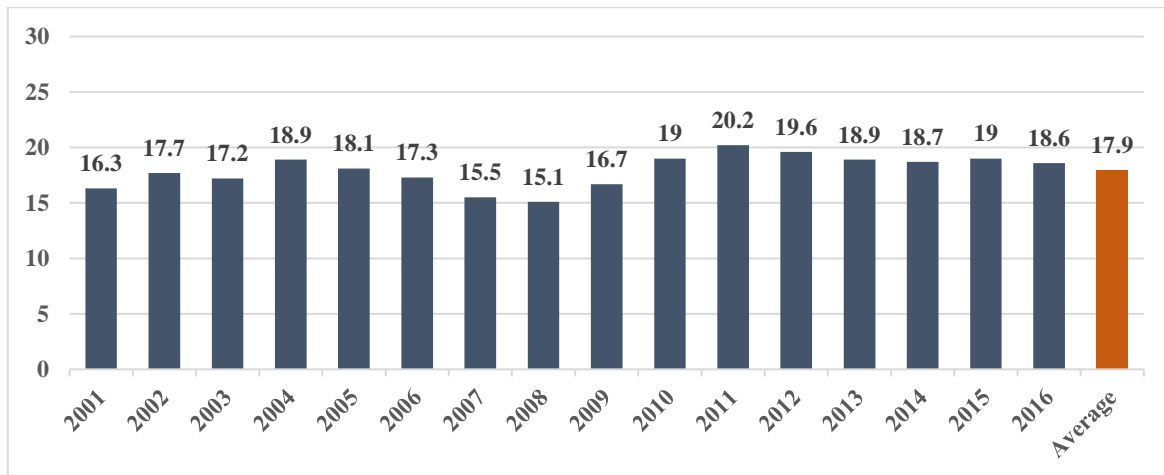
The sources for collecting the information on the NOE in Ukraine, as defined by the Guidelines (SSSU, 2004), are:

- Data from the household surveys as to household expenses.
- Data from the enterprise surveys as regards the volume production/sale, number of employees, production expenses and salary paid. In addition, the analytical report on unregistered enterprises is considered.
- Data from the labour force surveys concerning employment status (employees, employers, own-account workers and unpaid family workers) and earnings.
- Data from the sector of agriculture as for production, intermediate consumption by households and production for own consumption.

- Administrative data, such as number of entities that should be registered, activities that may be carried out.

This data is further reinforced with the registers from the State Tax Administration of Ukraine in terms of the number of enterprises, self-employed, construction permits, as well as the data from the internal affairs bodies as regards illegal activities.

Figure 2.1. Non-observed economy of Ukraine (2001-2016), % of GDP



Source: SSSU (2018b)

We group the available estimates of the NOE of Ukraine **Figure 2.1**. The estimates vary in the range of 16.3-18.9% of GDP during 2001-2006. In 2007-2008 when the Ukrainian economy was evolving, NOE shrank to its minimum of 15.1%. After the crisis of 2008, the NOE of Ukraine enlarged to 20.2% in 2011. Since then it is slowly declining and equals 18.6% in 2016.

OECD (2010, p. 191) points out that the informal economy in Ukraine is understood as “*economic activity, i.e. production and sale of goods performed outside the mechanisms of legal regulation and official monitoring*” by the academia and in the official documents. The Ukrainian informal economy is associated with tax evasion, non-compliance with regulations and licensing procedures, provision of bad quality production and unsatisfactory working conditions.

In Ukraine, the definition of “**shadow economy**” that is used in the estimations and combatting of what is vocalized as a most frequent political statement, is considered as “*unregistered in the established manner economic activity of an entity that aims to minimize the cost of production of goods and provision of services, evade the taxes and duties (compulsory payments), statistical surveys and submission of statistical reporting. This results in the violation of the*

established by the law norms (the level of minimum wages, the length of working time, conditions and safety of work, etc.)” (MEDTU, 2009, p. 1).

Methodological Recommendations for Calculating the Level of the Shadow Economy (MEDTU, 2009) suggest that four methods to estimate shadow economy are the most relevant in Ukraine: “household expenditure - retail turnover”, financial method, currency method and ECM. First, the four estimates according to each of these methods is produced, and after an integral indicator is calculated:

“The calculation of the integral indicator of the level of shadow economy in the national economy as a whole is carried out by combining the estimates by the methods of (i) “household expenditure - retail turnover”, (ii) financial, (iii) currency and (iv) electric into a generalized indicator using the coefficients used to estimate the level of the shadow economy by each method in the period analysed, taking into account the stability of estimates by the appropriate method for previous years. The more unstable the estimation of the level of the shadow economy by each method in previous years is, the less is the effect of the corresponding method on the integral indicator of the level of the shadow economy. The advantage is given to a method with more stable estimates over the past five years.” (MEDTU, 2009, p. 14)

The integral indicator is calculated as the sum of weighted averages of the estimates of four methods. We briefly define each of these four methods:

1. The method “household expenditure - retail turnover” consists in identifying a mismatch between consumer expenditures for the purchase of goods and the total volume of sales of all economic entities in the legal sector. Data on household expenditures is collected through household surveys, and data on total sales is obtained through mandatory statistical reports.
2. “Financial method” aims to determine trends in proportions between the value of goods and services used in the production and the gross income of enterprises. It is assumed that the growth in time of the share of the value of goods and services used in the production relative to the gross income of enterprises is the evidence of expanding shadow economy.
3. The currency method estimates the ratio of the volume of cash to bank deposits in the current period relative to the base period (which is 1991 in case of Ukraine). It is assumed that all “shadow” transactions are undertaken using cash, which results in an increase in demand for cash in circulation; the velocity of cash both in the official and in the shadow economy is the

same; the base period is considered a period in which the level of the shadow economy was insignificant, thus zero.

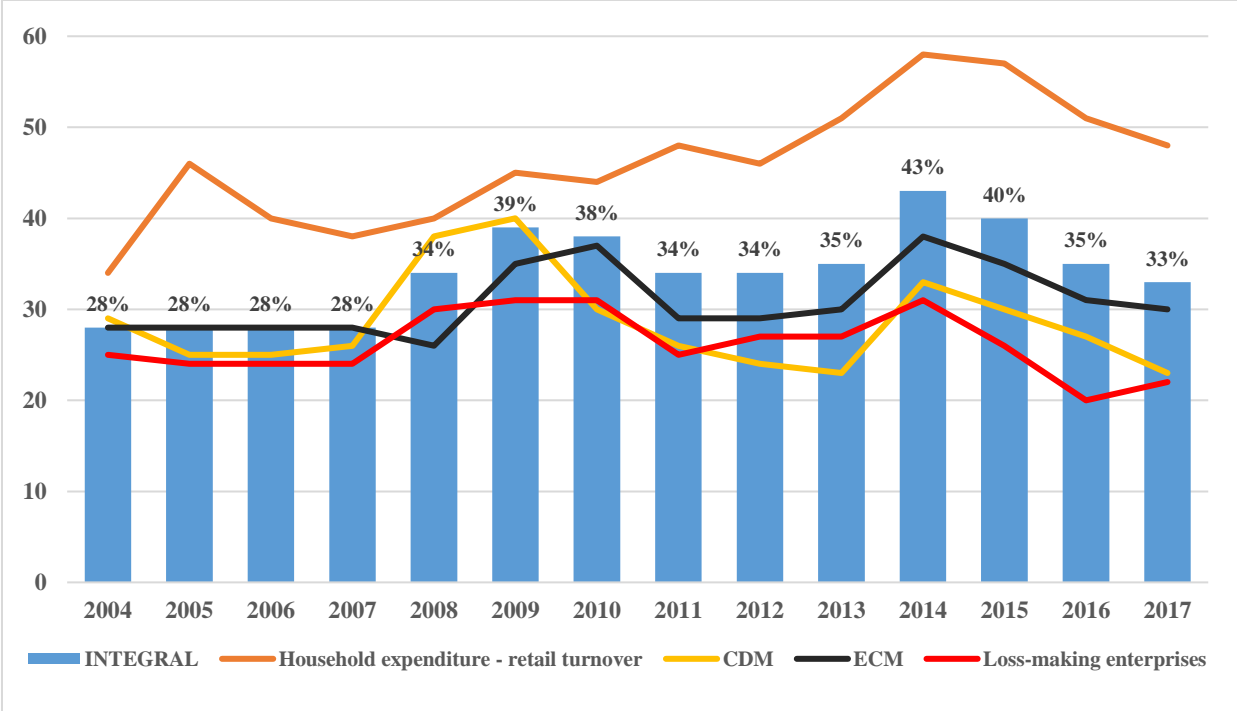
4. Finally, the famous ECM compares the growth of domestic electricity consumption with the GDP growth. It is assumed that the growth of domestic electricity consumption should correspond to the growth of the real GDP. If there is an increase in the growth of domestic electricity consumption over GDP growth, it is assumed that electricity is directed to the production in the shadow economy.

5. The fifth method used is the “loss-making enterprises” method that defines the upper and lower limits for the coefficients of the shadow economy as a share of GDP. The assumption behind this method is that all the enterprises that make loss according to official statistics, are in fact profitable, thus operating in the shadow economy. Profitability of loss-making enterprises is equal to the one of profitable enterprises.

After the estimate of the four methods (1-4) are made, an integral indicator is calculated, as mentioned, as the sum of weighted averages.

All available estimated provided by the MEDTU are reported in **Figure 2.2**. We need to point out that the estimates of the financial method are not available, as this component is not included in official estimates reported by the MEDTU.

Figure 2.2. Share of the shadow economy of Ukraine by different methods, % of the official GDP (2004-2017)



Source: MEDTU (2018)

The MEDTU estimates of the integral indicator of the shadow economy of Ukraine (**Figure 2.2**) somewhat correspond to the most quoted estimates of Schneider, at least in terms of the dynamics, but not the magnitude. Before comparing them, we should remind that the integral indicator is calculated as a weighted index of four indirect estimates, and MIMIC is a macroeconomic model with “indicators” and “causes”. First, it is possible to compare only the period between 2004 and 2015, as other time spans are not available in either the MEDTU reports, or Schneider’s publications. According to Medina & Schneider (2018), the Ukrainian shadow economy was decreasing from 2004 (42%) to 2008 (37%), in 2009 it reached 44%, went down in 2011 (39%) and augmented to 43% in 2015. According to the MEDTU, the shadow economy in Ukraine was not changing during 2004-2007, in 2008-2009 it started to progress, regressed to 34% in 2011-2012, grew again to 43% in 2014, went down to 40% in 2015 and to 33% in 2017.

We now consider different estimation methods. According to the MEDTU estimates of the Ukrainian shadow economy (See **Figure 2.2**), the ECM estimates, surprisingly, most closely correspond to the integral indicator differing by only several percentage points. The ECM estimates are always lower the integral share. Regarding the tendency of the shadow economy by ECM, it equals exactly 28% during 2004-2007 (in line with the integral indicator), declines to 26% in 2008, expands to 37% in 2010, then varies around 29-30% during 2011-2013, rises to 38% in 2014, shrinks to 35% in 2015 and to 30% in 2017.

Glushchenko (2016) proposes an important remark about the MEDTU methodology of applying ECM, namely the contribution of technological changes to the consumption of electricity and is taken into account in a very restrictive way. In fact, the index that is used to adjust the GDP to technological changes is constant (and equals 0.912) and is applied only during the period of 1998-2006 (MEDTU, 2009). Nevertheless, it is unclear where this figure comes from, and therefore this estimate is unreliable (Glushchenko, 2016). The author points out another weakness in this method, namely it does not correctly represent the sector of services, but reflects mainly manufacturing.

The method “household expenditure - retail turnover” seeks the discrepancies between consumer expenditures for goods and total sales from all the legal entities. This method usually displays the highest estimates of the shadow economy of Ukraine and one of the strongest fluctuations. For example, according to this method, the shadow economy reached 46% in 2005, then descended to 38% and recovered back to 45% in 2009, showing not that extreme growth

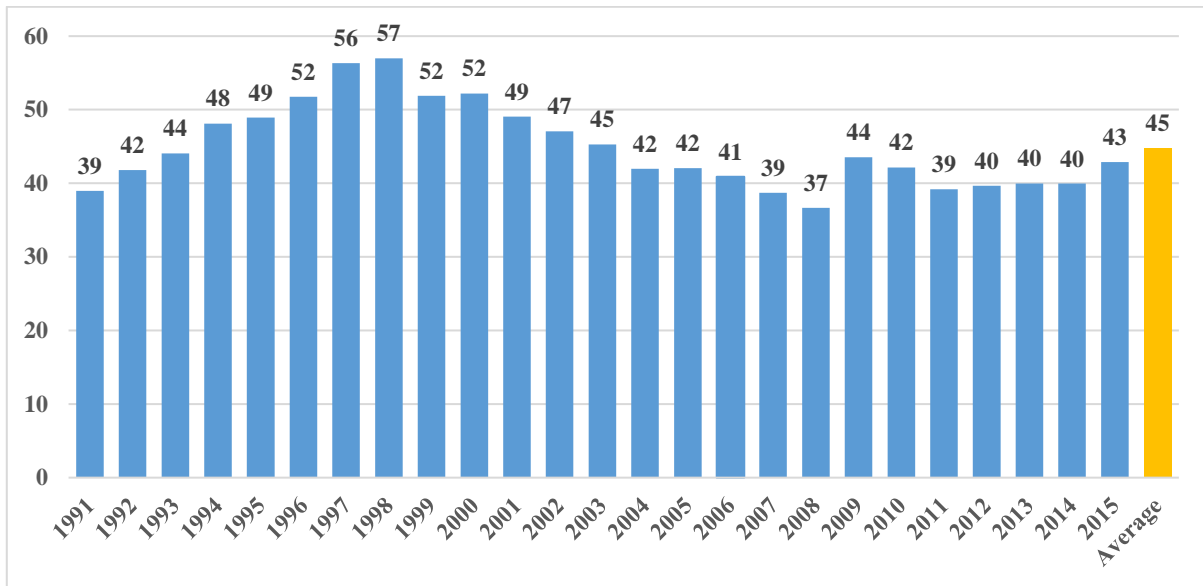
because of the crisis, compared to other methods. The shadow economy after varied around 44-48 percent and in 2014 attained 58% of GDP. In 2015 it equalled 57%, in 2016 51% and in 2017 – 48%. Glushchenko (2016) among the four methods applied by the MEDTU, considers the method of “household expenditure - retail turnover” as the most plausible for Ukraine.

As regards the CDM estimates of the shadow economy of Ukraine (See **Figure 2.2**), they fluctuate around the integral indicator, in some cases exceeding it (in 2008-2009), but in most cases fall behind the integral indicator. In fact, according to the MEDTU, CDM produces the lowest estimates of the shadow economy of Ukraine out of the four methods used for the integral indicator. As a result of the crisis, shadow economy grew to 40% in 2009, being the highest estimate for this method during 2004-2017. Even when other methods demonstrated increase in 2014-2015, the CDM estimates for this period were 33-30%. Glushchenko (2016) suggests an argument that may cause bias in Ukrainian CDM estimates: as a base year, it uses 1991 and presumes that the shadow economy in 1991 was zero, which is doubtful to believe in.

Among all the indirect methods that were used to estimate the shadow economy of Ukraine, the highest score of it produces “household expenditure - retail turnover” (with the mean value of 46.1 for the period 2004-2017), the lowest – CDM (with the corresponding mean of 28.5), and ECM (with the mean of 30.1), relates more closely to the integral indicator (its mean is 34.1), that is why the ECM estimates alter somewhere between the “household expenditure - retail turnover” method and CDM.

In **Figure 2.3**, we summarize the most recent estimates of the shadow economy of Ukraine according to the MIMIC method. This figure supports the necessity to study the shadow economy in Ukraine as a phenomenon of a transition economy. The average size of the shadow part of GDP is 45%. That is, about half of GDP is neither reflected, nor reported, or registered, is illegal or criminal. With the maximum of 57% in 1998 (when Ukraine experienced a financial crisis), the shadow economy was slowly going down and reached 37% of GDP in 2008. After the global crisis of 2008, Ukrainian shadow economy expanded again to 44% in 2009 and 42% in 2010. During 2011-2014, it was fairly “stable” being equal to 40% and in 2015, it rose to 45%, largely due to the annexation of Crimea by the Russian Federation and the anti-terrorist operation in the Donetsk and Luhansk oblasts of Ukraine (Popova, 2015).

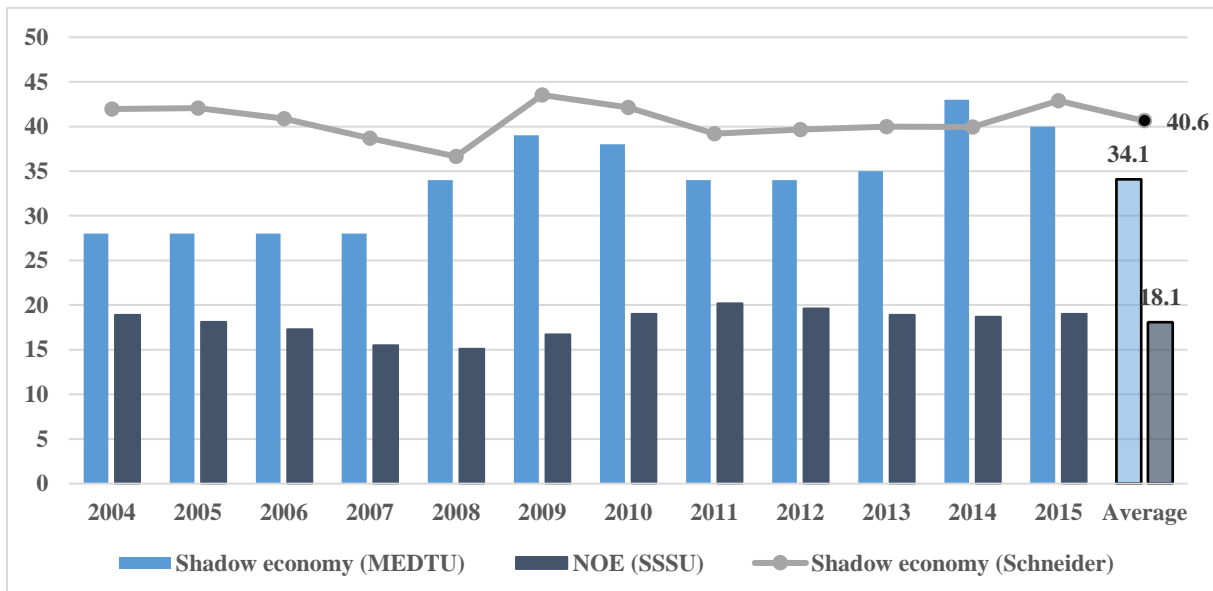
Figure 2.3. Size and trend of the shadow economy of Ukraine, % of GDP (1991-2015)



Source: Medina & Schneider (2018)²

To conclude, we group the estimations of the shadow economy of Ukraine by the MEDTU, Medina and Schneider (MIMIC adjusted) and of the NOE by the SSSU (Figure 2.4). We deliberately selected the period of 2004-2015 given that the availability of the estimates for the three methods differ, so we limited this period of comparison for 2004-2015, available for all of them.

Figure 2.4. Estimation of the shadow economy, NOE of Ukraine, % of GDP (2004-2015)



Source: MEDTU (2018), SSSU (2018b), Medina & Schneider (2018)³

² Here we present the MIMIC corrected values with the use of correction factor of 0.65.

³ Here we present the MIMIC adjusted values.

The estimates of Medina and Schneider for the corresponding period exceed those of the MEDTU and the SSSU with an average of 40.6% of the GDP of Ukraine. The estimates of the shadow economy of Ukraine provided by the MEDTU obviously exceed the estimates of the NOE of Ukraine by the SSSU, the mean of the NOE for 2004-2015 is 18.1% and the average of the integral indicator of the shadow economy by the MEDTU is 34.1%, twice as big the NOE estimate, even though the definitions closely relate one to another.

<p>Non-observed economy: “activities that, for one reason or another, are not captured in regular statistical enquiries”</p>	<p>Shadow economy: “unregistered economic activities of the entities that aim to minimize the cost of production, evade the taxes and avoid reporting”</p>
<p>(SSSU, 2004, p. 4)</p>	<p>(MEDTU, 2009, p. 1)</p>

2.4. Conclusions

In the *Second Chapter*, we presented indirect measurement methods and demonstrated how indirect methods are applied in Ukraine to measure the NOE and the shadow economy of Ukraine.

Indirect measurement methods are macroeconomic methods that utilize the data that is available to estimate informal or non-observed part of economy. The feature that is common to all indirect methods is that they are usually based on one indicator, like currency demand, electricity consumption rate or labour activity.

Electricity consumption method is treated as a proxy for economic activity and, even though revised in recent years, is criticized for producing the upper bound estimates of the shadow economy. Income – expenditure difference method compares income and expenditures of individuals or households and fails to oppose the assumption of independency between the national income and national expenditures.

Currency demand model supposes that informal economy uses cash payments as monetary transactions. This method is applied more often than the preceding two; new interpretation of it take into account electronic payment system and obviate some questionable assumptions like zero shadow economy. This method is also applied as a calibration technique for the MIMIC model.

Labour force participation rate method states that any variations of it are caused by the increase of underground economy. The researchers agree that this method uses two weak assumptions that do not allow its utilization: one, the equal productivity in official and unofficial economy and second, constant labour force participation rate. Nevertheless, LIM is required to be applied by the EC and the Decision on Exhaustiveness (1994). According to this method, labour input is estimated from household and enterprise surveys and seeks for the discrepancy between those two estimates, which reflects the magnitude of the NOE.

Structural (MIMIC) model represents the effect of several causal variables on a latent variable (shadow economy), and the effect of the latter on macroeconomic indicators. In this respect, structural models permit to take into consideration numerous variables (as causes and indicators), as well as to compare estimates over time and between countries. Nevertheless, there is an agreement within academic community that the MIMIC model overestimates the shadow economy and may work only on an aggregate level.

In the last section of this *Second Chapter*, we showed how indirect methods are employed to estimate the NOE and the shadow economy of Ukraine. To measure the NOE of Ukraine, the SSSU collects information from the household, enterprise and labour force surveys, as well as from the sector of agriculture, administrative and official data. The NOE in 2016 composed almost one fifth of the GDP. The MEDTU estimates the shadow economy of Ukraine by the four methods and the integral indicator of the shadow economy for the year 2017 amounted one third of the GDP of Ukraine. At the same time, the MIMIC method of Schneider produces the estimate of the shadow economy of Ukraine at the level of 43% of the GDP.

Chapter 3

Measuring “informality”. Direct methods

3.1. Introduction

In the *Third Chapter*, first, we describe the two main direct methods that help estimated the informal employment, such as tax audits and labour market surveys, though focusing attention on labour market surveys. Second, we show how informal employment is measured in Ukraine. Third, we demonstrate findings of the Ukrainian Undeclared Work Survey (UUDWS) that was recently carried out in Ukraine. Finally, we make a comparison of the UUDWS and the latest Eurobarometer, its predecessor.

3.2. Direct methods

Direct (or statistical (Eurostat, 2014)) methods refer to microeconomic approaches, such as surveys and tax audits, aimed to construct estimates of the total economic activity and disentangling the non-observed part of economy.

Microeconomic methods allow us to discover people’s motivation to work officially or not (Schneider, 2011), to “unearth the truth” so that it is y that is useful to policy-makers. (Blades, 2011), as Thomas (1999, p. F388) pinpoints famous questions: “Where was this all happening? Who was doing it and how were they hiding their activities? What are the implications for policy makers?” Direct methods are much more likely to answer these questions.

3.2.1. Tax audits

According to this method, a sample of tax returns that should not be representative of the whole population are investigated and are subject to detailed tax auditing. The idea of this method is to find discrepancy between income declared to the fiscal administration and income estimated from the selective tax returns (Schneider & Enste, 2000) and to come up with correction factors to adjust for hiding incomes (Blades & Roberts, 2002).

Internal Revenue Service (1979) was among the first to acknowledge the problem of unreported income in the USA and employ two alternative approaches to measuring it. The first is direct estimation method that aimed at comparing the reports of tax return filers with non-filers to detect unreported income. Persons who do not file tax returns, and if their taxable income exceeds filing threshold, are considered as delinquent non-filers and may be subject to a retention tax, fees or penalties. Finally, this study estimates that about 92-94 percent of income from legal activities were reported in the USA in 1976, under direct approach.

Tax audits method, as mentioned, is based on a not random sample, which may cause biased, possible lower-bound estimates. Moreover, this approaches takes into account the data that the government was able to collect, which may be only a part of hidden economy (Schneider & Enste, 2000), or hidden activities might be not possible to detect. Additionally, tax audits do not collect data on illegal activities and provide rather point estimated than time series (Adair, 2018).

3.2.2. Labour market surveys

Isachsen & Strom (1985) were among the first to develop and utilize the method of questionnaires in analysing hidden economy. They conduct two surveys in Norway, in 1980 and 1983, and use the questionnaires that included the questions on individual characteristics, employment attitudes, experience and possible ways to detect hidden activities. Among the findings were that the size of the hidden economy in Norway at 4-6 percent of GDP, half of which they believe is hidden labour income. They also discover that about 35 percent of the adult population at least once participated as providers or consumers of hidden labour services; around 80 percent of services in hidden economy are paid in cash; and majority of population think that hidden labour market is acceptable and will be expanding. Mogensen, Kvist, Koermendi, & Pedersen (1995) estimate the shadow economy of Denmark applying *an interview method*.

Frey & Pommerehne (1984) mention that if the sample interviewed is representative, and if the questioning methodology is developed enough to avoid biased answers, surveys serve as a good instrument to derive the share of the hidden economy, at least a lower boundary estimate of it.

Since then much was elaborated and we now have a range of household and individual survey datasets available: Labour Force Survey, European Union Survey on Income and Living

Conditions, European Survey on Working Conditions, World Bank Enterprise Survey, European Social Survey, Eurobarometer, Life in Transition, World Values Survey, etc. Surveys have been carried on the assumption that it is easier to collect data from the users on the demand side than from those who provide their provisioning on the supply side (Adair, 2018). Respectively, both demand side and supply side surveys may shed light on the research question.

As every method, surveys do have disadvantages. Primary are the issues of ensuring randomness, representativeness, unbiasedness, and willingness to cooperate from the respondent's side. In addition, there are several factors the surveys are dependent on, for example, the design: the way the survey is structures, the way a question is asked, or the sequence of questions. Some part of enterprises may be excluded from the sample, for example the smallest firms; due to statistical data deficiencies, the register (business or demographic) that the survey is based on could be out of date or not properly completed; obtained dataset might have many missing answers (Blades & Roberts, 2002). If the weighting technique – used to adjust to selection probabilities, under-coverage, non-response and other factors that result in discrepancies between the sample results and more reliable information about the population that can be obtained from other sources (ILO, 2013a) – if applied incorrectly, may fail to represent the whole population.

At the same time, labour market surveys provide detailed information on the characteristics of interviewees, structure of the economy they participate in, labour market of underground economy, the reasons to go informal, attitudes, possible measures as perceived by the respondents, etc. (Schneider & Enste, 2000).

3.2.2.1. Labour Force Survey

The European Union Labour Force Survey (EU LFS, or LFS) is a household sample survey that is held quarterly since 1983 and provides an in-depth dataset on the labour market of European countries with regard to total population, activity and activity rates, employment, employment rates, self-employed, employees, temporary employment, full-time and part-time employment, population in employment having a second job, working time, total unemployment and inactivity. Some LFS are devoted to specific topics. Since 1999, every LFS is extended with the ah-hoc modules (e.g. employment of the youth, migrants, disabled people) (Eurostat, 2017a). It is mandatory for all EU countries to conduct LFS; LFS is also carried out in some

non-EU member states. Eurostat (2018a) provides a comprehensive list of all the core and derived variables of the LFS.

ILO (2013a) acknowledges the advantages in utilizing LFS to study information on employment in the informal sector and informal employment. Besides discussing LFS questionnaire design (content, timing and placement of interviews), data processing, including agriculture employment in the measurement and taking into account secondary job, the ILO also proposes a set of key variables that identify the *informal sector*, these are: registration, ownership of the enterprise, type of accounts, product destination, firm size (the number of persons employed). The LFS variables that may classify *informal employment* are contribution by employer to pension funds/retirement scheme and de facto employment-based coverage of social security, health care or any other private or public protection scheme (ILO, 2013a). Another advantage of LFS is that it records the same set of characteristics in each country under the same concepts and definitions (Eurostat, 2017c), therefore ensures comparability between countries.

3.2.2.2. European Union Survey on Income and Living Conditions

The European Union Survey on Income and Living Conditions (EU-SILC) collects comparable time-series and longitudinal data on the topics of income distribution, living conditions, social exclusion (Eurostat, 2017b). EU-SILC replaced the ECHP (European Community Household Panel) survey, which expired in 2001.

EU-SILC was launched in 2003 in six EU Member States; in 2004, it was expanded to 15 countries, in 2005 – to 25 EU Member States. Bulgaria introduced this survey in 2006, and Romania, Switzerland and Turkey – in 2007.

The EU-SILC variables are grouped into four different files: household register, personal register, household data and personal data. These files exhaustively cover all the variables in the dataset that represent a *household level variables* (both collected and computed) and a *person level variables* (both collected and computed). There are also *linking variables* like year of survey, country ID and personal/household ID and *auxiliary variables* that are derived, such as statistical measures (in particular weights), thresholds, etc. (Eurostat, 2017b).

3.2.2.3. European Working Conditions Survey

European Working Conditions Survey (EWCS) is conducted once in every five years since 1990 by Eurofound. The topics covered by this survey include employment status, working

time duration and organisation, work organisation, learning and training, physical and psychosocial risk factors, health and safety, work-life balance, worker participation, earnings and financial security, as well as work and health (Eurofound, 2016). The sample includes only workers (employees and self-employed). In 2005, EWCS interviewed about 44.000 workers in 35 countries (28 EU Member States, 5 EU candidates, Norway and Switzerland).

Due to its nature that is reflected in the title, EWCS is a popular source to analyse job quality and working conditions. For example, Aleksynska (2018) uses the EWCS for the year 2015 to show that temporary employment has a negative effect on job satisfaction of wage employees both in transition and non-transition countries, though in transition countries with stronger magnitude.

3.2.2.4. European Social Survey

The European Social Survey (ESS) is an academically driven multi-country survey that was conducted in over 30 countries up to 2016. ESS aims to monitor social indicators, values and attitudes, as well as to enhance the methods of cross-national survey measurement in Europe (European Social Survey, 2017). ESS was first administered in 22 countries in 2002; now it is held every second year to cover about the same number of countries, in the Eighth wave 23 countries took part in the survey. ESS was conducted in Ukraine in 2004, 2006, 2008, 2010 and 2012.

ESS is necessary for our research because it allows, among other individual and employment characteristics, to detect the type of contract that the employees or family business have, such as *“Do/did you have a work contract of unlimited duration, limited duration, do/did you have no contract?”*(European Social Survey, 2012).

3.2.2.5. Eurobarometer 2007 and 2013

Special Eurobarometer #284 in 2007 and Special Eurobarometer #402 in 2013 addressed the undeclared work in the EU and were held in all EU countries. In fact, the Eurobarometer 2007 was the first survey that attempted to measure undeclared work on an EU wide basis and in a comparable way across countries using the same methodology, questionnaires and definition in all countries (EC, 2007).

To complement the analysis of this sensitive topic, the Eurobarometer surveys aimed to study undeclared work from both supply and demand side. Moreover, the method of “informers”

(Blades & Roberts, 2002) was applied, according to which the respondents were asked to assess the extent to which people in their neighbourhood took part in undeclared activities.

3.2.2.6. Enterprise surveys

Enterprise surveys allow to collect information on the number and characteristics of the businesses; their production activities, generation of income and fixed capital; conditions of work and relationships with the formal sector (Eurostat, 2014). To compose a sample of enterprises, usually a business register is used, but it does not cover informal sector, which raises a big issue of representativeness. Another disadvantage of enterprise surveys is their high price, they also may have overlaps and fail to cover home-based businesses. However, they are an important source of information, when combined with household surveys.

Example of an enterprise survey is the Structural Business Statistics (SBS) (Eurostat, 2018c), which “describes the structure, conduct and performance of businesses across the EU” and is collected annually since 1995. The SBS databases covers only four NACE economic sectors (industry, construction, distributive trades and services) and may be broken down by sectoral levels, NUTS-2 regions and different enterprise sizes. Even though some sectors are not present in the dataset, it is not likely to have high level of undeclared work, for instance, in financial sector because financial institution are required to keep highly consistent financial records as they are overseen by regulatory institutions (Williams et al., 2017).

The SBS includes business demographic variables, output and input related variables (Eurostat, 2018b).

One of the main difference between household and enterprise surveys is that one individual in the enterprise survey may be counted more than once if he/she works for more than one employer (Williams et al., 2017).

3.2.2.7. Mixed household-enterprise surveys

This approach focuses on the idea of detecting unincorporated enterprises within the households. In mixed household-enterprise surveys (MHES), the sampled units and initial reporting units are households but the final observation units are enterprises. (OECD, 2002)

At the first stage, a sample of households is selected and each household is asked if any of its members own and operate an unincorporated enterprise (e.g. is a sole proprietor or a partner in an unincorporated enterprise). This allows detecting the small enterprises that are not included in list-based enterprise surveys and provides the measurement of the NOE. In this respect, the

main distinction of MHES is that it collects information about enterprises as it is, and a household survey collects information about the household members, possibly asking about their personal contributions to enterprises.

Eurostat (2014) defines three possible approaches for MHES:

- The modular approach, according to which the existing LFS includes a module of questionnaire for evaluating the informal sector; the two surveys may be conducted subsequently and monitor the trends of the informal sector.
- The stand-alone approach: informal sector survey is held independently, which creates an opportunity to design a specific sample, though its quality requires a complex sampling and questionnaire design. This approach allows selecting the sample of households where one of the members works in informal sector enterprises and interviewing the samples of household and enterprise owners.
- Integrated approach, somewhat similar to the first approach, because they may be regarded a special typed of modular surveys. The sample of households participating in the informal sector should be as large as possible so as to assure full representation of informal sector activities. The data is collected on informal sector, labour force characteristics, household income and expenditure, etc. This approach may be of special relevance for the countries where regular household surveys are not conducted.

The Fully Integrated Rational Survey Technique (FIRST) methodology is based on a modified MHES that is a part of a complex data collection programme on economic statistics. Its application, however, requires financial and human resources and is difficult to conduct on a regular basis (Eurostat, 2014).

The “1-2” survey is a kind of MHES that uses the LFS as a base to collect information on informal sector. This serves as a sample frame for the Household Unincorporated Enterprises with at least some Market production (HUEMs). When HUEMs are identified, the enterprise survey is help uniquely for this sample which collects the data on the same NACE that are included in the enterprise surveys (industry, construction, trade, and services) (Eurostat, 2014).

3.3. Direct methods in estimating the informal employment of Ukraine

3.3.1. Ukraine country profile

In 2017, the total population of Ukraine is 42.3 million (SSSU, 2018c). according to **Table 3.1**, the economically active population of age 15-70 is estimated as 17.9 million and working age population as 17.2 million (SSSU, 2018d). The working age in Ukraine is 15-59, now equal for women and men⁴. The activity rate in 2017 is 62% and the employment rate is 56.1%. The unemployment rate is estimated at the level of 9.5%. As regards the unemployment rate by the age groups, the unemployment is the highest for the 15-24 age group (18.9%) and decreases for every next each group (unemployment rate is 7.9% for the 50-59 age group).

Table 3.1. Economic activity of the population of Ukraine (2017)

Economically active population	aged 15-70	millions person		17.9	
		% of the total population in respective age group		62	
	of working age	millions person		17.2	
		% of the total population in respective age group		71.5	
of which	employed	aged 15-70	millions person		16.2
			% of the total population in respective age group		56.1
		of working age	millions person		15.5
			% of the total population in respective age group		64.5
	unemployed (ILO methodology)	aged 15-70	millions person		1.7
			% of the economically active population in respective age group		9.5
		of working age	millions person		1.7
			% of the economically active population in respective age group		9.9

Source: SSSU (2018b)

As for the structure of employed population, the employment rate in urban settlement is higher (57.1%) compared to rural areas (54.8%). The employment rate of men is higher compare to women (61.4% and 51.7%, respectively) (State Employment Service, 2018).

⁴ Before 2012, the upper working age for women was 54. According to the Law of Ukraine “On the Measures for Legislative Support of the Pension System Reform”, the working age for women should equal the working-

The IFC and WB (2009) conduct the first of this kind survey of enterprises as regards tax compliance. The survey covered 2,082 private companies for the tax year 2007 and 1,000 sole proprietors for tax year 2008. This study revealed that taxes are perceived as a weighty burden for enterprises but even more – for sole proprietors; for them taxes may amount to 8% of turnover. Another finding was that small businesses operate in less competitive conditions compared to larger businesses. Thus, the main recommendations included to: (i) simplify VAT, the enterprise profit tax, and other taxes, (ii) simplify social payments, (iii) reduce the need for visits to supervisory offices, (iv) improve the control system and reduce inspections/audits, (v) prevent penalties and (vi) provide access to tax information.

Ostapenko & Williams (2016) discuss the association between the acceptability of tax evasion from the entrepreneurs' view and informal economy in Ukraine and Slovakia. For this, they use the enterprise survey conducted in both countries and reveal that there is no relationship between attitudes towards formal institutions and the acceptability of operating in the informal economy and tax evasion from the entrepreneurs' point of view. The results of the paper, at the same time, may be questionable because of a very low response rate of only 5% (out of 6000 questionnaires distributed, only 238 were filled in).

Symonenko & Kostiuk (2017) hypothesize that the tax system in Ukraine is similar to the French one, which presumes that the taxpayer is honest, so the taxpayer is responsible for administering personal taxes and pays taxes voluntarily. The difference between the French model and Ukrainian is that a taxpayer in France should be notified about the inspection 8 days in advance. In Ukraine, on the contrary, inspections may be both scheduled and not scheduled.

Overall, tax audits are quite frequent in Ukraine. More than 60% of companies in Ukraine were inspected by at least one supervisory body in 2007 (IFC, 2009). The State Fiscal Service of Ukraine (SFSU) and the State Financial Monitoring Service of Ukraine (SFMSU) are in charge of the state policy of combating the trespassing the tax legislation and exercising the control over tax revenues in Ukraine. Among the responsibilities of SFSU are identification of financial transactions that may be related to income laundering, as well as verification and audit of taxpayers. Tax inspections, both scheduled and unscheduled, may be conducted also by the Pension Fund bodies and the state social insurance funds (IFC, 2009). In 2016, 42% of

age of men. To allow slow transition, in 2012, the pension age of women was 55, in 2013 – 56, in 2014 – 57, in 2015 – 58 and from 2016 – 59 years.

unscheduled inspections and in 2017, 37% were initiated by the control body (SFSU, 2018c). For example, in 2017 SFSU conducted 16.2 thousand of unscheduled inspections that lead to the detection of UAH 14.8 billion (\$558 million) of fictitious VAT and accrual of additional UAH 16.3 million (\$615 thousand) of financial obligations (SFSU, 2018b). The most common offenses were: unreal operations for the purchase of goods or services that were not produced or provided in full, absence of primary documents, registers, financial statements and documents related to the calculation and payment of taxes and fees (SFSU, 2018a).

In terms of tax discipline, Ukraine was ranked #181 (out of 183 countries) in 2011 by the indicator of *Paying taxes* with about 135 tax payments per year (WB & IBRD, 2011), in 2018 Ukraine takes the rank #43 (out of 190) for the same indicator with only 5 tax payments per year (see **Table 3.2**), after easing tax compliance by introducing and improving an electronic filing system for VAT (WB & IBRD, 2018) and adoption of certain provisions of the Tax Code of 02.12.2010 № 2755-VI and other regulations (Vinnychuk & Ziukov, 2013). These reforms were important measures to decrease the corruption in tax rebate (Yuzhanina, 2017). Ukraine also decreased the tax rates, in 2011 total tax rate amounted to 55.5% of profit, and in 2018, it is 37.8% of profit. In fact, the number of tax payments as well as tax burden were gradually reduced (Vinnychuk & Ziukov, 2013).

Table 3.2. Country ranking by the Paying taxes index (2011 and 2018)

Country	Rank		Payments (number per year)		Time (hours per year)		Total tax rate (% of profit)	
	2011	2018	2011	2018	2011	2018	2011	2018
Bulgaria	85	90	17	14	616	453	29.0	27.1
Czech Republic	128	53	12	8	557	248	48.8	50.0
Estonia	30	14	7	8	81	50	49.6	48.7
Hungary	109	93	14	11	277	277	53.3	46.5
Latvia	59	13	7	7	293	168.5	38.5	35.9
Lithuania	44	18	11	11	175	109.3	38.7	42.7
Poland	121	51	29	7	325	260	42.3	40.5
Romania	151	42	113	14	222	163	44.9	38.4
Slovakia	122	49	31	8	257	192	48.7	51.6
Ukraine	181	43	135	5	657	327.5	55.5	37.8

Note: Paying taxes is one of 11 indicators by Doing Business that measure business regulation, protection of property rights and their effect on businesses, especially small and medium-size domestic firms. In the Paying taxed indicator are included: payments, time and total tax and contribution rate for a firm to comply with all tax regulations as well as post-filing processes (WB & IBRD, 2018).

Source: WB & IBRD (2011), WB & IBRD (2018)

Table 3.2 demonstrates that Ukraine significantly improved its position by the *Paying taxes* index and addresses the issues raised by the report “The Costs of Tax Compliance in Ukraine”

(IFC, 2009). Five payments per year (for a total number of taxes and contributions paid, including consumption taxes (value added)) is the least out of all European transition economies. Launching an electronic payment system halved the total number of hours spent on preparation, filing, returning and paying taxes (from 657 to 327.5 hours). The total tax and contribution rate⁵ dropped from 55.5% to 37.8%. Finally, the most significant progress is achieved in the ranking. In fact, about 35% of Ukrainian companies considered tax administration a significant obstacle to doing business in 2009, when Ukraine was ranked #180 by the *Paying taxes*. From the second to the last country in 2011 (#181 out of 183), in 2018 Ukraine holds the rank #43.

The statistical information for the LFS in Ukraine is collected by the SSSU, the survey that is organized according to the methodology of the ILO is carried out every year since 1999 and interviews around 13 000 households in each wave (SSSU, 2014a). The LFS in Ukraine (frequently titled as “household sample surveys as regards economic activity”) aim to study current state and changes of labour supply in the labour market of Ukraine and provide data for the analysis of trends in the development of the business environment. For the description of sample design and data quality assessment, see SSSU (2017). We mention two characteristics of this household survey:

- This is a rotative survey where each selected household is surveyed for a total of 6 periods: during three consecutive months and again for another three months after a nine-month break. So, the household stays in the sample for 15 months but is interviewed only 6 times.
- Statistical weighting is designed to account for household selection probabilities, levels of refusals to be interviewed and harmonization of survey results with the demographic characteristics of the population of Ukraine

For our study, we are mostly interested in informal employment of Ukraine that may be derived from the LFS survey data and is regularly reported by the SSSU. *Informal employment* covers informal jobs at the enterprises of both formal and informal sectors. Considering this, as well as the Guidelines concerning a statistical definition of informal employment, adopted at the 17th ICLS (ILO, 2003a) and the Guidelines on the definition of informal employment of the population (SSSU, 2013c), informal employment includes:

⁵ Includes (i) profit or corporate income tax, (ii) social contributions and labour taxes paid by the employer, (iii) property and property transfer taxes, (iv) dividend, capital gains and financial transactions taxes and (v) waste collection, vehicle, road and other taxes.

- Employed at informal sector enterprises (unregistered own-account workers, employers and their employees, contributing family workers, etc.) (See **Figure 1.1**: cells 3-6, 8);
- Contributing family workers in formal sector enterprises (cell 1);
- Employees holding informal jobs in formal sector enterprises (those who worked according to oral agreement or did not have any social guarantees, particularly: no single contribution for compulsory state social insurance has been paid for them, they did not have right to annual leave or paid sick leave) (cell 2).

It is important to point out that this list does not include “own-account workers engaged in the production of goods exclusively for own final use by their household, if considered employed” (cell 9) because in Ukraine, this category is not regarded as employed population (SSSU, 2013c, p. 11). On the other hand, this group depicted in cell 9, especially in developing countries (which includes Ukraine) may be subject to vulnerable employment (ILO, 2003b).

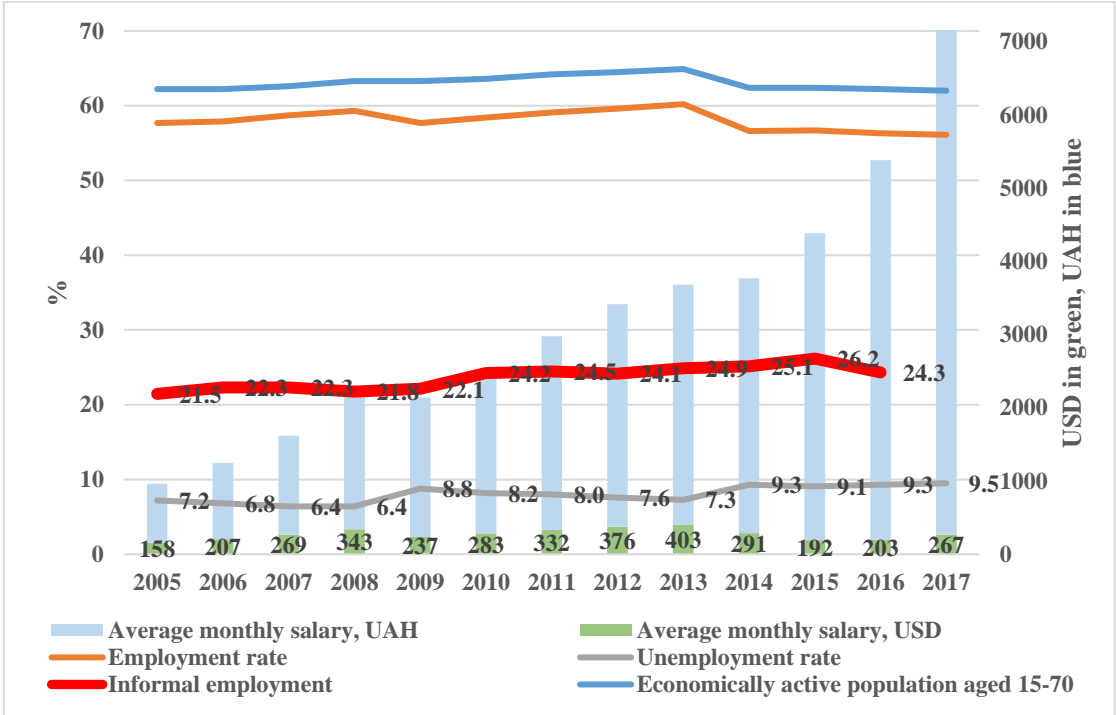
Before 2013, when Ukraine developed and adopted the Guidelines on the definition of informal employment of the population (SSSU, 2013c), statistical information was available only on the *population engaged in the informal sector*. According to the national methodology, the informal sector includes all persons who were employed at unregistered enterprises that by their size (number of employees) belong to the household sector. But, taking into account Ukrainian peculiarities concerning the spread of informal labour relations, the criteria for determining the population engaged in the informal sector were expanded by the inclusion of persons who worked in an oral arrangement with the employer in the formal sector, that is, without a formal labour contract (contract) and no social warranties (SSSU, 2014c).

In **Figure 3.1**, we grouped the main indicators of the labour market of Ukraine, such as the average monthly salary, employment rate, rate of economic activity of the population aged 15-70, unemployment rate and rate of informal employment.

As reported in **Figure 3.1**, informal employment ranges between 21.5-22.3% of the employed population during 2005-2017, the economic crisis of 2008 did not change it significantly: it equalled 22.3% in 2008, than fall down to 21.8% in 2009 and grew by 0.3 percentage points to reach 22.1% in 2010. Only in 2010, the informal employment in Ukraine started to augment and reached 24.5% in 2012. In 2015, it climbed to 26.2% and in 2016, it was estimated to be 24.3%. State Employment Service (2018) defines the structure of employment in the informal

sector: 43% of the informal sector is in agriculture, 20% is trade, 16% is construction, 5% – industry and 3% – transport.

Figure 3.1. Indicators of the labour market of Ukraine (2005-2017)



Source: SSSU (2018b)

The unemployment rate changed within limits of 7.2-6.4% during 2005-2018. In 2009 it broadened to 8.8%, slowly went down to 7.3% and in 2014 enlarged to 9.3%. In 2017, the unemployment of Ukraine exceeded this level and was estimated as 9.5%. If we compare the relationship between informal employment and unemployment in Ukraine, we can recognize that informal employment lags one year behind the unemployment changes.

What obviously raises interest from **Figure 3.1**, is the strong growth of the average monthly salary in the national currency (UAH), but its US dollar equivalent actually shrank. In 2013, the average salary equalled \$403, in 2015 it deteriorated more than twice, to \$192 (less than almost a decade before) and in 2017 slowly recovered to \$267 on average per month.

European social survey, to our surprise, was not often utilized to study the labour market of Ukraine. Bari & Róbert (2016) study the well-being of individuals and the association between satisfaction with life and satisfaction with work-life balance using the data for the Czech Republic, East Germany, Estonia, Hungary, Poland, Slovakia, Slovenia and Ukraine. The authors demonstrate that the work balance has a significant effect on satisfaction with life. Another finding is that individuals that are more educated have greater subjective well-being.

3.4. Ukrainian Undeclared Work Survey

In October-November 2017, the Kyiv International Institute of Sociology (KIIS) on the request of the National University of Kyiv-Mohyla Academy (NaUKMA) and the International Labour Office (ILO) carried out the **Ukrainian Undeclared Work Survey (UUDWS)** (ILO, 2018b; Nezhyvenko, 2018).

3.4.1. Methodology of the survey

The sample developed for the study is representative for the Ukrainian adult population, excluding the Autonomous Republic of Crimea and temporally occupied territories of Donetsk and Luhanska oblasts (15+ years). The electoral statistical data of the Extraordinary parliamentary elections of 2014 was used for sample design to select a certain number of voting precincts. The survey was carried out in 100 PSU (urban settlements and rural districts) in all regions of Ukraine (except of Crimea and temporally occupied territories of Donetsk and Luhanska oblasts). The sample is a stratified three-staged random sample, random at each step of selection.

1000 face-to-face interviews were carried out during the field work stage. 20% of interviews were controlled at the control field work stage.

To take into account a multi-stage sample design and a correct gender-age structure (to meet the data from the State Statistical Service of Ukraine (SSSU)), the weighting technique was applied. For weighting, the most recent statistical information on the “Distribution of resident population of Ukraine by gender and age on 1 January 2017” from the SSSU that provides the data on the number and gender-age distribution of the permanent population of Ukraine by regions, type of area and cities with population over 100,000, was used. A weighting factor enables us to project the survey to the whole population that of age “15 years old and above” (35,879,399 individuals). As of November 2017, the total population of Ukraine, according to the SSSU, was 42,414,900. The total population of the age group “15 and above” was 35,879,400.

The questionnaire was developed according to the Eurobarometer methodology (EC, 2014b) with the aim to later compare the results of the UUDWS with the EU28. According to the methodology used, the undeclared work is defined as “paid activities that are lawful by their

nature but not declared to public authorities”. In this regard, all interviewees were instructed about the definition of undeclared work as “*activities which avoid partly or entirely declaration of the income to the tax authorities, but which are otherwise legal. This could be people working in certain sectors of activity like home maintenance – including builders, electricians and plumbers – but also in restaurants and cafes. Undeclared work is also common in a whole range of household services – such as gardening, babysitting and elderly care, personal services – like hairdressing, and repair services for cars, clothes or computers. Also, this situation often manifests itself in the fact that part or all of the salary is paid to employees in an envelope*” (NaUKMA & ILO, 2017).

Finally, interviewers repeated for four times during the interview that all information given would be handled with confidentiality and that answers would remain absolutely anonymous.

3.4.2. Demand side of the undeclared work

Two separate questions estimate the demand side of the undeclared work in Ukraine, as regards *services* and *goods*. 12.2 percent of respondents report having acquired any *services* undeclared (“had a good reason to assume that they involved undeclared work” as was stated in the question) and 15.2 percent report having purchased undeclared *goods*. Overall, 18.2 percent of the respondents admit having paid for any *goods or services* that included undeclared work, 75 percent have not done so, and 6 percent either do not know or refuse to answer.

The socio-demographic characteristics of those who use undeclared goods or services are presented in **Table 3.3**.

According to **Table 3.3**, as regards the gender, both women (16%) and men (21%) use undeclared work. In urban settlement, undeclared work is used more (22% to 14%, respectively). In terms of age, 25-44 years age group is more likely to buy undeclared goods or services. Self-employed have the highest tendency to be on the demand side of undeclared work (33%), compared with employees (21%), unemployed (19%), retired (11%) and students (8%). Those who report to have poor financial situation use undeclared work less frequently (15%) compared to those with very good financial situation (31%). In terms of sector, in hotel & restaurants undeclared work is used in the majority of cases (55%), it is followed by activities of households (31%), real estate and finance (25%), manufacturing (24%), trade and repair (23%) and construction and utilities (22%).

Table 3.3. Have you acquired any goods or services of which you had a good reason to assume that they involved undeclared work (the income was not completely reported to tax or social security institutions)? Share (%) (2017)

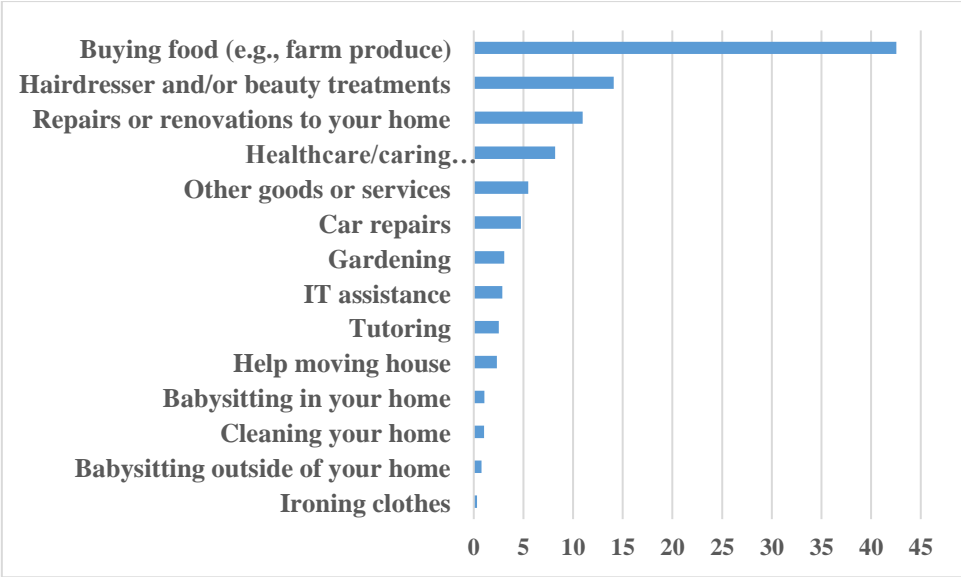
	Yes	No	Refusal	Don't know
Gender				
Female	16	79	1	4
Male	21	71	2	6
Type of settlement				
Rural	14	82	1	3
Urban	22	70	1	6
Age groups				
15 - 24 years	16	76	3	5
25 - 34 years	26	71	1	3
35 - 44 years	23	71	0	6
45 - 54 years	21	71	4	5
55 - 64 years	11	82	1	5
65 years+	12	82	1	6
Employment status				
Employee	21	71	2	6
Self-employed	33	54	8	5
Unemployed	19	77	1	4
Retired	11	83	1	5
Student	8	86	0	6
Other, refusal, don't know	26	73	0	1
Financial situation				
Poor	15	82	0	3
Average	18	76	1	6
Good	20	73	3	4
Very good	31	65	0	4
Sector				
Agriculture	14	81	0	5
Manufacturing	24	71	0	4
Construction & utilities	22	46	12	20
Trade & repair	23	61	4	12
Hotel & restaurants	55	45	0	0
Transport & telecommunication	16	81	0	3
Real estate & finance	25	75	0	0
Public administration	17	80	0	3
Health & education	13	87	0	0
Activities of households	31	66	3	0

Source: UUDWS

The most important good or service coming from undeclared work that was acquired in the last 12 months was worth on average UAH 3,869.76 (as of November 2017, this corresponds to

USD 145, or 124 euro⁶). This represents 120.8 percent of minimum wage (UAH 3,200 or USD 120, or 102 euro) and 51.7 percent of average wage (UAH 7,479 or USD 280, or 239 euro).

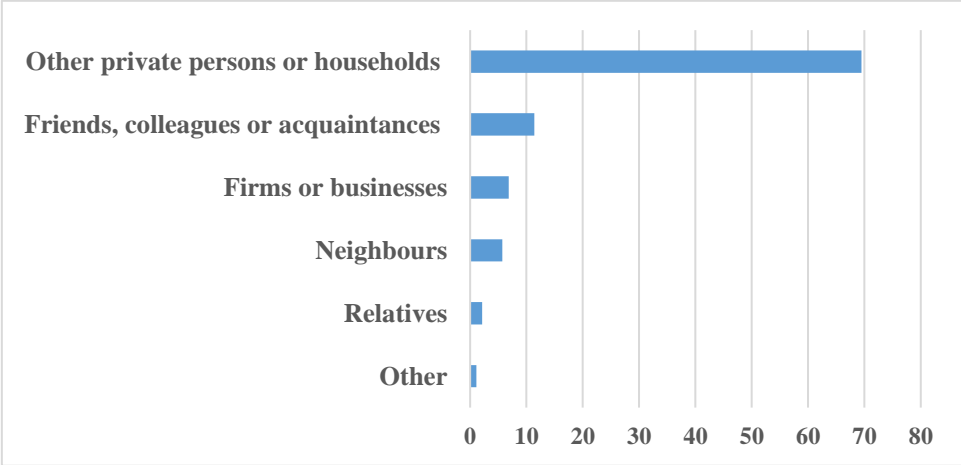
Figure 3.2. Types of undeclared work acquired in Ukraine (2017)



Source: UUDWS

According to **Figure 3.2**, primarily used undeclared activities are food (43%), hairdresser and/or beauty treatments (14%) and home repairs or renovations (11%).

Figure 3.3. Sources of undeclared work used in Ukraine (2017)



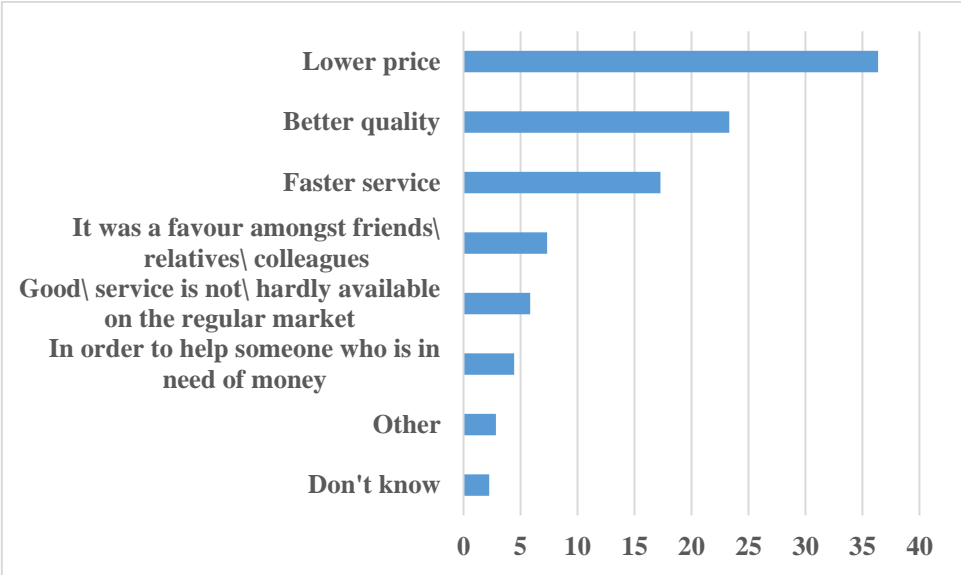
Source: UUDWS

Ukrainians in most cases purchase undeclared goods or services from other private persons or households (70%), much less buy from friends, colleagues or acquaintances (11%), firms or businesses (7%), neighbours (6%) and relatives (2%) (See **Figure 3.3**).

⁶ For currency conversion we used average real exchange rate of 26.74 UAH/USD and 31.32 UAH/Euro for November 2017 when the survey was conducted (official rate was 26.71 UAH/USD and 31.31 UAH/Euro).

Among the most important reasons for purchasing goods or services that involve undeclared work are “lower price” (36%), “better quality” (23%), “faster service” (17%), “it was a favour amongst friends/relatives/colleagues” (7%), “good/service is not/hardly available on the regular market” (6%) and “in order to help someone who is in need of money” (4%) (See **Figure 3.4**).

Figure 3.4. Reasons for purchasing goods or services involving undeclared work in Ukraine (2017)



Source: UUDWS

Finally, had the most important good or service for the respondent only been available on the regular market, the majority (65%) of respondents would have bought it from the regular market and only 3% would refuse from purchasing it.

3.4.3. Supply side of the undeclared work

7.10 percent of the respondents report having carried out any undeclared paid activity in the last 12 months. At the same time, 45.8 percent of respondents acknowledge that they personally know any people who work without declaring their income or part of their income to tax or social security institutions. Finally, 33 percent of the respondents assume that at least half (“50% or more” as stated in the answer) of the population of Ukraine work undeclared.

The socio-demographic characteristics of those who admit having carried out undeclared paid activities are presented in **Table 3.4**.

Table 3.4. Socio-demographic characteristics of those who admit having carried out undeclared paid activities (%) in Ukraine (2017)

Gender			
Female	26	Financial situation	
Male	74	Poor	8
Type of settlement		Average	47
Rural	38	Good	40
Urban	62	Very good	5
Age groups		Employment status	
15 - 24 years	11	Employee	31
25 - 34 years	22	Self-employed	18
35 - 44 years	32	Unemployed	34
45 - 54 years	28	Retired	11
55 - 64 years	4	Student	2
65 years+	3	Other, refusal, don't know	4

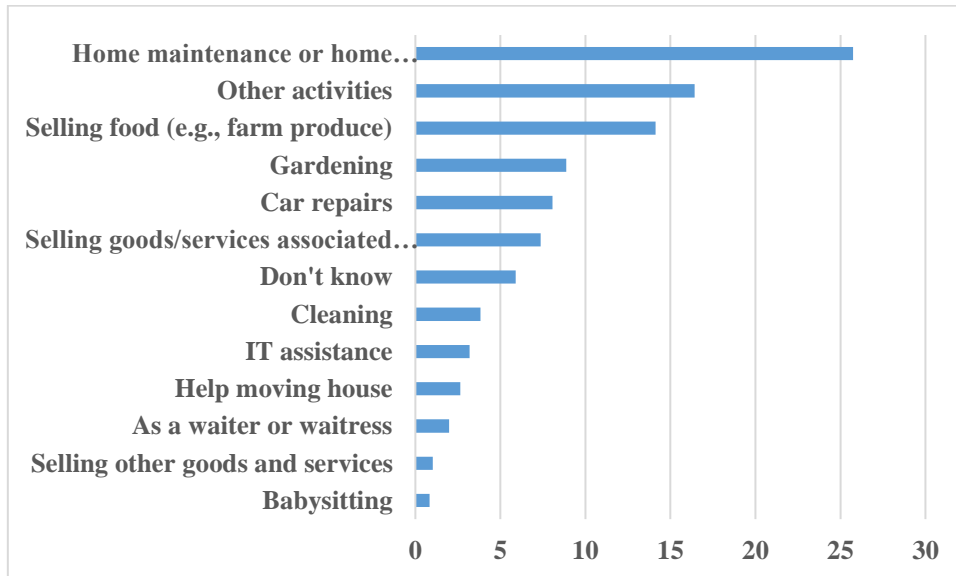
Source: UUDWS

Out of those who worked undeclared, 74% are males and 26% are females. 62% of undeclared workers live in urban and 38% live in rural settlements. Most of the “suppliers” of undeclared work are in the 35-44 years age group (32%), slightly less in the 45-54 years old group (28%), 25-34 years old groups represent 22%, the youngest 15-24 years old are 11% and above 55 years old represent 7%.

As regards the employment status of undeclared workers, most of them report to be unemployed (34%), slightly less are employees (31%), self-employed are 18% and retired are 11%, 2% are students. Providers of undeclared work report that their financial situation in most cases is average (47%) and good (40%). At the same time, for 8% the financial condition is poor and for 5% it is very good.

Among the activities that the respondents admit having carried out undeclared in the last 12 months are “home maintenance or home improvement services” (26%), “selling food (e.g., farm produce)” (14%), “gardening” (9%), “car repairs” (8%) and “selling goods/services associated with my hobby” (7%) (See **Figure 3.5**).

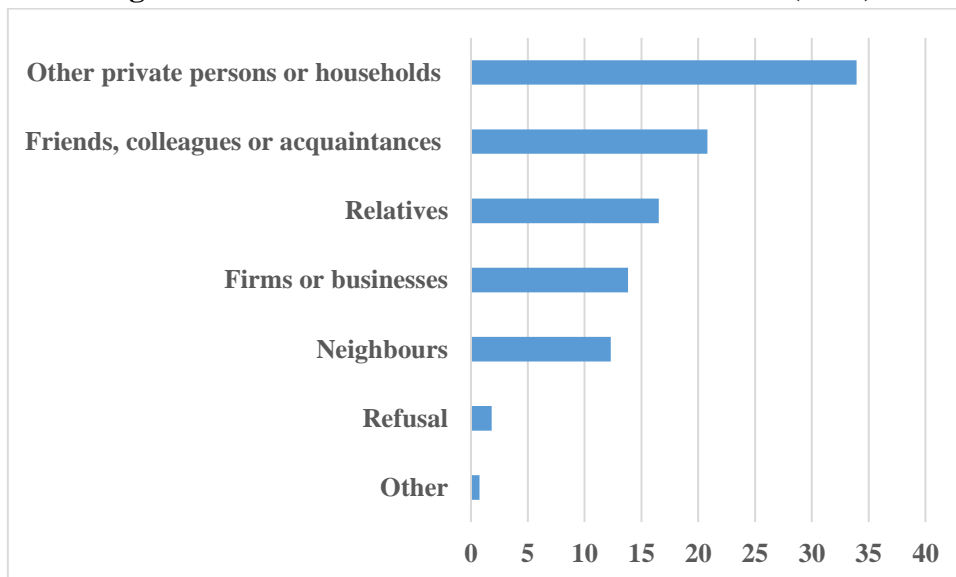
Figure 3.5. Types of undeclared work supplied in Ukraine (2017)



Source: UUDWS

According to **Figure 3.6**, most of undeclared workers perform their activities for other private persons or households (34%), for friends, colleagues or acquaintances (21%), relatives (17%), firms or businesses (14%) and neighbours (12%).

Figure 3.6. Clients of undeclared work in Ukraine (2017)

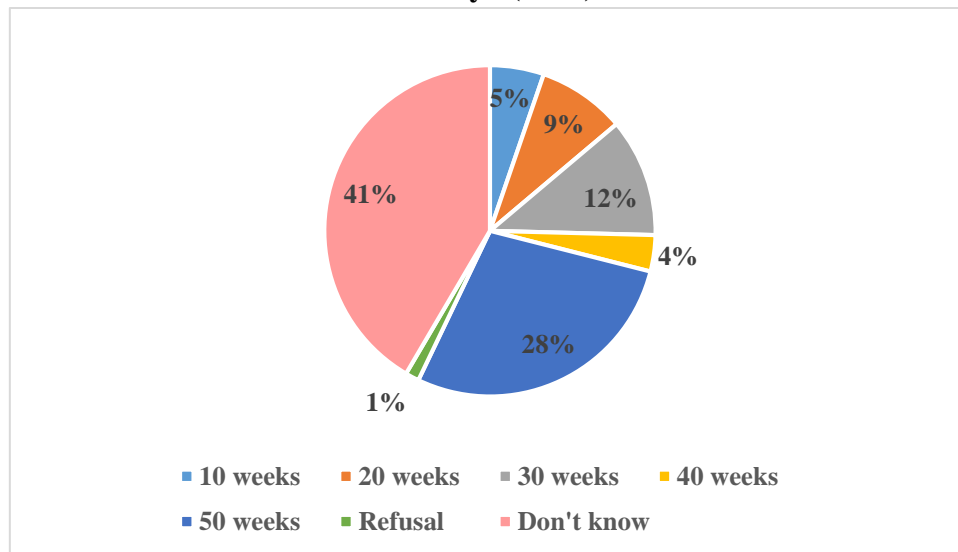


Source: UUDWS

Talking about the regularity of carrying out undeclared activities, one in five (22%) workers do this just once, one in three (33%) – few times and two in five (41%) – with certain regularity.

When those who perform undeclared activities are asked how many weeks during the last 12 months they worked in this activity, 28 percent report to working fulltime (50-52 weeks). At the same time, the highest number is for those who do not know (41%) (See **Figure 3.7**).

Figure 3.7. How many weeks during the last twelve months did you work in this activity? (2017)

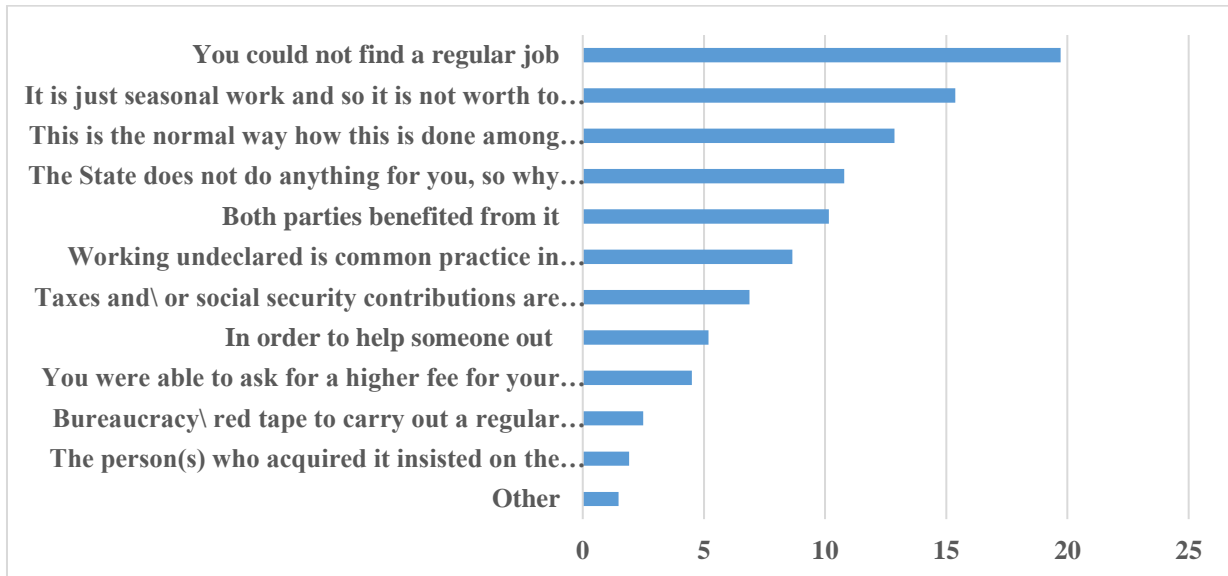


Source: UUDWS

The average yearly income from the undeclared activities (“Approximately, how much did you get in total from these undeclared activities in the last 12 months?”) was UAH 17,759.93 (or USD 664, or 567 euro). This means that monthly income from the undeclared activities equals UAH 1,479.99 (USD 55, or 47 euro). This constitutes 46.2 percent of minimum wage and 19.8 percent of average wage.

When those who admit having worked without declaration are asked about the reasons for doing the activities undeclared, the most common reasons were “could not find a regular job” (20%), “it was just a seasonal work and so it is not worth to declare it” (15%), “this is the normal way how this is done among friends, neighbours or relatives” (13%), “the State does not do anything for me, so why should I pay taxes” (11%) and “both parties benefited from it” (10%) (See **Figure 3.8**).

Figure 3.8. Personal reasons for working undeclared in Ukraine (2017)



Source: UUDWS

3.4.4. Envelope wages and income

3.4.4.1. Envelope wages

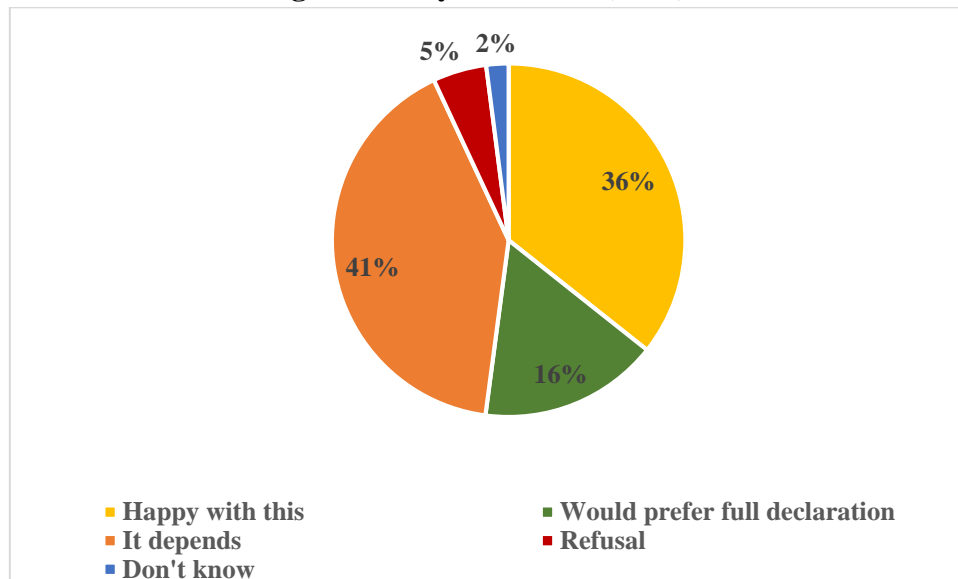
Almost every tenth (9%) dependent employee reports to have been paid envelope (cash-in-hand) wages, without declaring wages to tax or social security authorities within the past year. At the same time, a majority of employees (81%) say they have not received any part of their salary as envelope wages in the last 12 month.

More than half (55%) of dependent employees who had received income in the last year as cash, without it being declared, say that they received this envelope income as both regular and overtime work and one third (29%) receive it as part of the payment for regular work. For every seventh (14%) of them it was a payment for overtime or extra work.

In most cases (71%) paying the undeclared salary was initiated by the employer. In significantly less cases (16%) it was a joint idea of an employer and an employee. Interestingly, no one replied “It was on my initiative”.

The employees who had received income in the last year in envelope were asked if they were happy getting part of their salary without having it declared to the tax or social security authorities or would they have preferred to have had their total gross salary declared. Just over two fifths (41%) mention that “it depends”, slightly less (36%) are happy with this, every sixth (16%) would prefer full declaration (See **Figure 3.9**).

Figure 3.9. Were you happy getting part of your salary without having it declared to the tax or social security authorities or would you have preferred to have had your total gross salary declared? (2017)

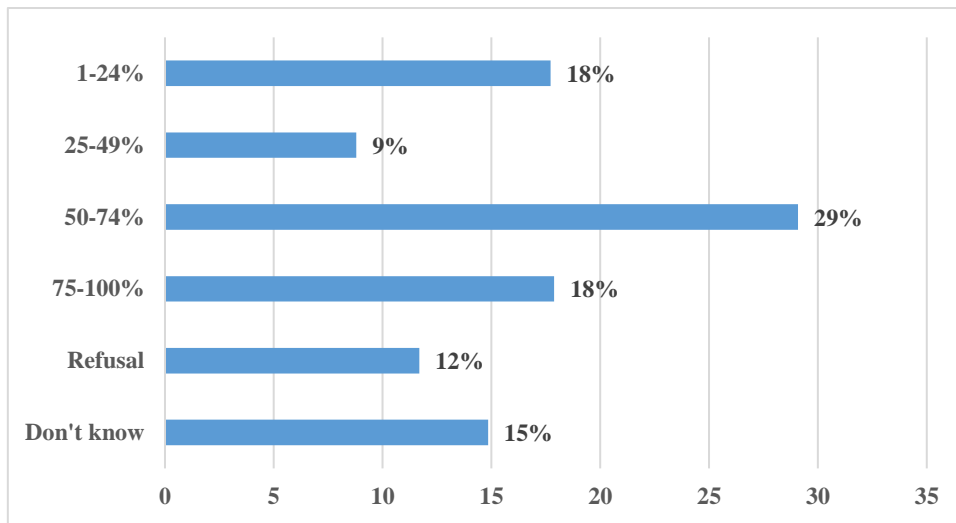


Source: UUDWS

Recipients of envelope wages were also asked if they did verbally agree with the employer about any of the conditions in return for receiving additional cash-in-hand payment. Three out of four (77%) say that no additional conditions were agreed, “agreed to work longer working hours than is in the formal contract” applies to 11%, “agreed to do different tasks than is in the formal contract” – to 7% and “agreed not to take full statutory holiday allowance” – to 3% of respondents.

Around one in three employees who had received income in the last year in envelope (29%) received 50% of their net monthly income this way. Only one in ten (9%) report that the cash payments accounted for 25-49% of their net monthly income. The equal number of 18% correspond to the lower bound of 1-24% and the upper bound of 75-100%. Around one in eight (12%) refused to provide an answer. Around one in seven (15%) said that they “don’t know” (See **Figure 3.10**).

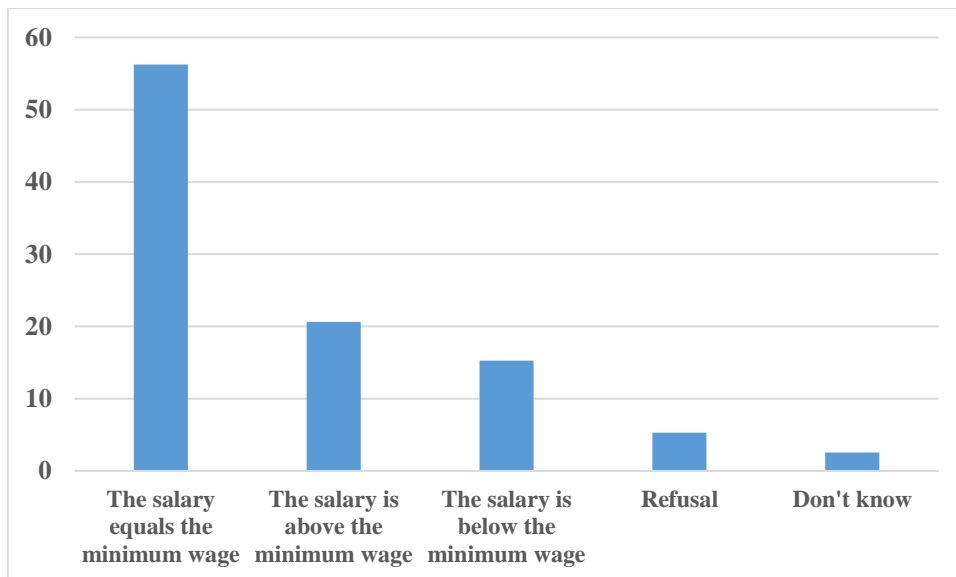
Figure 3.10. Approximately what percentage share of your net monthly income from this job did you get this way? (2017)



Source: UUDWS

The dependent employees were also asked about their official net monthly salary for the job. For most of them (56%) the salary equals the minimum wage. For every fifth (21%) the salary is above the minimum wage, for every seventh (15%) the salary is below the minimum wage (See **Figure 3.11**).

Figure 3.11. Which of the following best describes your officially declared monthly salary for this job? (2017)



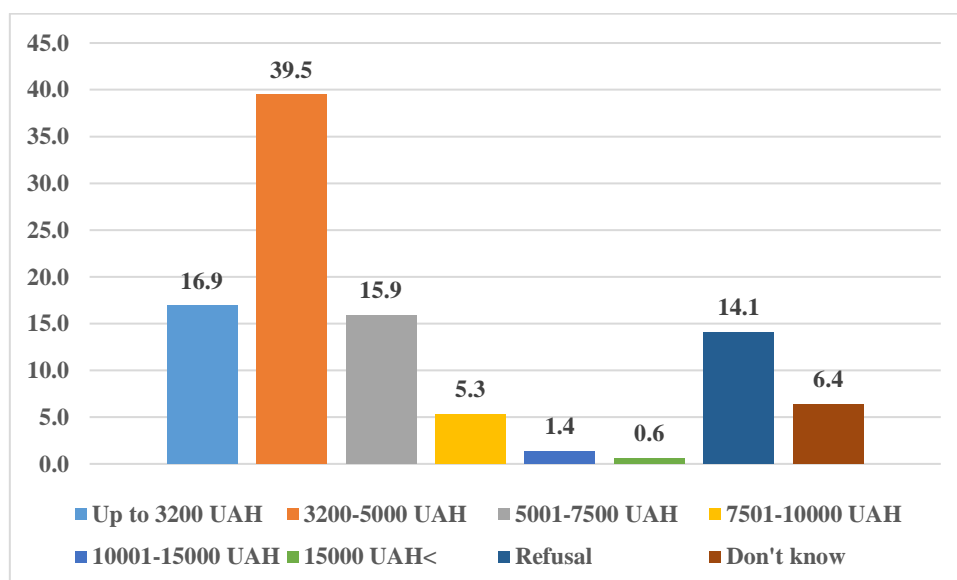
Source: UUDWS

High percentage of net monthly income received in the envelope (**Figure 3.10**) and low level of officially declared monthly salary of dependent employees (**Figure 3.11**) serve as an evidence of low protection level of Ukrainian employees.

3.4.4.2. Income

In the end of the questionnaire the respondents were asked to describe their net income generated from *formal work*⁷ in the last month (See **Figure 3.12**). The majority of respondents (40%) fall into the category of UAH 3200-5000 (UAH 3200 is the minimum wage at the time of interviews), which equals USD 119-187 per month. 17 percent of respondents earn less than UAH 3200 (USD 119, or 102 euro). 16 percent of respondents earn in the range of UAH 5001-7500, which equals USD 187-280 (or 160-240 euro). Significantly less (5%) indicate their income of UAH 7501-10000 (or USD 280-374, or 240-319 euro). Finally, around 1 percent earn in the range of UAH 10001-15000 (or USD 374-561, or 319-479 euro) per month and less than 1 per cent (0.6%) have an income above UAH 15000 (or USD 561, or 478 euro). 14 percent of respondents refused to reply to this question.

Figure 3.12. Income from the formal work in Ukraine (2017)



Source: UUDWS

The formal income distribution by age, gender and type of settlement (in UAH, in USD and as percentage of average wage) is presented in **Table 3.5**.

⁷ Here by “formal work” is understood as not generating undeclared activities; in contrast, “informal work” generates undeclared activities.

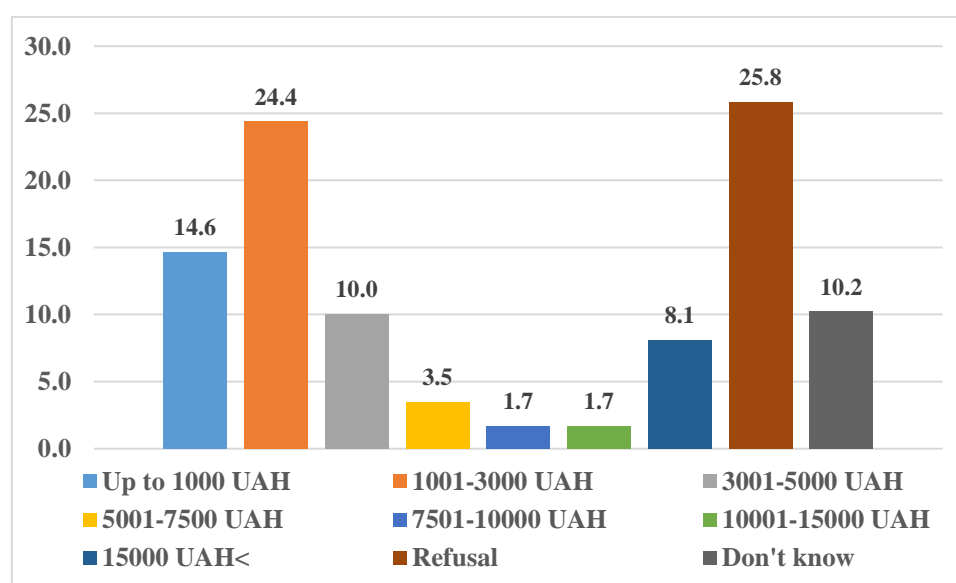
Table 3.5. Income from the formal work by age groups (15-25, 25-55, 55+), gender, and by settlement (2017)

	Income, in UAH	In USD	As % of average wage
Age groups			
15-25	4470.72	167.19	59.78
26-55	4624.54	172.94	61.83
56+	4084.78	152.76	54.62
Average	4544.23	169.94	60.76
Gender			
Female	3918.12	146.33	52.39
Male	5090.76	190.38	68.07
Type of settlement			
Urban	4925.30	184.19	65.86
Rural	3598.18	134.56	48.11

Source: UUDWS

Those who were engaged in carrying out undeclared activities were asked to describe their net income generated from *informal work* in the last month (See **Figure 3.13**). The majority of respondents (24%) report to earn UAH 1001-3000, which equals USD 37-112 per month. Every seventh undeclared worker (15%) earns less than UAH 1000 (or USD 37, or 32 euro). Every tenth undeclared worker (10%) earns between UAH 3001-5000, which equals USD 112-187 (or 96-160 euro). Significantly less (4%) indicate their income of UAH 5001-7500 (or USD 187-280, or 160-239 euro) per month. Almost 2 percent (1.7% in both cases) earn UAH 7501-10000 (or USD 280-374, or 239-319 euro) and UAH 10001-15000 (or USD 374-561, or 319-479 euro). Interestingly, one in twelve (8%) of those who carry out undeclared work earn more than UAH 15000 (USD 561, or 479) per month. The refusal to reply was 26 percent.

Figure 3.13. Income from the informal work in Ukraine (2017)



Source: UUDWS

The informal income distribution by age, gender and type of settlement is presented in **Table 3.6**.

Table 3.6. Income from the informal work by age groups (15-25, 25-55, 55+), gender, and by settlement (2017)

	Income, in UAH	In USD	As % of average wage
Age groups			
15-25	7504.13	280.63	100.34
26-55	4089.79	152.95	54.68
56+	1755.99	65.67	23.48
Average	4487.93	167.84	60.01
Gender			
Female	1751.71	65.51	23.42
Male	5791.30	216.58	77.43
Type of settlement			
Urban	3469.75	129.76	46.39
Rural	6835.12	255.61	91.39

Source: UUDWS

3.4.5. Perceptions and acceptance of undeclared work

3.4.5.1. Level of risk

Almost half (48%) of respondents think that people who carry out undeclared work are at a small risk of being detected by tax or social security institutions, with most (25%) saying the risk is “fairly small” rather than “very small” (23%). Around one in three (28%) think the risk of being detected is high, with most saying the risk is “fairly high” (21%) rather than “very high” (7%). Almost one in five (22%) say they do not know what the level of risk of being detected is.

3.4.5.2. Expected sanctions

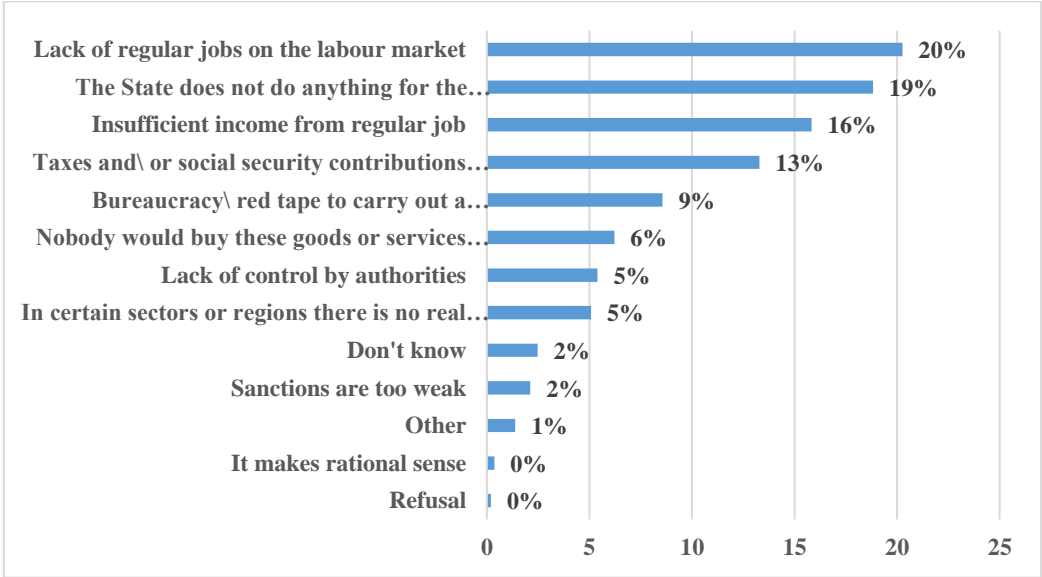
The majority of respondents (41%) say that if someone was discovered to be receiving an income from work which was not declared to the relevant authorities the sanction would be the normal tax and social security contributions, plus a fine. Just over one in three (34%) think that the punishment would be to pay the normal tax and social security contributions. Only a small minority (2%) imagine that the person would be sent to prison. At the same time, around one in six respondents (18%) say they “don’t know” what sanction would be imposed.

3.4.5.3. Assumed reasons for doing undeclared work

Respondents were asked about the two most important reasons for engaging in undeclared work in Ukraine. In total, one in five (20%) of respondents think that a reason for doing undeclared

work is because there is a lack of regular jobs on the labour market. Slightly less (19%) think that the State does not do anything for the people, so why should they pay taxes. Every sixth person (16%) thinks that they receive insufficient income from regular job. One in eight (13%) say that taxes and/or social security contributions are too high. Every tenth respondent (9%) mention a complicated bureaucracy/red tape to carry out a regular economic activity as a reason and only one in sixteen (6%) thinks that nobody would buy these goods or services at normal rates on the regular market. All other reasons were mentioned by less than one in twenty respondents (See **Figure 3.14**).

Figure 3.14. Reasons for doing undeclared work (2017)

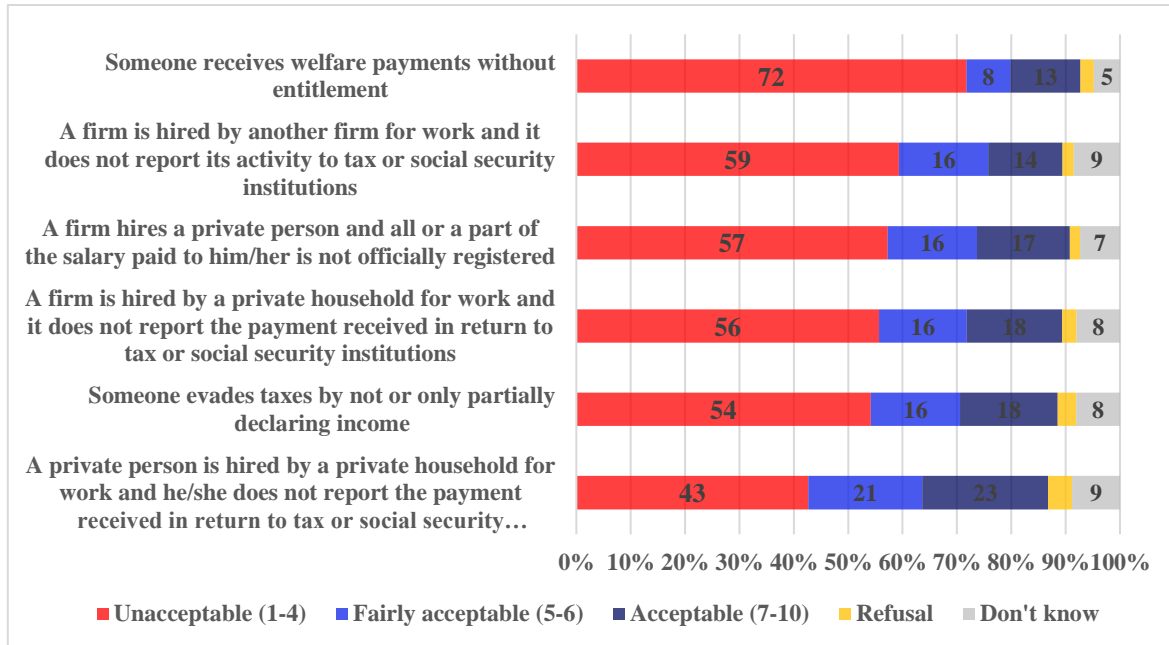


Source: UUDWS

3.4.5.4. Acceptability of undeclared work

The respondents were offered six various “evasion” behaviours and were asked to assess them on a 10 point scale where “1” is “absolutely unacceptable” and “10” is “absolutely acceptable”. We group it to three categories: from 1 to 4 as “unacceptable”, 5 and 6 as “fairly acceptable” and from 7 to 10 as “acceptable”.

Figure 3.15. How do you assess these various behaviours? For each of them, please tell me to what extent you find it acceptable or not (2017)



Source: UUDWS

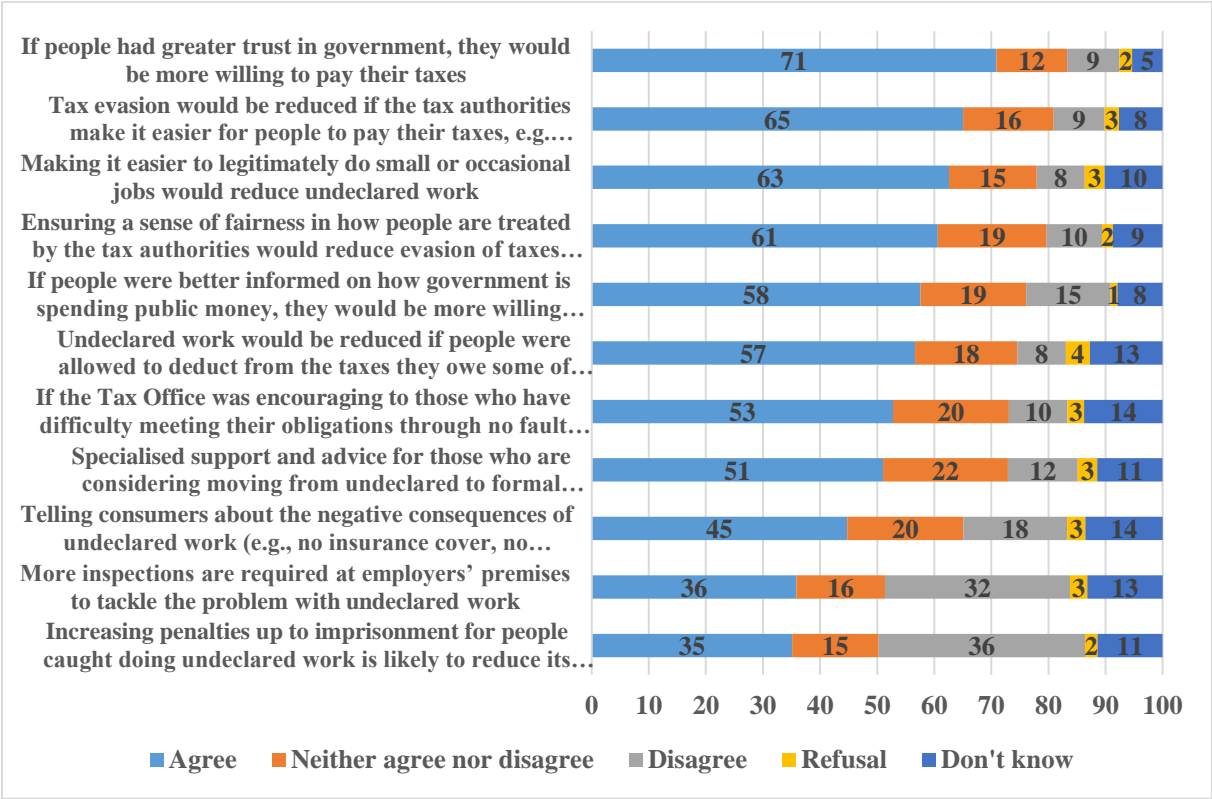
As reported in **Figure 3.15**, for five out of six “evasion” scenarios described, the majority of respondents think the behaviour is “unacceptable”. In particular, respondents are most likely to think that someone receiving welfare payments without entitlement is “unacceptable” (72%), only for 13% it is “acceptable”. A scenario of a firm hired by another firm for work which does not report its activity to the relevant authorities is mostly “unacceptable” (59%), but acceptable for every seventh respondent (14%). Hiring a private person by a firm and paying all or a part of the salary to him/her not officially is “unacceptable” in most cases (57%) and acceptable for 17%. More than half of respondents (56%) think that it is “unacceptable” for a firm that is hired by a private household for work, not to report the payment received to tax or social security institutions; however, 18% think that it is “acceptable”. A scenario of someone to evade taxes by not or only partially declaring income is as well regarded in majority as “unacceptable” (54%) and as “acceptable” in 18% of replies. The behaviour of a private person that is hired by a private household for work and he/she does not report the payment received in return to tax or social security institutions although it should be reported is perceived as unacceptable in less than half replies (43%) and “acceptable” for almost every fourth respondent (23%).

3.4.6. Possible measures to improve the labour market in Ukraine

In order to know the perception of possible measures to improve the labour market in Ukraine and at the same time to decrease the level of undeclared work, the respondents were asked to

estimate their level of agreement or disagreement with eleven statements on a 5 point scale where “1” means “strongly disagree” and “5” means “strongly agree”. The responses are further grouped into three categories: “4-5” as “agree”, “3” as “neither agree nor disagree” and “1-2” as “don’t agree”. Five statements are related to tax evasion and six statements – to undeclared work.

Figure 3.16. To what extent you agree or disagree with the following statements? (2017)



Source: UUDWS

Regarding *tax evasion*, the majority of respondents (71%) think that the most common reason for avoiding paying taxes is the low level of trust in government (See **Figure 3.16**). Slightly less (65%) believe that tax evasion would be reduced if the tax authorities make it easier for people to pay their taxes (e.g. through providing pre-filled tax returns). Six out of ten respondents (61%) assume that ensuring a sense of fairness in how people are treated by the tax authorities would reduce evasion of taxes and social contributions. Almost the same number of respondents (58%) think that if people were better informed on how government is spending public money, they would be more willing to pay taxes. Finally, more than half or respondents (53%) say that if the tax office was encouraging to those who have difficulty meeting their obligations through no fault of their own, the tax evasion would be reduced.

As regards *undeclared work*, the majority (63%) believe that making it easier to legitimately do small or occasional jobs would reduce undeclared work. Almost six out of ten respondents

(57%) believe that undeclared work would be reduced if people were allowed to deduct from the taxes they owe some of the costs of paying for household services (e.g., babysitting, cleaning, elderly care, cooking, gardening, tutoring). Every second respondent (51%) thinks that a specialised support and advice for those who are considering moving from undeclared to formal work would reduce undeclared work. Almost half (45%) believe that telling consumers about the negative consequences of undeclared work (e.g., no insurance cover, no guarantees that health and safety regulations have been followed, no legal recourse) would reduce the use of undeclared work. Finally, more than one third (36% and 35%, respectively) think that ‘more inspections are required at employers’ premises to tackle the problem with undeclared work’ and “increasing penalties up to imprisonment for people caught doing undeclared work is likely to reduce its prevalence”. The level of agreement with all but the last statement was the highest out of all, but the level of disagreement with increasing penalties up to imprisonment is higher (36%) than the agreement level. That is, the Ukrainians tend to believe in preventive measures of tackling the undeclared work rather than punitive measures.

3.5. Comparison between the UUDWS and the Eurobarometer 2013

The fact that the Eurobarometer methodology was used to develop the UUDWS in terms of the sample design, utilizing the same questionnaire and using the same definition of the undeclared work, it allows for a comparison between the UUDWS of 2017 and the latest Eurobarometer of 2013.

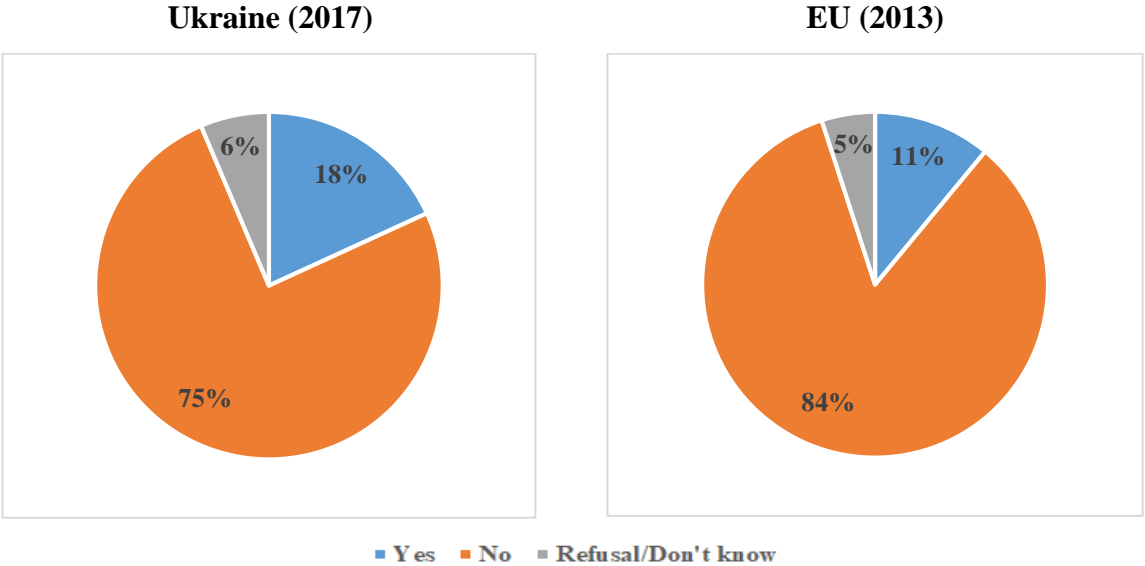
Taking into account the sensitivity of the topic, it is important to note that in both surveys the interviewers were asked to assess their cooperation with the respondents. Williams & Horodnic (2017b) indicate that in 93% of cases of the Eurobarometer 2013, the interviewers evaluated their cooperation with the interviewees as good or excellent, in 6% it was average and in only 1% of interviews it was poor. As for the UUDWS, in 65% of cases the cooperation was assessed as good or excellent, in 29% as average and in 4% as poor.

3.5.1. Demand side

Both in Ukraine and in Europe (hereinafter by “Europe” in the comparison we mean EU-27), most respondents report that they have not purchased any goods or services undeclared (had a

good reason to assume that they involved undeclared work), but in Ukraine their share is 9 percentage points smaller (See **Figure 3.17**). About the same share in Ukraine and in Europe refuse or do not know the answer (6% and 5%, respectively). Finally, 18 percent of Ukrainian respondents as opposed to 11 percent of European purchased undeclared goods or services.

Figure 3.17. Have you in the last 12 months paid for any goods or services of which you had a good reason to assume that they included undeclared work?



Source: UUDWS and Table QE5 in EC (2014b)

As regards the socio-demographic structure, both in Ukraine and in Europe, men (21% and 12%, respectively) purchase undeclared goods or services more compared to women (16% and 10%). The age groups that are more likely to pay for undeclared goods or services are 25-44 in Ukraine and 25-39 years old in Europe. Both in Ukraine and in Europe the self-employed tend more to be on the demand side of undeclared production and services (33% and 16%, respectively). Finally, the only difference between Ukraine and Europe consists in the financial situation of those who purchase undeclared goods or services: in Europe, the majority of those people have financial difficulties paying bills (13%). In contrast, in Ukraine the tendency is opposite: the majority of the respondents who bought undeclared goods or services have very good (31%) and good (20%) financial situation. We should also note the magnitude of replies; the fact that it is sensibly higher in Ukraine suggests that the prevalence of undeclared work in Ukraine is stronger than in Europe.

The types of undeclared goods or services acquired differ between Ukraine and Europe. In Ukraine (See **Figure 3.2**) these are (from the most frequent answer) buying food, hairdresser and/or beauty treatments, home repairs and healthcare. In Europe (See **Figure QE6** in EC (2014b)) these are home repairs, car repairs, cleaning the home and buying food.

As regards the sources of undeclared work, in Ukraine (See **Figure 3.3**) it comes in the majority of cases from other private persons or households (70%). In Europe (See **Figure QE8** in EC (2014b)), the most popular sources are friends, colleagues or acquaintances (42%), other private persons or households (28%) and firms or businesses (24%).

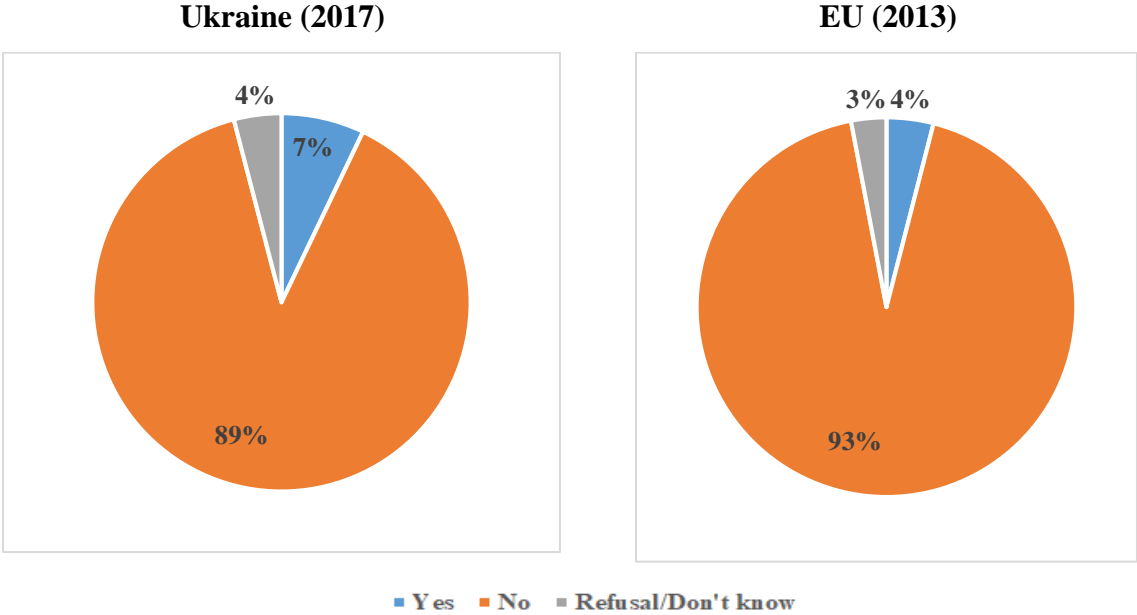
In the UUDWS, the respondents were asked about the price of the most important good or service that he or she acquired in the last 12 months. In the Eurobarometer, the interviewees were asked how much they spent on all undeclared goods and services in the last 12 months, as well as how much the undeclared services they buy most frequently cost approximately per hour. This difference in questions does not allow comparing between surveys.

The most common reasons for purchasing undeclared goods or services in Ukraine (See **Figure 3.4**) are lower price, better quality and faster service. In Europe (See **Figure QE9** in EC (2014b)) the reasons are similar, in particular, lower price, favour amongst friends or relatives, faster service and in order to help someone.

3.5.2. Supply side

As reported in **Figure 3.18**, in Ukraine, about twice as many respondents (7%) carried out undeclared activities compared to the respondents Europe (4%).

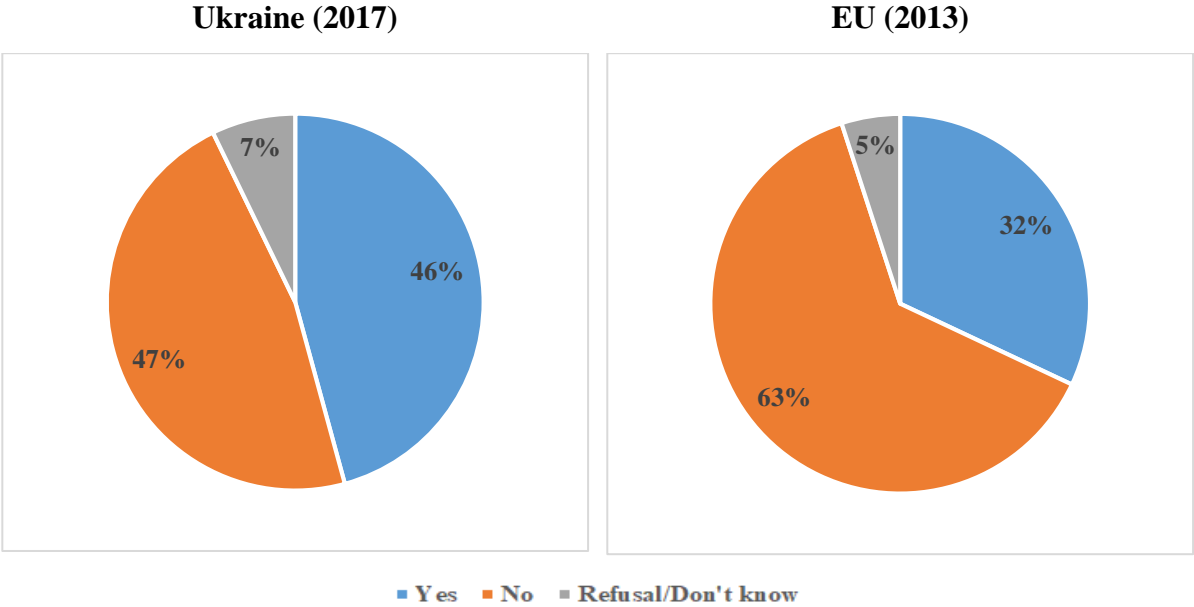
Figure 3.18. Did you yourself carry out any undeclared paid activities in the last 12 months?



Source: UUDWS and Figure QE14 in EC (2014b)

This difference may occur because the connotation of this question varies slightly. In the Eurobarometer the question was “Apart from a regular employment, have you yourself carried out any undeclared paid activities in the last 12 months?” In the UUDWS the question was “Did you yourself carry out any undeclared paid activities in the last 12 months?” In this respect, the Eurobarometer question restricts the sample to those who have already a regular employment. In both cases, this estimate (7% for Ukraine and 4% for Europe) should be treated as the lower bound limit (EC, 2014b).

Figure 3.19. Do you personally know any people who work without declaring their income or part of their income to tax or social security institutions?



Source: UUDWS and Figure QE1 in EC (2014b)

When the interviewees are asked if they personally know anyone who works without declaring income, the numbers are significantly higher: 46% for Ukraine and 32% for Europe (See **Figure 3.19**). At the same time almost every second respondent in Ukraine (47%) and the majority in Europe (63%) say that they do not know anyone who supplies undeclared work.

Undeclared workers in Ukraine are more likely to provide services in home maintenance, selling food and gardening (See **Figure 3.5**). In Europe, these are as well home repairs or renovations, gardening, also cleaning, babysitting and work as a waiter/waitress (See **Figure QE15a** in EC (2014b)).

The clients of undeclared work in Ukraine are other private persons or households, friends, colleagues and acquaintances and relatives (See **Figure 3.6**). In Europe, main clients are

friends, colleagues and acquaintances, followed by other private persons or households and relatives (See **Figure QE16** in EC (2014b)).

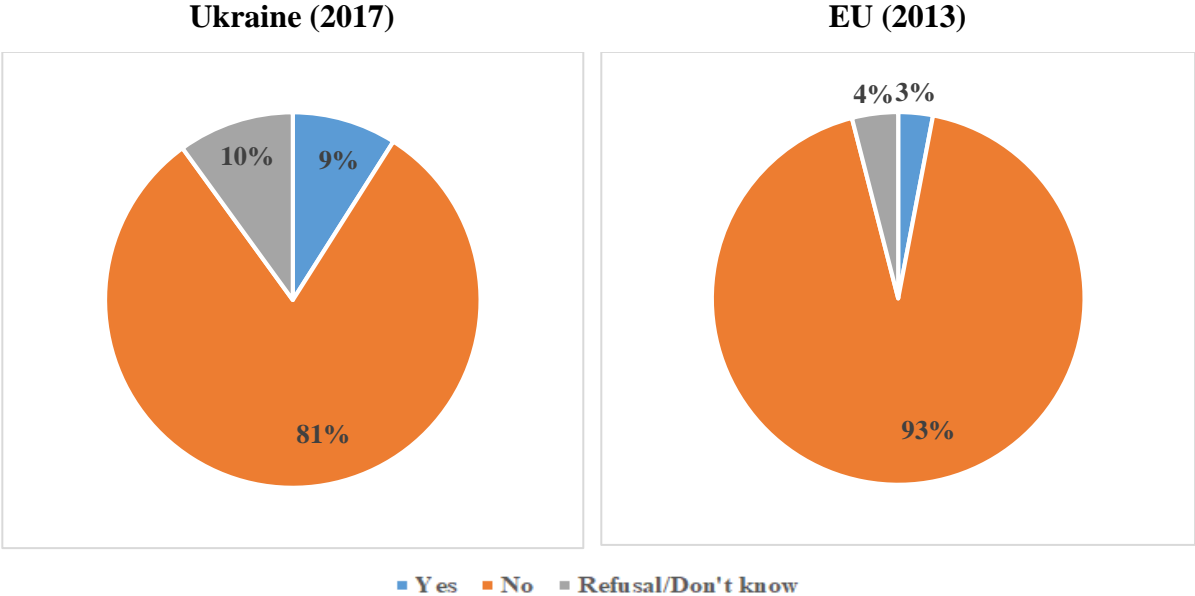
The last question to assess the supply side of undeclared work deals with the reasons that push to undeclared work. In Ukraine, the main reasons are the difficulty to find a regular job, seasonal nature of work, the fact that this is a normal practice and low trust in government (See **Figure 3.8**). In Europe (See **Figure QE17** in EC (2014b)), as the most frequent reasons were mentioned mutual benefit from undeclared work (50%), difficulty to find a regular job (21%), taxes and social security contributions are too high (16%), absence of other means of income (15%) and common practice of working without declaration (14%).

3.5.3. Envelope wages and income

3.5.3.1. Envelope wages

Figure 3.20 depicts the prevalence of paying envelope wages. It is about three times higher in Ukraine compared to European countries (9% and 3%, respectively). The share of those who either refused to answer or do not know is also greater in Ukraine (10% compared to 4%). This makes the majority of respondents admit that their employer did not pay envelope wages in the last 12 months (81% in Ukraine and 93% in Europe).

Figure 3.20. Has your employer paid you all or part of your salary in cash and without declaring it to tax or social security institutions in the last 12 months?



Source: UUDWS and Table QE10 in EC (2014b)

Out of those who were paid envelope wages, the majority in Ukraine received it for both regular and overtime work (55%). Only a fourth part of dependent employees in Europe (25%) receive envelope wages for both regular and overtime work, in most cases European workers are paid in cash as part of the remuneration for regular work (37%) and slightly less for overtime work (31%). These findings suggest that in Ukraine, this is a common practice to pay envelope wages for any kind of work and it has a rather permanent character, whereas in Europe paying in cash tends to have a temporary character (See **Table 3.7**).

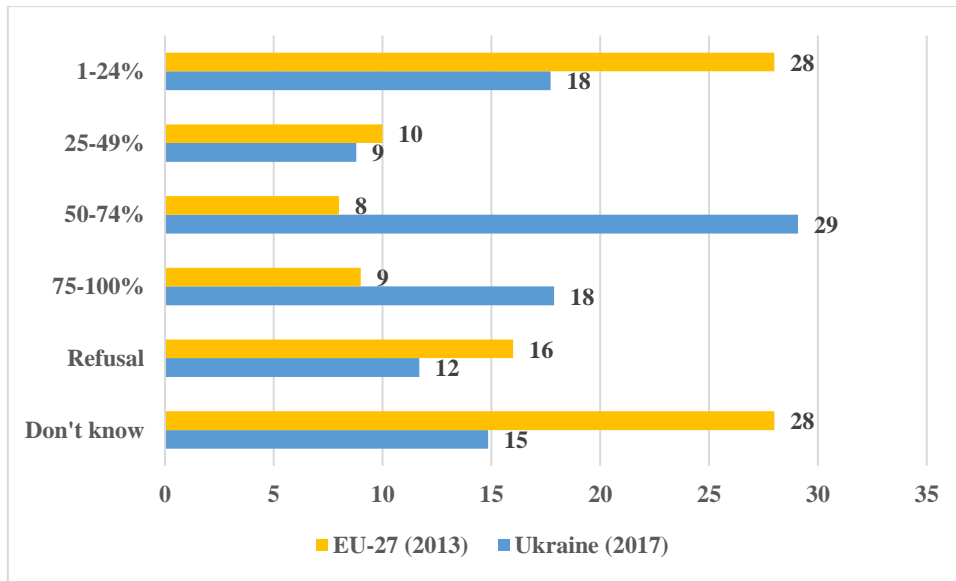
Table 3.7. Was this income part of the remuneration for your regular work, was it payment for overtime hours or was it both? (%)

	Ukraine (2017)	Europe EU-27 (2013)
Part of the remuneration for the regular work	29	37
Overtime, extra-work	14	31
Both regular and overtime work	55	25
Refusal, Don't know	2	7

Source: UUDWS and Table QE11 in EC (2014b)

Concerning the share of the income that was paid in cash, all salary is paid on a cash-in hand basis about twice as more in Ukraine, compared to Europe (18% to 9%, respectively) (See **Figure 3.21**). Half or two quarters of salary is paid in envelope approximately three times less in Ukraine (8% to 29% in Europe). Quarter to half of salary is paid in cash in Ukraine and Europe is similar (10% and 9%, respectively). Finally, less than quarter of salary is paid this way for almost every sixth person in Ukraine (18%) and every fourth in Europe (28%). At the same time, in Europe there was a high share of refusal or inability to answer to this question (44% and 27% in Ukraine).

Figure 3.21. Approximately what percentage of your gross yearly income in your main job did you get this way? (%)

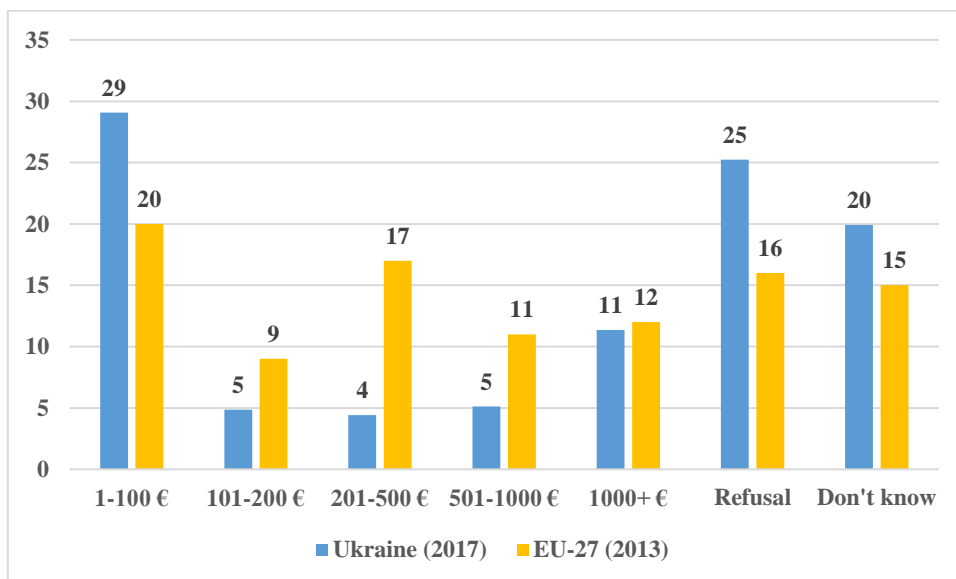


Source: UUDWS and Table QE12 in EC (2014b)

3.5.3.2. Income from undeclared work

This is not obvious to compare income from undeclared work in Ukraine and Europe because of the differences in economic environment and development; nevertheless, Ukrainian workers have a choice of employment in Europe, and this comparison helps estimate the alternative of a potential income abroad. Second, it allows once again to observe the discrepancies in earnings in Ukraine and Europe, in particular from undeclared activities. For this, we convert Ukrainian hryvnia (UAH) to euros (See footnote 6) and report the results in **Figure 3.22**.

Figure 3.22. Approximately, how much did you get in total from these undeclared activities in the last 12 months? (%)



Source: UUDWS and Figure QE15b in EC (2014b)

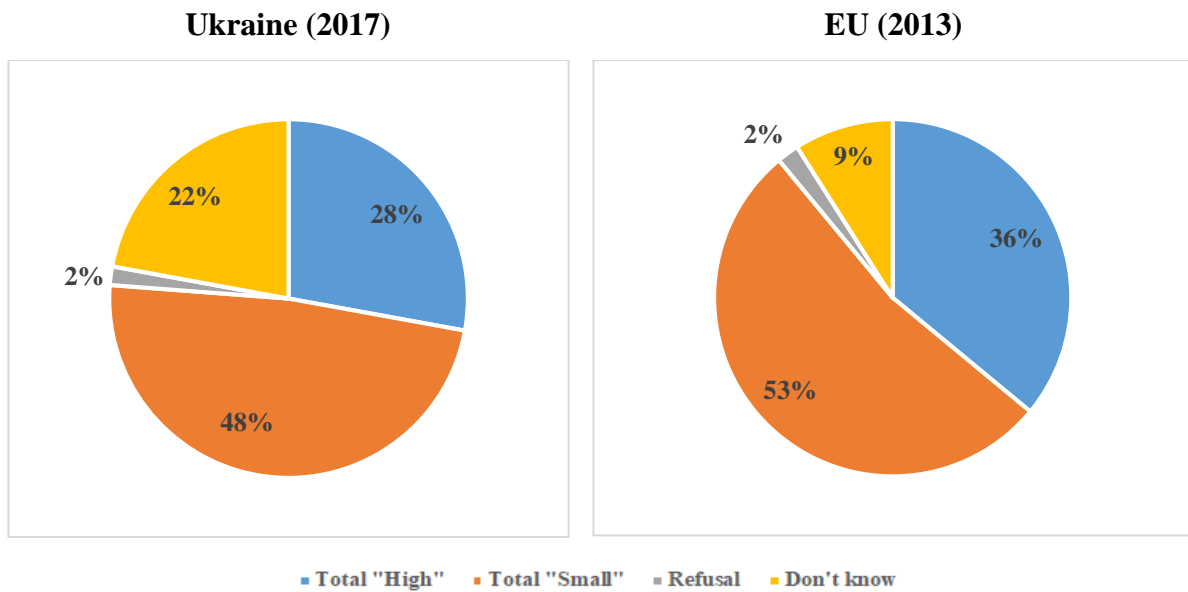
It is expected that the earnings in Ukraine are significantly lower compared to Europe. In fact, the median amount earned from undeclared activities in Europe is €300 and in Ukraine €176, according to the Eurobarometer and the UUDWS, respectively. Taking into account the sensitivity of this question, high percentage share of refusal (25% in Ukraine and 16% in Europe) and inability to answer (20% and 15%, respectively) are also anticipated. All things considered, we observe that the earnings are more equally distributed in Europe as compared to Ukraine. According to the Eurobarometer (See Figure QE15b in EC (2014b)), most of the undeclared workers (20%) earn less than €100 annually. Twice as less (9%) earn between 101 and €200. Every sixth (17%) earns between €201 and €500, every ninth (11%) earns between €501 and €1000 and every eighth person earns more than €1000. According to the UUDWS, the annual income of most Ukrainian respondents (29%) also falls under €100. Around one in twenty (5%) estimate earnings in the range of €101-200, the same share of respondents corresponds to the earnings of €501-1000, and slightly less (4%) earn between €201 and €500. Surprisingly, the income of one in nine Ukrainian undeclared workers actually exceeds €1000, suggesting that there is high inequality between the highest and the lower quantiles among undeclared workers in Ukraine.

3.5.4. Perceptions and acceptance of the undeclared work

3.5.4.1. Level of risk

The comparison of the level of risk of being detected in Ukraine and Europe puts forward few interesting findings (See **Figure 3.23**). First, we observe that the majority of respondents both in Ukraine and in Europe assess the level of this risk as small (48% and 53%, respectively). 28% in Ukraine and 36% in Europe think those who carry out undeclared activities are at a high risk of being detected. The share of those who refused to reply is the same and equals 2%. However, the share of those who indicate that they do not know the level or risk is more than twice as high in Ukraine in comparison with Europe (22% and 9%, respectively). This may imply that the respondents in Ukraine were less eager to open on this topic. Moreover, in both questionnaires the question about risk of being detected is asked in the beginning of the interview.

Figure 3.23. People who work without declaring the income risk that tax or social security institutions find out and issue supplementary tax bills and perhaps fines. How would you describe the risk of being detected in your country?

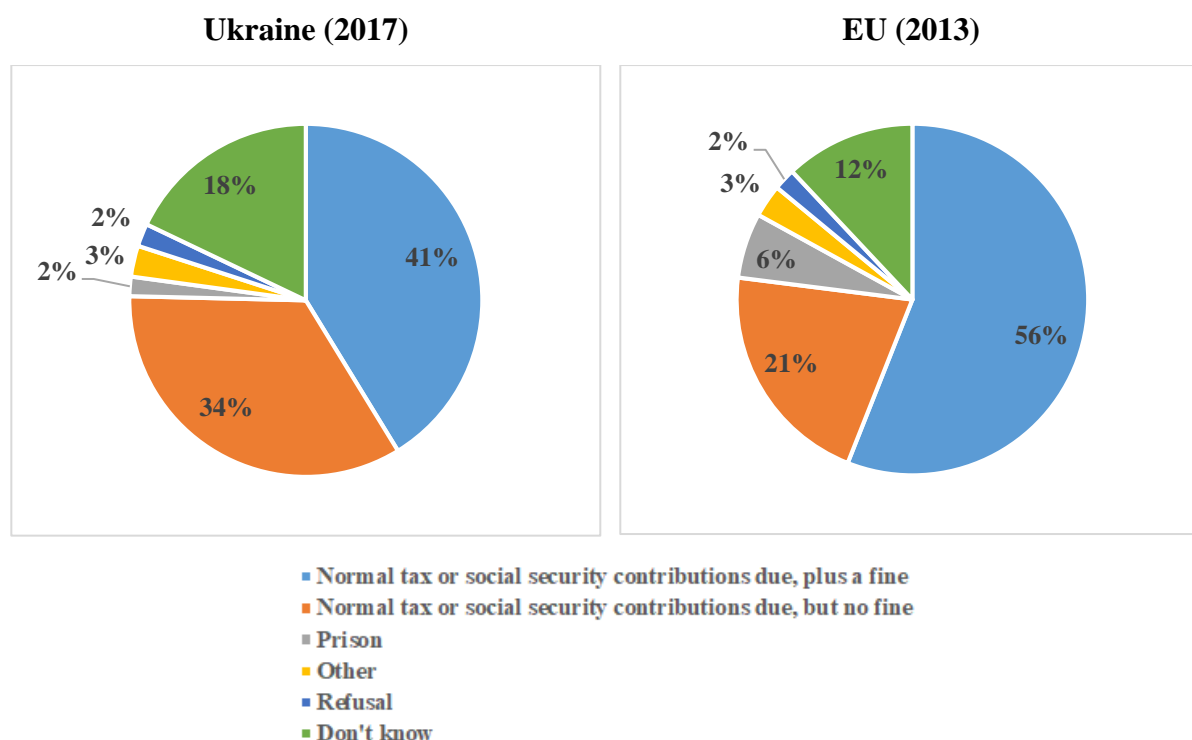


Source: UUDWS and Figure QE3 in EC (2014b)

3.5.4.2. Expected sanctions

The sanction of a normal tax or social security contributions due, plus a fine is more expected both in Ukraine and in Europe (41% and 56%, respectively), however with an evident dominance of 15 percentage points among European respondents. Slightly less expected in Ukraine (34%) and significantly less in Europe (21%) is a normal tax or social security contributions with no fine. Prison as a sanction is expected in Europe in 6% of cases and in Ukraine in only 2% of cases. Finally, 18% of the respondents in Ukraine and 12% in Europe do not know the sanctions the undeclared workers may be imposed to.

Figure 3.24. What sanction is to be expected if the authorities find out that someone receives an income from work which was not declared to tax or social security institutions?



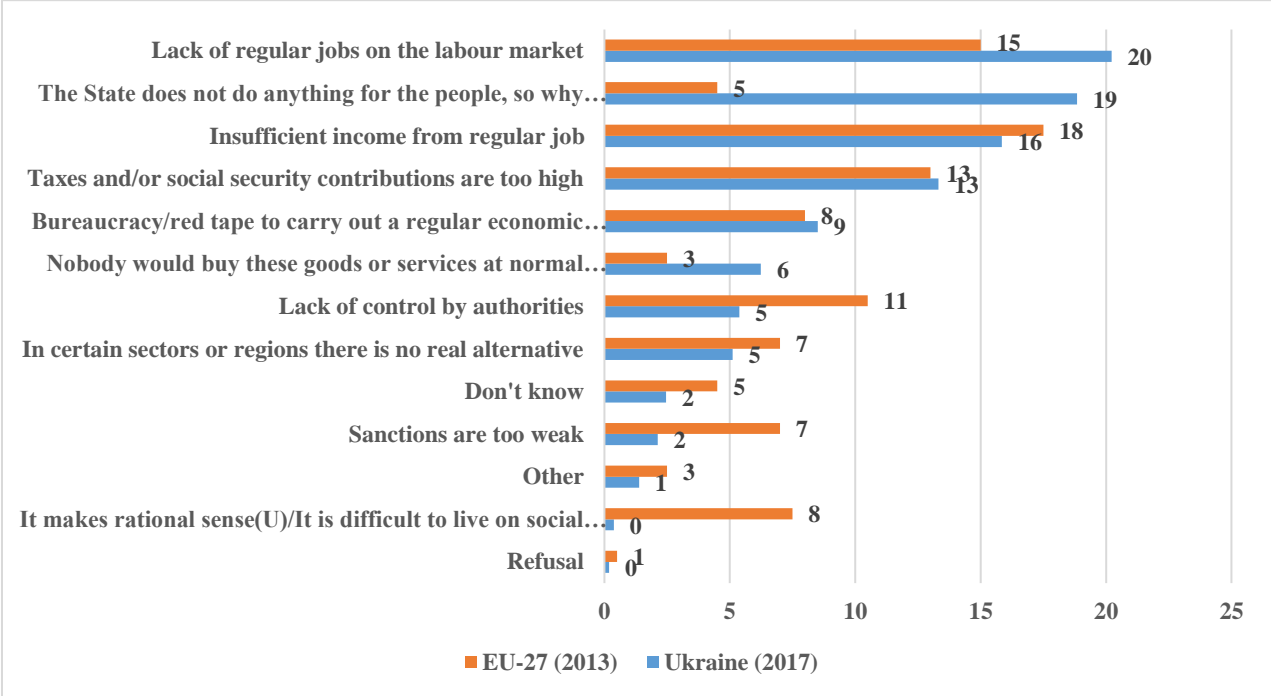
Source: UUDWS and Figure QE2 in EC (2014b)

3.5.4.3. Assumed reasons for doing undeclared work

As mentioned before and according to **Figure 3.25**, the four most significant reasons for carrying out undeclared activities as perceived by the Ukrainian interviewees, are lack of regular jobs on the labour market (20%), distrust in the government (“the State does not do anything for the people, so why should we pay taxes”) (19%), insufficient income from regular job (16%) and bureaucracy/red tape to carry out a regular economic activity (13%). In Europe the most important reasons are insufficient income from regular job (18%), lack of regular jobs on the labour market (15%), taxes and/or social security contributions are too high (13%) and lack of control by authorities (11%). Two conclusions arise from these findings. First, the contrast between the level of trust to the State: in Ukraine it is sensibly lower as 19% of respondents believe that the State does not do anything for them (the second most important reasons out of eleven). In Europe, only 5% of respondents share this view (the ninth most important reason). Second, these are the necessity driven reasons that push workers to undeclared work both in Europe and in Ukraine: insufficient income from regular job and lack of regular jobs on the labour market are perceived as the first and second most important reasons

in Europe and the first and the third in Ukraine (together with distrust in the government, which is second).

Figure 3.25. What are in your opinion the reasons for doing undeclared work?⁸



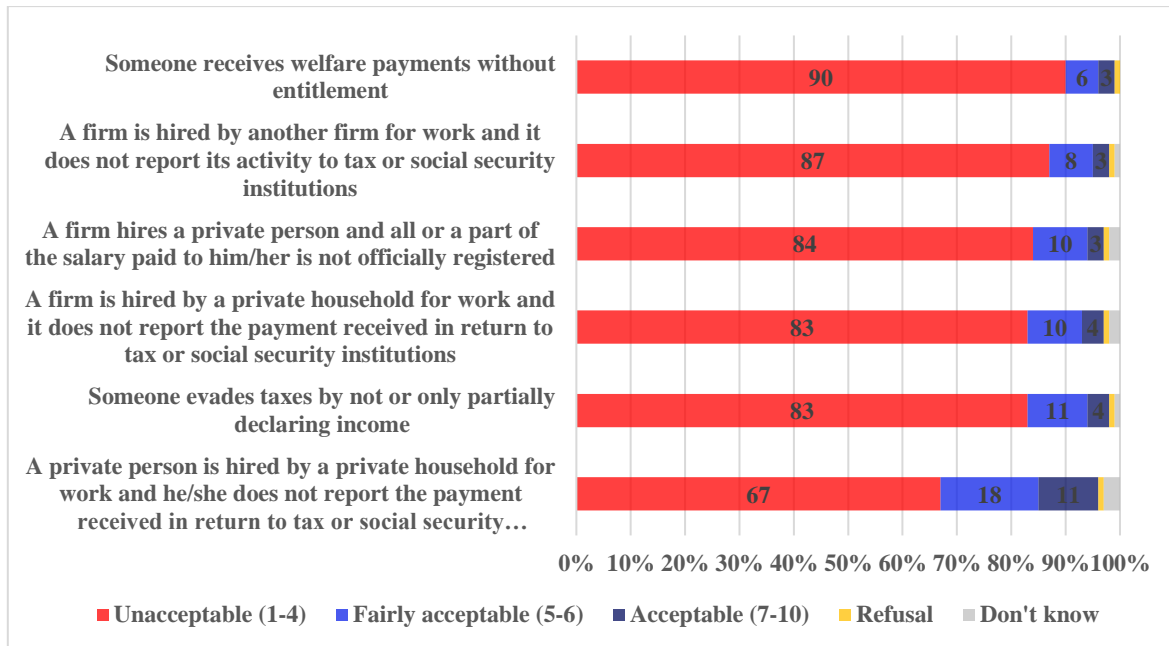
Source: UUDWS and Figure QE4T in EC (2014b)

3.5.4.4. Acceptability of undeclared work

The last section of comparison between the UUDWS and the Eurobarometer looks at the acceptability of several “evasion” behaviours. For the results of the UUDWS, See **Figure 3.15**. **Figure 3.26** presents the data from the Eurobarometer. The results both surveys are grouped in the same way.

⁸ The percentage was transformed from 200% in total for two questions to 100% in total.

Figure 3.26. How do you assess these various behaviours? For each of them, please tell me to what extent you find it acceptable or not, EU-27 (2013)



Source: Figure QE20 in EC (2014b)

The comparison of the acceptance of all “evasion” behaviours demonstrates a clear pattern of significantly stronger level of unacceptance in Europe compared to Ukraine. The highest share of those who do not accept a certain behaviour in Ukraine is 72% and the lowest is 43%. In Europe, the level of unacceptance is more convincing with the maximum share of 90% and the minimum of 67%. If we sum up the “fairly acceptable” and “acceptable” responses, Ukrainian interviewees tend to be more tolerant to these behaviours in comparison with European interviewees. For example, the behaviour of someone receiving welfare payments without entitlement is unacceptable in 72% of cases in Ukraine and acceptable (fairly acceptable and acceptable) in 21% of cases. In Europe, the same behaviour is unacceptable in 90% and acceptable in only 9% of responses. Another scenario of an individual who is hired by a household for work and who does not report the payment received although it should be reported, is perceived as unacceptable in 43% of replies in Ukraine and acceptable in 44% of cases (21% as “fairly acceptable” and 23% as “acceptable”), which demonstrates that not reporting personal earnings is recognized as tolerable and may be a common practice. In Europe, this scenario is regarded unacceptable for 67% and acceptable for 29% of respondents. Finally, the level of certitude about the perception of “evasion” scenarios seems to prevail in Europe with the highest share of “don’t know” at the level of 3% as opposed to Ukraine with the minimum of 5% and the maximum of 9% for the same response option.

3.6. Conclusions

In the *Third Chapter*, we discuss direct measurement methods, their application to estimate the informal employment of Ukraine. Additionally, we demonstrate the results of the survey on the undeclared work in Ukraine that was carried out in 2017 and compared its results with the Eurobarometer-2013.

Tax audits and labour market surveys, being the main direct methods to estimate the informal employment, provide valuable source of information because as opposed to indirect methods, they enable to avoid approximation and in general do not overestimate the informal part of the economy. As microeconomic methods, they pinpoint the motives that move individuals into “hidden” sector and allow to construct corresponding policy measures – a crucial assignment for the government in terms of labour market regulation.

Tax audits collect the data from tax returns and by the means of unveiling discrepancy between the declared and the expected, are essential in detecting the enterprises and individuals that do not obey the law. Nevertheless, using questionnaires and labour market surveys is regarded more accurate in terms of specifying the characteristics of individuals, structure of the sector or economic environment they work in, desirable working conditions and as of the most important – the reasons, incentives and attitudes. Altogether, this can serve as the most useful ground for elaborating policy response. Frequent application of surveys like the LFS, EU-SILC, EWCS, ESS, Eurobarometer, enterprise surveys, etc. – testify their accuracy and benefits.

Both the tax audits and the labour market survey methods are applied in measuring the informal employment in Ukraine. The tax system of Ukraine puts the responsibility of administering personal taxes on a taxpayer; however, the government controls the latter through frequent tax inspections, both scheduled and unscheduled. We demonstrated that there is a degree of the acceptability of tax evasion from the entrepreneurs’ point. At the same time, the tax discipline in Ukraine has improved considerably, which placed Ukraine from the position #181 in 2011 by the *Paying taxes* index at the position #43 in 2018.

Ukraine strictly follows the guidelines of the ILO as regards applying proper definitions and measurement methods of informal employment. The LFS is carried out annually and is the main statistical method of measuring informal employment. The latest data available as of 2016 estimates the informal employment of Ukraine at the rate of 24.3% of the employed population.

This indicator has been growing over the last years, whereas the real income (in foreign currency) has been decreasing.

In the final sections of this Chapter, we demonstrated findings of the Ukrainian Undeclared Work Survey that was recently carried out in Ukraine, and compared it with the latest Eurobarometer, the “predecessor” of the UUDWS. The UUDWS was aimed at estimating undeclared work and demonstrated that the respondents admitted to have paid for undeclared goods or services in 18.2% of cases, this kind of work is used mostly in the sector of hotels and restaurants. As regards the supply side, around 7% of the respondents admitted having worked undeclared in the last 12 months⁹, whereas around 46% know someone who works undeclared and around 33% estimate that at least 50% of the population of Ukraine work undeclared.

The UUDWS results also suggest that the majority of Ukrainian undeclared workers are between 35 to 54 years old, live in urban areas and are unemployed, employed in other occupation or self-employed. The main undeclared activities provided include home maintenance or home improvement services, selling farm produced food, gardening, car repairs and selling goods/services associated with their hobbies.

The reasons that justified the undeclared work were the difficulties on finding a regular job, the seasonal nature of the work, the fact that the undeclared work is the way such activities are usually done, the fact that the State does not do anything for them and the fact that both parties benefit from it.

While comparing the UUDWS-2017 and the Eurobarometer-2013, we identified that Ukrainians are more eager to be on the demand side of undeclared work. The comparison suggests that in Europe it is more common to buy undeclared goods or services from someone you know, whereas in Ukraine in the majority of cases the undeclared work comes from unknown private persons or households. The same applies for the clients: in Europe they tend to be out of the circle of acquaintances, which is not the case in Ukraine. The reasons that drive both Europeans and Ukrainians to purchase undeclared production are similar, such as lower price, faster service and better service.

At the same time, the comparison of the UUDWS and the Eurobarometer revealed that Ukrainians are more willing to be on the supply side. As the main reason in Europe to work undeclared is mutual benefit, in Ukraine is it the difficulty to find a regular job. The prevalence

⁹ This value should be viewed as the lower bound estimate, considering the natural reluctance of respondents to acknowledge their eventual provision of undeclared work.

of paying envelope wages in about three times higher in Ukraine. The employees that receive envelope wages seem to be more dependent in Ukraine rather than in Europe, as more than half of them in Ukraine receive envelope wages both for regular and overtime work; in Europe, in most cases this payment is made not for regular work. Undeclared income distribution suggests higher inequality in Ukraine between the lowest and the highest quantiles of undeclared workers. Finally, the section on acceptance of undeclared work suggests lower unacceptance, lower risk and lower sanctions from undeclared work in Ukraine, as opposed to Europe.

The assumed reasons for doing undeclared work demonstrate the low level of trust to the government in Ukraine (every fifth respondent believes that the State does not do anything for the people), in Europe only every twentieth shares this view. These are the necessity driven reasons that push workers to undeclared work both in Europe and in Ukraine: insufficient income from regular job and lack of regular jobs on the labour market are perceived as the first and second most important reasons in Europe and the first and the third in Ukraine (together with distrust in the government, which is second).

Chapter 4

Wage Differentials in EU Transition Economies (2009-2013): Informal Employment and Gender Issues

4.1. Introduction

This chapter is presented in Nezhyvenko & Adair (2018).

In as much as wages are the primary source of income for over four fifths of the employed population in the transition countries (ILO, 2015), in the *Fourth Chapter* we tackle the issue of wage differentials upon a sample of nine EU transition countries over 2009-2013 employing the data of the EU-SILC.

Such differentials arise due to differences in the personal characteristics (age or sex) of workers. Instances are there when woman worker is paid less than her male counterpart for doing the same job. Of course, there are other reasons also which cause wage differentials between male and female workers.

The rationale behind wage differentials is twofold. One is positive and it is due to differences in demand and supply of jobs along with variations in job requirements (skills, aptitude, experience, etc.). The other one is normative whereby the role of labour regulations is to minimize income inequalities, especially the gender wage gap, according to “equal pay for equal work” principle.

From the perspective of human capital theory, labour is a conglomeration of heterogeneous human beings differing by their productivity (Mincer, 1974) . The occupations that require more training are better remunerated (Teixeira, 2011). In this respect, human capital investment is the main explanatory variable of unequal income distribution.

Wages also depend on the level of labour market segmentation (ILO, 2015) and informal employment is widespread in transition countries.

The term “transition economy” often relates to those Central and Eastern European countries that shifted from a planned to a market based economy and experienced strong socio-economic transformation, implementing institutional and legislative reforms, as well as promoting private enterprises (Lowitzsch and Pacherowa, 1998). A list of transition countries may be expanded

to the countries on the west of the former USSR with Russian domination after World War II (Bulgaria, Czech Republic, Hungary, Poland, Romania and Slovakia), former USSR countries that gained independence in 1989 (among which Estonia, Latvia, and Lithuania) and the countries of the Balkan region (among which Croatia and Slovenia). From the aforementioned and based on the data availability and purpose of the study, we selected nine EU member countries: Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania and Slovakia. These countries amount for one fifth of EU labour force (Eurostat, 2017d). Croatia and Slovenia that are not included in our selected countries account for five percent of the labour force in all EU transition countries.

The remainder of the chapter is designed as follows: first, we present a literature review on the topic. It is followed by a comparison of data sources and estimates of informal wage employment. Later we describe the dataset and provide summary statistics. Finally, we explain the models and our findings and summarize conclusions.

4.2. Literature review

Eilat and Zinnes (2000) stress that informal economy is the main feature of the dynamics of transition. In the last few years, particular attention has been attracted by the informal economy in transition countries. For these countries, the positive impact that informal economy has had on a national welfare was in keeping economies afloat, since the costs of efficient production in the official economy have often increased. It has also debunked the myths of lack of entrepreneurship and lack of readiness for the market by Former Soviet Union citizens. Furthermore, it has provided valuable market experience to such budding entrepreneurs (Kaufmann and Kaliberda, 1996).

Pagés and Stampini (2009) assess labour market segmentation across formal and informal salaried jobs and self-employment in six countries. They demonstrate an evidence of a formal wage premium relative to informal salaried jobs in the three Latin American countries, but not in the three transition economies. These patterns suggest of a preference for formal over informal salaried jobs in all countries. For wage differentials however, there is no statistical difference across skill (education) levels, suggesting that the markets for skilled and unskilled labour are similarly affected by segmentation.

Kupets (2011) demonstrates strong wages differentials and builds a model in order to distinguish determinants on a set of 28 Post-socialist European and Central Asian countries. Besides labour productivity, which is the most significant factor in the model, also significant are the share of agriculture in GDP, the average duration of education of adults, freedom of employment and the EBRD transformation index.

Hazans (2011) investigates informal employment in Europe before the great recession. Comparing two datasets: Fourth European Working Conditions Survey (EWCS) of the year 2005, European Social Survey (ESS) of 2004/2005 and of 2006/2007, some estimates prove pair-wise consistent while others do not match. Hazans first uses an ordered probit and, second, mixed-effects logits with country and year fixed effects (capturing the macro factors) and region-level random effects, capturing region specific characteristics. The share of informal employment for 2007 is distributed as follows: 11.3 percent in Bulgaria, 7.2 percent in Latvia, 6.1 percent in Romania, 5.9 percent in Poland, 4.2 percent in Estonia, 3 percent in Lithuania, 2.9 percent in Slovakia, 2.7 percent in Czech Republic and 2.6 percent in Hungary.

Kuddo and Rutkowski (2011) point out the social costs of informality – forgone tax revenues, lower productivity and lack of social security coverage – outweigh the potential social benefits such as a social safety net, a trampoline to formal business. Accordingly, effective policies to promote formal employment enhance social welfare.

Tansel and Kan (2012) show that employees in the formal sector in Turkey get higher wages than those from the informal sector, and self-employed are often less paid than other workers. An interesting finding is that the penalty for participating in the informal sector decreases with the level of earnings, so it would be not significant for the upper-tier jobs and may be a largely penalty for lower-tier jobs. Hence, the upper-tier jobs would be better paid, whereas lower-tier jobs experience heavy penalty.

Santos and Sequeira (2013) study skills mismatch and its influence on wages throughout the distribution of wages on a large sample of European countries. Although the effects of skills and labour market mismatch differ across countries, the authors discover that over-educated workers tend to face a wage penalty, whereas under-educated workers get a wage premium. The first finding is consistent with the prevailing literature on this issue, but the second one is quite rare a finding.

Kan and Tansel (2014) use the EU-SILC for Turkey for the years 2006, 2007, 2008 and 2009. They estimate informality by two definitions: enterprise definition (informal are those

employees or employers who in a firm with less than 10 workers and self-employed as own-account workers or unpaid family workers) and social security definition (informal are those workers who are not registered at the social security institution regardless of the sector they work in). The authors conclude that the social security definition more precisely corresponds to the reality of the labour market in Turkey in explaining the relation between key individual and job factors and informality.

Tansel & Acar (2017) explore the mobility between formality and informality in Turkey focusing on the years 2006, 2007, 2008 and 2009. Utilizing the Turkish data from the EU-SILC, the authors define six employment states: formal-salaried (FS), informal-salaried (IS), formal self-employed (FSE), informal self-employed (ISE), unemployed (U) and out of the labour force (OLF). Tansel & Acar first explore transition patterns of the Turkish labour market by applying the Markov transition probability matrices and show that IS workers display high levels of mobility, whereas FS are the most reluctant to change their employment status. In fact, the probability of transition from IS to FS is about five times higher than the reverse probability. However, almost all employment categories seem to be satisfied with their state (except U) and prefer to keep the job or business. To further understand what characteristics that drive the individuals into formal *vs.* informal employment, Tansel & Acar utilize multinomial logit model. One of the most revealing findings is that gender has a strong explanatory power in mobility issue, implying that most women participate in ISE or OLF. Another finding suggests that high school and university degree reduce the chances of movement to informal sector. Additionally, the authors reveal that FS state is limited in employment opportunities, therefore has entry barriers.

According to Tkachenko and Mosiychuk (2014), in post-socialist countries high informal employment and unbalanced labour market have serious consequences for the official economy, in as much as there is an impact of human capital availability on the growth rate. Informal employment is low-paid and does not provide social protection for the worker from the labour legislation of the country. Moreover, this creates barriers to the economic inclusion of certain groups of population.

Lagakos et al. (2018) suggest that wages over the life cycle increase substantially almost twice as much in rich countries than in poor countries and education is likely to be a key explanatory element, as well as human capital accumulation over life cycle and on-the-job search or job choice. In addition, in rich countries, the wages of the most experienced workers are on average

twice as high than those of the least experienced workers. In the poor countries, this difference is smaller: the wages of the most experienced workers are on average fifty percent larger than those of the least experienced workers.

4.3. Informal employment: Comparing data and estimates

In 2003, the 17th International Conference of Labour Statisticians adopted guidelines endorsing the following framework as an international statistical standard. “Informal employment includes total number of informal jobs, whether carried out in formal sector enterprises, informal sector enterprises, or households; including employees holding informal jobs; employers and own-account workers employed in their own informal sector enterprises; members of informal producers’ cooperatives; contributing family workers in formal or informal sector enterprises; and own-account workers engaged in the production of goods for own end use by their household.” Informal wage employment is a subset of the former and includes “all employee jobs characterized by an employment relationship that is not subject to national labour legislation, income taxation, social protection or entitlement to certain employment benefits” (ILO, 2016a, p. 86).

It is worth mentioning that the informal employment rate is defined as the percentage of persons (and not the number of jobs) in total employment who are in informal employment in their main job. The indicator cannot be calculated with the EU-Labour Force Survey (LFS) variables. The percentage of employees without formal contracts on total number of employees is not available in the EU-LFS.

Five sources provide estimates of informal employment in the EU countries: The Labour Input Method (LIM), the 2013 Eurobarometer, the European Social Survey (ESS), the European Working Conditions Survey (EWCS) and the European Union Survey on Income and Living Conditions (EU-SILC). We examine which sources allow us to estimate best the size of informal employment in the nine selected transition countries (See **Table 4.1**).

Table 4.1. Estimates of informal wage employment in the nine selected EU transition countries (%)

Approach Sources	Direct						Indirect		
	Eurobarometer, undeclared work		ESS, no contract		EWCS, no contract,		EU-SILC, no social protection		LIM,
Country/Year	2013	2013*	2010	2012	2010	2015	2010	2013	2013
Bulgaria	5	6	7.1	6.0	4.4	6.0	7.5	6.6	17.8
Czech Rep.	4	5	6.2	3.5	1.0	4.3	3.1	3.7	7.7
Estonia	11	5	6.5	12.2	5.1	3.1	2.5	2.6	14.8
Hungary	4	6	3.4	4.6	1.6	5.1	5.3	6.9	17.3
Latvia	11	11	N/A	N/A	3.7	7.3	2.3	2.2	18.3
Lithuania	8	6	6.2	5.9	3.4	2.0	3.5	3.7	19.8
Poland	3	5	4.3	6.5	5.0	15.7	12.1	12.5	20.8
Romania	3	7	6.1	10.6	3.0	3.4	3.5	3.0	18.9
Slovakia	5	7	3.2	5.0	2.3	3.1	3.8	3.9	13.2
<i>Average</i>	6	7	5.4	6.8	3.3	5.6	4.8	5.0	16.5
Sample size	9,144	N/A	16,491	17,184	7,867	8,240	112,671	108,438	N/A

* Note: dependent employees paid with “envelope wages”.

Source: Author’s compilation of different surveys, all data weighted

The LIM estimate the magnitude of undeclared work from the discrepancy between the reported supply of labour according to the Labour Force Survey and labour demand data on recorded enterprise surveys or records, and tax or social security declarations. This indirect method, being used only in Italy is controversial (See Adair (2012)). There is no explicit assumption regarding the size of businesses and labour productivity on the supply side; there are loopholes in business data sets on the demand side. In addition, it does not provide information upon wages. On average, 16.5 percent of total labour input in the private sector in the EU is undeclared with Poland, Lithuania and Romania facing the highest undeclared work rate (Williams et al, 2017).

Among direct methods, Eurobarometer investigates undeclared work from both demand and supply side from a cross-section analysis upon an average sample of 1,500 individuals in each EU country (EC, 2014b). The share of undeclared work derives from the following question “*Did you yourself carry out any undeclared paid activities in the last 12 months (which were not or not fully reported to the tax authorities)*”? Here, the proxy for informal wage employment is dependent employees paid with “envelope wages”, a small subset of the overall sample of individuals as for the nine selected transition countries.

The European Social Survey (ESS) investigates social conditions every other year upon an average sample of 1,500 individuals in each EU country. It asks the question “*Do/did you have a work contract of unlimited duration, limited duration, or do/did you have no contract?*” The absence of contract provides a proxy for informal wage employment.

The same proxy for informal wage employment applies to the European Working Conditions Survey (EWCS), devoted to the working life and conditions, employment status and income. It only takes place every five years upon a sample of 1,000 individuals in each EU country. The relevant question from EWCS is “*What kind of employment contract do you have in your main paid job?*”

Direct approaches vary across surveys and within countries. In the Eurobarometer, Estonia, Latvia and Lithuania are the transition countries with the highest unregistered workforce in 2013. According to the ESS, Bulgaria Estonia and Lithuania experience the largest number of workers without contract in 2010; the ranking changes in 2012 with Estonia, Romania and Poland standing among the top three transition countries. As for the EWCS, Estonia, Poland, Latvia and Bulgaria have the highest percentage of “no contract” workers in 2010, whereas the ranking of these countries changes in 2015 and includes Hungary. In the EU-SILC, Poland, Bulgaria, Hungary have the highest percentage of workers “without social protection coverage” in 2010; the ranking of these transition countries has slightly changed in 2013.

The weighted average for informal wage employment in selected transition countries is pretty close, standing between 5.5 per cent at least and seven per cent at most as of comparable years 2012/2013. The figure for Eurobarometer is understated, due to a high rate of refusal (8% for Hungary) and missing answers (16% in Romania) that were not adjusted. The figure for LIM is not comparable with respect to methodology.

The trend within countries differs according to surveys and proves on rise as for ESS and EWCS compared with a mild increase in EU-SILC.

4.4. Descriptive statistics from EU-SILC

The justification for using the European Survey on Income and Living Conditions (EU-SILC) is that the sample size is far larger for the nine selected countries as compared to other surveys and it includes wages, which is also the case for EWCS, but neither for ESS nor for Eurobarometer.

First launched in 2003, EU-SILC is the main data source for comparative analysis and indicators on income and living conditions in the EU. It provides two kinds of data: cross-sectional data for a given time or a certain time period with variables on income, poverty, social

exclusion and other living conditions; and longitudinal survey and multidimensional statistics on income. Detailed data are collected on income components, mostly on personal income, although a few household income components are included (Eurostat, 2017a).

In EU-SILC weighting factors were calculated, meaning that the units' probability of selection and non-response were taken into account, as well as the sample was adjusted to external data relating to the distribution of households and persons in the target population, such as sex, age (five-year age groups), household size and composition and region (NUTS II level), or relating to income data from other national sources, in so far the Member States concerned consider such external data to be sufficiently reliable (EC, 2010).

We use income and labour market statistics, in as much as labour market conditions (gross national income per capita, net wages and labour productivity) stand as a set of main criteria and a widespread characteristic of how well a country economy develops and provides earning possibilities to its citizens. EU-SILC provides quantitative database on net earnings, gross earnings and structure of earnings. For this survey, we use a cross-sectional and panel data. Cross-sectional samples for the years 2009, 2010, 2011 and 2013 consist of 150,394, 150,225, 153,108 and 143,289 individuals (the data for the year 2012 is not available for us). Panel sample consists of 157,463 individuals. Hereafter, we use the survey on individuals.

Table 4.2. Economic status of individuals in the nine selected transition countries (2013)

Economic status	Frequency	Percent of total population	Percent of active population
Active population sub-total	69 059 448	83.7	100
Employee	57 950 495	70.2	83.9
Self-employed	9 947 059	12.1	14.4
Unemployed	1 161 894	1.4	1.7
Inactive population sub-total	13 444 954	16.3	
Total	82 504 402	100	

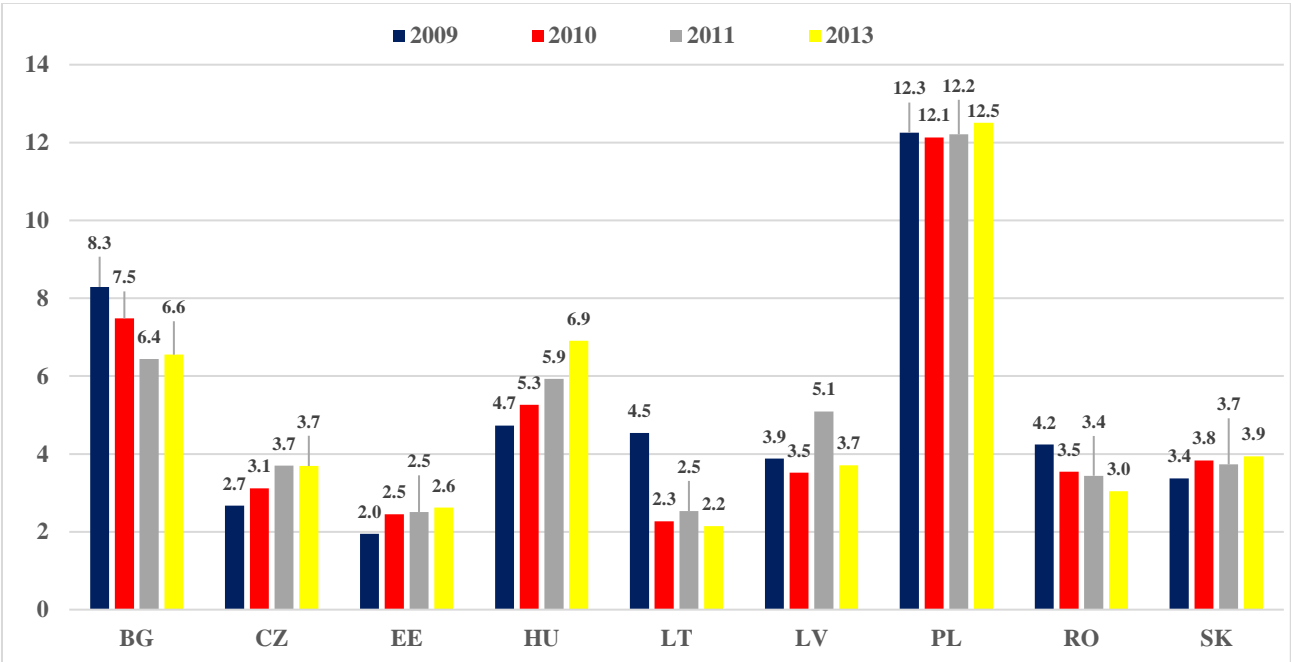
Source: Author's calculations based on EU-SILC 2013 survey

We use the working status of the individuals in the survey to get a profile of workers from the selected countries. Hence, we define a labour market status as “employee”, “self-employed” and “unemployed”. According to **Table 4.2**, most individuals belonging to the active population sub-total are employees (70.2 percent in the whole sample and 83.9 as of active population) upon which we focus in order to investigate informal wage employment. As the EU-SILC questionnaire does not provide a direct division into formal and informal employment, we needed to come up with a proxy for “informal”. In line with the same logic Kan and Tansel (2014) used for Turkey, we design the category of “informal” for the employees who receive

zero employer’s social insurance contribution and at the same time do not have a permanent contract at the main job.

This assumption leaves us with the statistics on the informal employees among employees presented in **Table 4.1** (for 2010 and 2013) and **Figure 4.1** (for all years).

Figure 4.1. Share of informal employees among employees (%) (2009-2013)



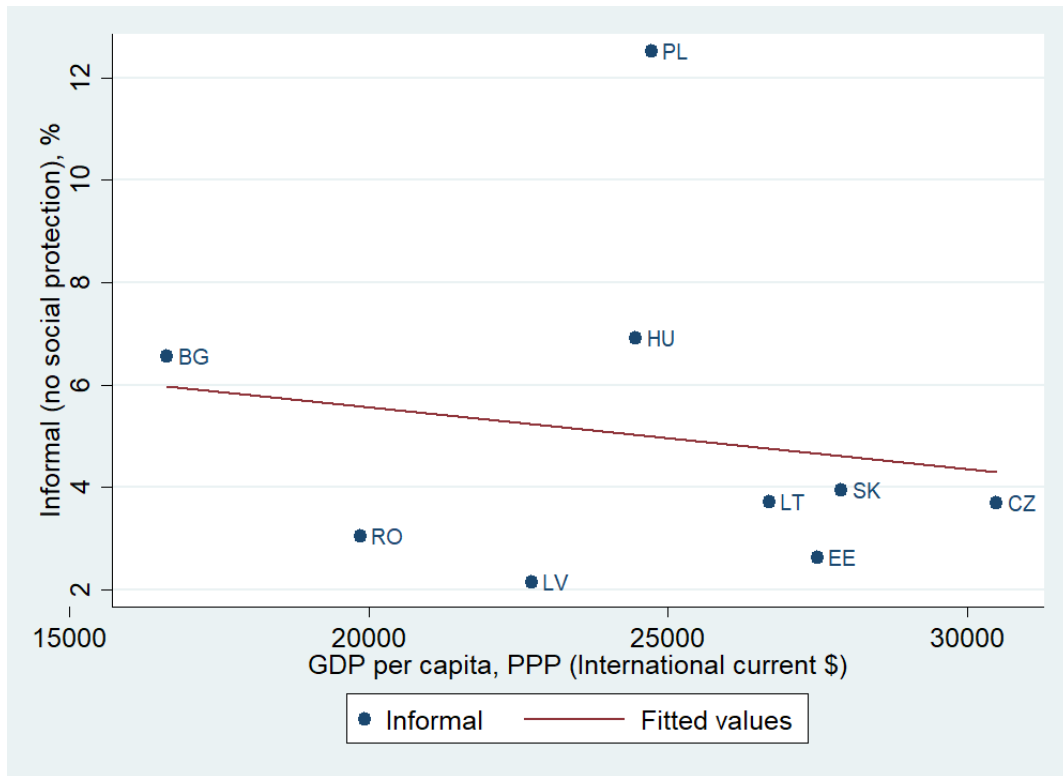
Source: Author’s calculations based on EU-SILC 2009-2013 survey

Overall, we observe that the share of informal employees is increasing over time, with the exception of Bulgaria, Latvia and Romania.

The statistics we compiled from the EU-SILC are in line with those compiled by Hazans (2011, Table A3). In the case of Bulgaria, we come up with 8.29 percent share of informal employees among wage earners for 2009 whereas Hazans estimates it as 11.3 percent for 2007. For Lithuania, the share is the same, 3 percent. For other countries our estimates vary slightly as compared to Hazans’s, Czech Republic (2.67 percent and 2.7 percent), Slovakia (3.37 and 2.9), Hungary (4.73 and 2.6) and Romania (4.24 and 6.1). For two countries, our data display a lower share of informal employment as compared to Hazans’ estimates, namely Estonia (1.95 and 4.2) and Latvia (3.88 and 7.2), whereas our data display a higher share of informal employment for Poland (12.25 compared to 5.9).

Figure 4.2 demonstrates an inverse relationship between informal employment based on the EU-SILC and the GDP per capita in purchasing power standards for the nine transition countries. The lower GDP per capita is the higher informal employment goes.

Figure 4.2. Relationship between informal employment and GDP per capita (2013)



Source: Authors based on EU-SILC and World Bank data

Table 4.3 reports summary statistics for employees of the selected dataset of nine countries detailing the variables, their standard deviation and number of observations for each of the four years in the sample: 2009, 2010, 2011 and 2013. On average, the share of informal employment does not change significantly from 2009 to 2013. The average real monthly income for all employees is in the range of 570-652 euro. Hours worked reach 41 hours per week. Average age of employees varies between 49 and 50 years old, experience equals about 30 years and most of the employees (about 60 percent) are married. About 60 percent of employees in the sample have secondary education and about half experience low-skilled occupations.

Table 4.3. Summary statistics for all employees (2009-2013)

Variables	2009			2010			2011			2013		
	Mean	SD	N obs	Mean	SD	N obs	Mean	SD	N obs	Mean	SD	N obs
<i>Real monthly income</i>	652.0	(585.93)	65278	570.2	(494.70)	63573	583.5	(477.75)	63857	576.5	(468.44)	60198
<i>Informal</i>	0.1	(0.26)	112698	0.1	(0.25)	112671	0.1	(0.26)	115770	0.1	(0.26)	108342
<i>Hrs_wu</i>	40.6	(6.54)	58117	40.6	(6.56)	56685	40.5	(6.45)	57953	40.4	(6.36)	55285
<i>Age</i>	49.1	(16.65)	112698	49.4	(16.65)	112671	49.8	(16.59)	115770	50.4	(16.59)	108342
<i>Experience</i>	30.7	(17.45)	112464	30.9	(17.47)	112399	31.2	(17.46)	115332	31.7	(17.47)	108196
<i>Male</i>	0.5	(0.50)	112698	0.5	(0.50)	112671	0.5	(0.50)	115770	0.5	(0.50)	108342
<i>No secon_edu</i>	0.2	(0.39)	112698	0.2	(0.39)	112671	0.2	(0.38)	115770	0.2	(0.38)	108342
<i>Secon_edu</i>	0.6	(0.49)	112698	0.6	(0.49)	112671	0.6	(0.49)	115770	0.6	(0.50)	108342
<i>Univ_edu</i>	0.2	(0.42)	112698	0.2	(0.43)	112671	0.2	(0.43)	115770	0.3	(0.44)	108342
<i>Student</i>	0.0	(0.17)	112698	0.0	(0.16)	112635	0.0	(0.16)	115768	0.0	(0.15)	108342
<i>Married</i>	0.6	(0.48)	112697	0.6	(0.48)	112671	0.6	(0.48)	115760	0.6	(0.49)	108341
<i>Agriculture</i>	0.0	(0.13)	112698	0.0	(0.13)	112671	0.0	(0.13)	115770	0.0	(0.13)	108342
<i>Manufacturing</i>	0.2	(0.36)	112698	0.2	(0.36)	112671	0.2	(0.36)	115770	0.2	(0.36)	108342
<i>Construction</i>	0.1	(0.22)	112698	0.0	(0.22)	112671	0.0	(0.21)	115770	0.0	(0.21)	108342
<i>Trade</i>	0.1	(0.27)	112698	0.1	(0.27)	112671	0.1	(0.27)	115770	0.1	(0.27)	108342
<i>Transportation</i>	0.0	(0.19)	112698	0.0	(0.19)	112671	0.0	(0.19)	115770	0.0	(0.19)	108342
<i>Accomm-n</i>	0.0	(0.13)	112698	0.0	(0.13)	112671	0.0	(0.13)	115770	0.0	(0.13)	108342
<i>Finances</i>	0.1	(0.24)	112698	0.1	(0.23)	112671	0.1	(0.23)	115770	0.1	(0.24)	108342
<i>Public administ</i>	0.0	(0.21)	112698	0.0	(0.21)	112671	0.0	(0.21)	115770	0.0	(0.21)	108342
<i>Education</i>	0.1	(0.27)	112698	0.1	(0.27)	112671	0.1	(0.27)	115770	0.1	(0.27)	108342
<i>Other services</i>	0.0	(0.12)	112698	0.0	(0.12)	112671	0.0	(0.12)	115770	0.0	(0.12)	108342
<i>Director</i>	0.0	(0.20)	112698	0.0	(0.19)	112671	0.0	(0.19)	115770	0.0	(0.19)	108342
<i>Professional</i>	0.1	(0.33)	112698	0.1	(0.30)	112671	0.1	(0.35)	115770	0.1	(0.35)	108342
<i>Technician</i>	0.1	(0.34)	112698	0.1	(0.32)	112671	0.1	(0.32)	115770	0.1	(0.32)	108342
<i>Semi-skilled</i>	0.2	(0.41)	112698	0.2	(0.38)	112671	0.2	(0.42)	115770	0.2	(0.42)	108342
<i>Low-skilled</i>	0.5	(0.50)	112698	0.4	(0.49)	112671	0.5	(0.50)	115770	0.5	(0.50)	108342
<i>Fulltime</i>	0.5	(0.50)	112698	0.5	(0.50)	112671	0.5	(0.50)	115770	0.5	(0.50)	108342
<i>Micro firm</i>	0.1	(0.31)	112698	0.1	(0.31)	112671	0.1	(0.31)	115770	0.1	(0.31)	108342
<i>Small firm</i>	0.2	(0.42)	112698	0.2	(0.41)	112671	0.2	(0.41)	115770	0.2	(0.42)	108342
<i>Med-Large firm</i>	0.2	(0.42)	112698	0.2	(0.42)	112671	0.2	(0.42)	115770	0.2	(0.42)	108342

Note: weighted descriptive statistics

Source: Authors

Table 4.4. Summary statistics, formal employees (2009-2013)

	2009			2010			2011			2013		
	Mean	SD	N obs	Mean	SD	N obs	Mean	SD	N obs	Mean	SD	N obs
<i>Real monthly income</i>	662.5	(592.23)	62491	580.0	(501.59)	61086	593.1	(483.78)	61369	584.7	(474.19)	58066
<i>Hrs_wu</i>	40.7	(6.24)	56019	40.6	(6.31)	54701	40.5	(6.23)	55956	40.5	(6.10)	53580
<i>Age</i>	49.6	(16.54)	106363	49.9	(16.52)	106494	50.3	(16.47)	109094	50.9	(16.49)	102078
<i>Experience</i>	31.1	(17.37)	106164	31.4	(17.39)	106270	31.7	(17.38)	108710	32.2	(17.41)	101947
<i>Male</i>	0.5	(0.50)	106363	0.5	(0.50)	106494	0.5	(0.50)	109094	0.5	(0.50)	102078
<i>No secon_edu</i>	0.2	(0.39)	106363	0.2	(0.38)	106494	0.2	(0.38)	109094	0.2	(0.37)	102078
<i>Secon_edu</i>	0.6	(0.49)	106363	0.6	(0.49)	106494	0.6	(0.49)	109094	0.6	(0.50)	102078
<i>Univ_edu</i>	0.2	(0.42)	106363	0.2	(0.43)	106494	0.3	(0.43)	109094	0.3	(0.44)	102078
<i>Student</i>	0.0	(0.16)	106363	0.0	(0.15)	106462	0.0	(0.15)	109092	0.0	(0.14)	102078
<i>Married</i>	0.6	(0.48)	106362	0.6	(0.48)	106494	0.6	(0.48)	109084	0.6	(0.48)	102077
<i>Agriculture</i>	0.0	(0.12)	106363	0.0	(0.12)	106494	0.0	(0.12)	109094	0.0	(0.13)	102078
<i>Manufacturing</i>	0.2	(0.37)	106363	0.2	(0.36)	106494	0.2	(0.37)	109094	0.2	(0.37)	102078
<i>Construction</i>	0.0	(0.22)	106363	0.0	(0.21)	106494	0.0	(0.21)	109094	0.0	(0.21)	102078
<i>Trade</i>	0.1	(0.28)	106363	0.1	(0.27)	106494	0.1	(0.27)	109094	0.1	(0.27)	102078
<i>Transportation</i>	0.0	(0.20)	106363	0.0	(0.19)	106494	0.0	(0.19)	109094	0.0	(0.19)	102078
<i>Accomm-n</i>	0.0	(0.13)	106363	0.0	(0.13)	106494	0.0	(0.13)	109094	0.0	(0.13)	102078
<i>Finances</i>	0.1	(0.24)	106363	0.1	(0.23)	106494	0.1	(0.24)	109094	0.1	(0.24)	102078
<i>Public administ</i>	0.0	(0.21)	106363	0.0	(0.22)	106494	0.0	(0.21)	109094	0.1	(0.22)	102078
<i>Education</i>	0.1	(0.28)	106363	0.1	(0.28)	106494	0.1	(0.28)	109094	0.1	(0.28)	102078
<i>Other services</i>	0.0	(0.12)	106363	0.0	(0.12)	106494	0.0	(0.12)	109094	0.0	(0.12)	102078
<i>Director</i>	0.0	(0.20)	106363	0.0	(0.19)	106494	0.0	(0.20)	109094	0.0	(0.19)	102078
<i>Professional</i>	0.1	(0.33)	106363	0.1	(0.31)	106494	0.1	(0.35)	109094	0.2	(0.36)	102078
<i>Technician</i>	0.1	(0.35)	106363	0.1	(0.32)	106494	0.1	(0.33)	109094	0.1	(0.33)	102078
<i>Semi-skilled</i>	0.2	(0.41)	106363	0.2	(0.38)	106494	0.2	(0.42)	109094	0.2	(0.42)	102078
<i>Low-skilled</i>	0.5	(0.50)	106363	0.4	(0.48)	106494	0.5	(0.50)	109094	0.5	(0.50)	102078
<i>Fulltime</i>	0.5	(0.50)	106363	0.5	(0.50)	106494	0.5	(0.50)	109094	0.5	(0.50)	102078
<i>Micro firm</i>	0.1	(0.31)	106363	0.1	(0.30)	106494	0.1	(0.30)	109094	0.1	(0.30)	102078
<i>Small firm</i>	0.2	(0.42)	106363	0.2	(0.42)	106494	0.2	(0.42)	109094	0.2	(0.42)	102078
<i>Med-Large firm</i>	0.2	(0.42)	106363	0.2	(0.42)	106494	0.2	(0.43)	109094	0.2	(0.42)	102078

Note: weighted descriptive statistics

Source: Authors

Table 4.5. Summary statistics, informal employees (2009-2013)

Variables	2009			2010			2011			2013		
	Mean	SD	N obs	Mean	SD	N obs	Mean	SD	N obs	Mean	SD	N obs
<i>Real monthly income</i>	490.4	(449.50)	2787	398.8	(307.09)	2487	415.3	(310.28)	2488	427.4	(311.45)	2132
<i>Hrs_wu</i>	39.0	(10.50)	2098	39.7	(10.35)	1984	39.7	(9.88)	1997	39.0	(10.34)	1705
<i>Age</i>	42.7	(16.80)	6335	42.8	(16.97)	6177	43.4	(16.78)	6676	43.9	(16.48)	6264
<i>Experience</i>	24.9	(17.41)	6300	24.9	(17.51)	6129	25.5	(17.42)	6622	26.0	(17.14)	6249
<i>Male</i>	0.5	(0.50)	6335	0.4	(0.50)	6177	0.5	(0.50)	6676	0.4	(0.50)	6264
<i>No secon_edu</i>	0.3	(0.45)	6335	0.3	(0.44)	6177	0.3	(0.44)	6676	0.3	(0.44)	6264
<i>Secon_edu</i>	0.6	(0.50)	6335	0.6	(0.49)	6177	0.6	(0.49)	6676	0.6	(0.49)	6264
<i>Univ_edu</i>	0.1	(0.35)	6335	0.1	(0.35)	6177	0.1	(0.35)	6676	0.2	(0.36)	6264
<i>Student</i>	0.1	(0.27)	6335	0.1	(0.26)	6173	0.1	(0.25)	6676	0.1	(0.22)	6264
<i>Married</i>	0.5	(0.50)	6335	0.5	(0.50)	6177	0.5	(0.50)	6676	0.5	(0.50)	6264
<i>Agriculture</i>	0.0	(0.16)	6335	0.0	(0.16)	6177	0.0	(0.16)	6676	0.0	(0.17)	6264
<i>Manufacturing</i>	0.1	(0.27)	6335	0.1	(0.26)	6177	0.1	(0.26)	6676	0.1	(0.25)	6264
<i>Construction</i>	0.1	(0.26)	6335	0.1	(0.25)	6177	0.1	(0.26)	6676	0.1	(0.24)	6264
<i>Trade</i>	0.1	(0.25)	6335	0.1	(0.24)	6177	0.1	(0.24)	6676	0.1	(0.22)	6264
<i>Transportation</i>	0.0	(0.14)	6335	0.0	(0.12)	6177	0.0	(0.14)	6676	0.0	(0.12)	6264
<i>Accomm-n</i>	0.0	(0.15)	6335	0.0	(0.15)	6177	0.0	(0.13)	6676	0.0	(0.12)	6264
<i>Finances</i>	0.0	(0.21)	6335	0.0	(0.19)	6177	0.0	(0.19)	6676	0.0	(0.19)	6264
<i>Public administ</i>	0.0	(0.15)	6335	0.0	(0.15)	6177	0.0	(0.12)	6676	0.0	(0.12)	6264
<i>Education</i>	0.0	(0.19)	6335	0.0	(0.17)	6177	0.0	(0.16)	6676	0.0	(0.18)	6264
<i>Other services</i>	0.0	(0.15)	6335	0.0	(0.13)	6177	0.0	(0.12)	6676	0.0	(0.12)	6264
<i>Director</i>	0.0	(0.10)	6335	0.0	(0.10)	6177	0.0	(0.11)	6676	0.0	(0.11)	6264
<i>Professional</i>	0.1	(0.24)	6335	0.0	(0.21)	6177	0.1	(0.23)	6676	0.1	(0.22)	6264
<i>Technician</i>	0.1	(0.27)	6335	0.1	(0.25)	6177	0.1	(0.23)	6676	0.1	(0.23)	6264
<i>Semi-skilled</i>	0.3	(0.44)	6335	0.3	(0.44)	6177	0.3	(0.45)	6676	0.3	(0.45)	6264
<i>Low-skilled</i>	0.6	(0.49)	6335	0.5	(0.50)	6177	0.6	(0.49)	6676	0.6	(0.49)	6264
<i>Fulltime</i>	0.3	(0.47)	6335	0.3	(0.46)	6177	0.3	(0.45)	6676	0.3	(0.44)	6264
<i>Micro firm</i>	0.1	(0.34)	6335	0.1	(0.33)	6177	0.1	(0.32)	6676	0.1	(0.31)	6264
<i>Small firm</i>	0.2	(0.38)	6335	0.2	(0.37)	6177	0.2	(0.36)	6676	0.1	(0.35)	6264
<i>Med-Large firm</i>	0.1	(0.31)	6335	0.1	(0.29)	6177	0.1	(0.29)	6676	0.1	(0.28)	6264

Note: weighted descriptive statistics

Source: Authors

Table 4.4 and **Table 4.5** report the same statistics for formal and informal employees, respectively. The average real monthly income of formal employees varies in the range of 580-662 euro and of informal it is significantly lower, namely 398-490 euro. Average age of formal employees is 50 and informal – 43 years old. Average experience of formal employees is 32 and informal – 25 years. Formal employees work on average 41 hours a week and informal – 39 hours. As regards educational attainment, there are about 10 percent more employees with a university degree in formal employment and about 10 percent more employees with no secondary education in informal employment. There are more married individuals among formal employees. At the same time, formal employees tend to have more fulltime job

arrangements compared to informal employees. About 60 percent of informal employees have low-skilled occupations. As regards the firm size, there are about 10 percent more employees working in medium and large firms in formal employment.

Our dependent variable, log real monthly income, is calculated as the sum of “gross employee cash or near cash income” (for a reference period, which is a twelve-month period) and “gross non-cash employee income”, then we adjust it for a full-time equivalent and a CPI (World Bank, 2017a)) with 2010 as a base year. See **Table 4.14** (in the Appendix) for the description of other variables.

4.5. Models and results

4.5.1. Pooled OLS regression

To study wage determinants, we selected the Mincer model:

$$\ln Income_{it} = \alpha_j + \beta_j Informal_{it} + \sum_r \gamma_j x_{it} + \delta_j Education_{it} + \varepsilon_j Experience_{it} + u_{it} \quad [4, 1]$$

Where $\ln Income_{ij}$ denotes the log real monthly income of the employee i at time t ; the dummy variable $Informal$ takes the value of one if individual is in informal employment and zero otherwise; x is the set of individual, household and job characteristics; $Education$ and $Experience$ are the main explanatory variables in our model; α , β , γ and δ are unknown coefficients; and u represents a random disturbance and measurement error.

Table 4.6 presents the coefficients of Mincer equations using pooled OLS regressions for all employees (models (1) - (3)), male employees (models (3) - (5)) and female employees (models (6) - (9)). We start with a simple model with “informal” dependent variable and year dummies. This model suggests large wage penalty for participation in the informal employment, namely 40 percent. When individual characteristics are added to the model, this wage penalty falls to 23 percent, and when job characteristics are taken into consideration, the wage penalty for informality drops to 15 percent. This shows that about 25 percent of wage penalty for informal employment for all employees is explained by both individual and job characteristics, but 15 percent remains unexplained.

Table 4.6. Pooled OLS Mincer regression, log real monthly income as a dependent variable (2009-2013)

Variables	All			Male			Female		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>Informal</i>	-0.400***	-0.232***	-0.150***	-0.367***	-0.205***	-0.124***	-0.461***	-0.260***	-0.177***
<i>Hrs_wu</i>		0.016***	0.013***		0.013***	0.011***		0.020***	0.017***
<i>Age</i>									
<i>Age_25-39</i>		0.035***	0.014*		0.050***	0.030***		0.013	-0.008
<i>Age_40-54</i>		0.039***	0.007		0.044***	0.009		0.033*	-0.001
<i>Age_55-64</i>		0.102***	0.035**		0.095***	0.029		0.110***	0.039**
<i>Age_65+</i>		0.189***	0.092***		0.220***	0.130***		0.135***	0.052
<i>Experience</i>		0.028***	0.024***		0.028***	0.025***		0.026***	0.022***
<i>Experience2</i>		-0.001***	-0.000***		-0.001***	-0.000***		-0.000***	-0.000***
<i>Male</i>		0.228***	0.216***						
<i>Education</i>									
<i>Below secondary</i>		-0.214***	-0.146***		-0.208***	-0.150***		-0.220***	-0.123***
<i>University</i>		0.485***	0.208***		0.461***	0.200***		0.503***	0.209***
<i>Student</i>		0.059***	-0.011		0.060***	-0.015		0.051***	-0.018*
<i>Married</i>		0.036***	0.025***		0.110***	0.089***		-0.024***	-0.028***
<i>Industry</i>									
<i>Agriculture</i>			-0.012			-0.020			0.044**
<i>Manufacturing</i>			0.098***			0.110***			0.106***
<i>Construction</i>			0.122***			0.125***			0.115***
<i>Trade</i>			0.043***			0.093***			-0.001
<i>Transportation</i>			0.180***			0.184***			0.163***
<i>Accommodation</i>			0.053***			0.094***			0.031**
<i>Finances</i>			0.136***			0.117***			0.167***
<i>Public administr</i>			0.115***			0.131***			0.105***
<i>Education</i>			0.001			-0.014			-0.003
<i>Occupation</i>									
<i>Director</i>			0.582***			0.516***			0.700***
<i>Professional</i>			0.471***			0.426***			0.554***
<i>Technician</i>			0.287***			0.241***			0.366***
<i>Semi-skilled</i>			0.070***			0.010			0.162***
<i>Fulltime</i>			0.094***			0.103***			0.049***
<i>Firm size</i>									
<i>Small</i>			0.104***			0.095***			0.114***
<i>Medium-Large</i>			0.216***			0.224***			0.210***
<i>Year</i>									
<i>2010</i>	-0.129***	-0.137***	-0.148***	-0.133***	-0.138***	-0.152***	-0.123***	-0.135***	-0.142***
<i>2011</i>	-0.113***	-0.126***	-0.125***	-0.118***	-0.129***	-0.126***	-0.106***	-0.124***	-0.122***
<i>2013</i>	-0.114***	-0.136***	-0.129***	-0.120***	-0.134***	-0.126***	-0.106***	-0.139***	-0.131***
<i>Country difference</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Constant</i>	5.764***	4.559***	4.383***	5.868***	4.936***	4.688***	5.651***	4.439***	4.243***
<i>Observations</i>	252,906	227,748	220,668	128,159	115,286	110,877	124,747	112,462	109,791
<i>F-test (P<0.001)</i>	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
<i>R-squared</i>	0.285	0.484	0.543	0.319	0.481	0.527	0.271	0.479	0.556

Note: Robust standard errors are omitted. *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors

Regarding wage penalty for informality of male employees, we observe a similar tendency: initial informal wage penalty for men is 37 percent. When individual characteristics are added, it goes down to 21 percent and finally – to 12 percent. As for female employees, initial wage penalty for informality is the highest and reaches 46 percent. When individual characteristics are added, it falls to 26 percent and finally – to 18 percent. That is, about 24 percent of wage penalty for informal employment for male employees (and 28 percent for female employees) is explained by both individual and job characteristics; respectively, 13 percent for male and 18 percent for female employees are not explained.

All the models are consistent with the human capital theory suggesting that male employees and married individuals tend to have higher income. Education, skills and experience have strong magnitude and prove to be highly significant as for wages determination. This strongly supports the approach of human capital theory generally accepted in the literature: the higher the level of education is, the more grows the income.

4.5.2. Pooled quantile regression

Next, we are interested in distributional character of our dependent variable in different quantiles and we want to test the uniform distribution of earnings, therefore we estimate not only the mean earnings, but with respect to quantiles by applying the conditional quantile regression (Koenker & Bassett, 1978):

$$Q_k(\ln Income_{it} | x_{it}) = \alpha_j^{(k)} + \beta_j^{(k)} Informal_{it} + \sum_r \gamma_r^{(k)} x_{it} + \delta_j^{(k)} Education_{it} + \varepsilon_j^{(k)} Experience_{it} + u_{it}, \quad k \in (0,1) \quad [4, 2]$$

Where $Q_k(\ln Income_{it} | x_{it})$ is the k^{th} percentile of the distribution of log real monthly income of the employee conditional on the covariate matrix x_{it} ; α , β , γ , δ and ε are unknown coefficients; and u is a random disturbance and measurement error.

We run regressions separately for all employees (See **Table 4.7**), male employees and female employees (See **Table 4.8**).

Although the earnings distribution is not uniform along the quantiles, the results of the conditional quantile regression suggest that there is no wage premium for participation in the informal employment. Both male and female employees have wage penalty for informality, being the highest at the bottom decile (-0.24 for male employees and -0.27 for female

employees) and the lowest at the top decile (-0.13 and -0.20, respectively). Therefore, we do not observe an upper-tier premium for informal employment for a pooled sample of nine EU transition economies.

Table 4.7. Pooled quantile regression for all employees (2009-2013)

	(1)	(2)	(3)	(4)	(5)
Variables	q10	q25	q50	q75	q90
<i>Informal</i>	-0.245***	-0.204***	-0.205***	-0.215***	-0.165***
<i>Hrs_wu</i>	0.020***	0.022***	0.022***	0.020***	0.018***
<i>Age_25-39</i>	0.068***	0.052***	0.052***	0.050***	0.049***
<i>Age_40-54</i>	0.077***	0.056***	0.057***	0.042***	0.028*
<i>Age_55-64</i>	0.090***	0.089***	0.102***	0.080***	0.064***
<i>Age_65+</i>	-0.037	0.039	0.110***	0.138***	0.180***
<i>Experience</i>	0.008***	0.011***	0.014***	0.017***	0.021***
<i>Experience2</i>	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
<i>Male</i>	0.176***	0.203***	0.245***	0.285***	0.312***
<i>Below secondary edu</i>	-0.232***	-0.212***	-0.212***	-0.197***	-0.183***
<i>University education</i>	0.082***	0.060***	0.074***	0.116***	0.176***
<i>Student</i>	0.025*	0.018**	0.002	0.015**	0.032***
<i>Married</i>	-0.023***	-0.016***	-0.000	0.007**	0.006
<i>Agriculture</i>	-0.014	-0.004	-0.008	-0.004	0.021
<i>Manufacturing</i>	0.139***	0.154***	0.148***	0.108***	0.072***
<i>Construction</i>	0.127***	0.118***	0.115***	0.123***	0.125***
<i>Trade</i>	0.022	-0.009	-0.024**	-0.040***	-0.034***
<i>Transportation</i>	0.184***	0.189***	0.203***	0.183***	0.161***
<i>Accommodation</i>	0.026	-0.001	-0.024**	-0.030***	-0.029**
<i>Finances</i>	0.102***	0.122***	0.152***	0.162***	0.179***
<i>Public administr</i>	0.220***	0.207***	0.173***	0.137***	0.110***
<i>Education</i>	0.134***	0.100***	0.040***	-0.025***	-0.081***
<i>Director</i>	0.584***	0.685***	0.689***	0.698***	0.742***
<i>Professional</i>	0.441***	0.532***	0.547***	0.527***	0.519***
<i>Technician</i>	0.382***	0.437***	0.427***	0.388***	0.358***
<i>Semi-skilled</i>	0.105***	0.146***	0.146***	0.130***	0.114***
<i>Fulltime</i>	-0.051***	-0.093***	-0.108***	-0.097***	-0.101***
<i>Small firm</i>	0.043***	0.046***	0.059***	0.062***	0.048***
<i>Medium-Large firm</i>	0.170***	0.183***	0.190***	0.182***	0.172***
<i>Country</i>	0.014***	0.017***	0.003***	-0.010***	-0.014***
Constant	4.119***	4.378***	4.765***	5.207***	5.534***
Observations	231,121	231,121	231,121	231,121	231,121
Pseudo R-squared	0.130	0.148	0.175	0.190	0.198

Note: Standard errors are omitted. *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors

Table 4.8. Pooled quantile regression for male and female employees (2009-2013)

Variables	Male					Female				
	(1) q10	(2) q25	(3) q50	(4) q75	(5) q90	(6) q10	(7) q25	(8) q50	(9) q75	(10) q90
Informal	-0.242***	-0.208***	-0.213***	-0.216***	-0.132***	-0.271***	-0.199***	-0.194***	-0.204***	-0.196***
<i>Hrs_wu</i>	0.017***	0.020***	0.021***	0.019***	0.018***	0.024***	0.024***	0.023***	0.020***	0.016***
<i>Age_25-39</i>	0.069***	0.058***	0.063***	0.069***	0.069***	0.059***	0.034**	0.035***	0.016	0.017
<i>Age_40-54</i>	0.044*	0.021	0.033**	0.031**	0.024	0.096***	0.068***	0.065***	0.030**	0.014
<i>Age_55-64</i>	0.063**	0.063**	0.090***	0.061***	0.063***	0.102***	0.097***	0.101***	0.070***	0.046**
<i>Age_65+</i>	-0.008	0.026	0.149***	0.212***	0.299***	-0.073	0.032	0.058**	0.055**	0.040
<i>Experience</i>	0.006***	0.011***	0.016***	0.020***	0.025***	0.009***	0.011***	0.012***	0.015***	0.017***
<i>Experience2</i>	-0.000***	-0.000***	-0.000***	-0.000***	-0.001***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
<i>Under secondary edu.</i>	-0.234***	-0.224***	-0.246***	-0.203***	-0.164***	-0.201***	-0.183***	-0.157***	-0.162***	-0.156***
<i>University education</i>	0.102***	0.081***	0.077***	0.115***	0.169***	0.066***	0.049***	0.072***	0.122***	0.179***
<i>Student</i>	0.039	0.038**	0.022**	0.029**	0.058***	0.014	-0.003	-0.014*	0.003	0.009
<i>Married</i>	0.068***	0.063***	0.069***	0.079***	0.076***	-0.079***	-0.067***	-0.045***	-0.039***	-0.042***
<i>Agriculture</i>	-0.022	-0.011	-0.027*	-0.022	-0.030	0.019	0.039	0.081***	0.096***	0.149***
<i>Manufacturing</i>	0.181***	0.204***	0.193***	0.146***	0.099***	0.088***	0.106***	0.117***	0.098***	0.061***
<i>Construction</i>	0.140***	0.128***	0.125***	0.135***	0.120***	0.094***	0.093***	0.119***	0.106***	0.105***
<i>Trade</i>	0.052**	0.032*	0.038***	0.050***	0.040*	-0.011	-0.045***	-0.067***	-0.099***	-0.093***
<i>Transportation</i>	0.190***	0.200***	0.227***	0.204***	0.176***	0.137***	0.158***	0.151***	0.142***	0.136***
<i>Accommodation</i>	-0.025	-0.006	0.023	0.062***	0.042*	0.036**	-0.017	-0.038***	-0.054***	-0.054***
<i>Finances</i>	0.066***	0.097***	0.141***	0.164***	0.150***	0.155***	0.166***	0.177***	0.179***	0.191***
<i>Public administration</i>	0.220***	0.207***	0.189***	0.170***	0.128***	0.215***	0.191***	0.167***	0.120***	0.087***
<i>Education</i>	0.087***	0.064***	0.010	-0.039***	-0.092***	0.122***	0.090***	0.031***	-0.037***	-0.095***
<i>Director</i>	0.521***	0.643***	0.626***	0.621***	0.675***	0.657***	0.741***	0.782***	0.815***	0.858***
<i>Professional</i>	0.401***	0.487***	0.489***	0.458***	0.459***	0.495***	0.592***	0.625***	0.626***	0.630***
<i>Technician</i>	0.320***	0.393***	0.365***	0.312***	0.288***	0.441***	0.492***	0.498***	0.490***	0.469***
<i>Semi-skilled</i>	0.037***	0.051***	0.047***	0.024***	0.002	0.177***	0.235***	0.243***	0.244***	0.234***
<i>Fulltime</i>	-0.042**	-0.112***	-0.131***	-0.117***	-0.126***	-0.096***	-0.107***	-0.101***	-0.086***	-0.065***
<i>Small firm</i>	0.016**	0.019***	0.038***	0.045***	0.021***	0.084***	0.087***	0.080***	0.082***	0.073***
<i>Medium-Large firm</i>	0.152***	0.175***	0.183***	0.173***	0.148***	0.204***	0.206***	0.202***	0.196***	0.193***
<i>Country</i>	0.003**	0.006***	-0.005***	-0.016***	-0.018***	0.023***	0.026***	0.009***	-0.005***	-0.009***
Constant	4.486***	4.733***	5.104***	5.511***	5.840***	3.920***	4.217***	4.670***	5.148***	5.534***
Observations	117,295	117,295	117,295	117,295	117,295	113,826	113,826	113,826	113,826	113,826
Pseudo R-squared	0.100	0.121	0.143	0.161	0.173	0.100	0.121	0.143	0.161	0.173

Note: Standard errors are omitted. *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors

4.5.3. Panel fixed effects regression

We expand our study for all available waves of EU-SILC (2009, 2010, 2011 and 2013) and apply fixed effects model to account for time-invariant unobserved individual characteristics:

$$\ln Income_{it} = \alpha_j + \beta_j Informal_{it} + \sum_r \gamma_r x_{it} + \delta_j Education_{it} + \varepsilon_j Experience_{it} + Z_i + u_{it} \quad [4, 3]$$

Where $\ln Income_{it}$ denotes the log real monthly income of the employee i at time t (2009, 2010, 2011 or 2013); the dummy variable $Informal$ takes the value of one if individual is in informal employment and zero otherwise; x is the set of individual, household and job characteristics, $Education$ and $Experience$ are the main explanatory variables; α , β , γ , δ and ε are unknown coefficients, Z is the time-invariant factor that captures unobserved individual fixed effects; and u represents a random disturbance and measurement error that is normally and IID.

See **Table 4.9** for the results of this model for all employees and separately for males and females. Although we account for unobservable characteristics, the earnings differentials associated with informal employment do not disappear. There is still a 13 percent wage penalty for informal employment for all employees, 7 percent wage penalty for male employees and 22 percent wage penalty for female employees. Fixed effects model correlates with our previous findings, being positive and highly significant for higher educational attainment and experience. Gender proves to be as well significant, as is the married status for males (but not females).

Overall, the results of Mincer model application support our suggestion that for the set of nine transition countries (Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania and Slovakia) over 2009-2013 wage differentials depend on educational attainment, work experience and job characteristics. For example, the most significant and the most influential determinants for wages are educational level, gender, work experience, age and marital status.

Table 4.9. Fixed effects regression (2009-2013)

	All	Male	Female
Variables	(1)	(2)	(3)
<i>Informal</i>	-0.128***	-0.065***	-0.219***
<i>Hrs_wu</i>	0.013***	0.010***	0.018***
<i>Age_25-39</i>	-0.003	0.023	-0.050*
<i>Age_40-54</i>	-0.017	-0.003	-0.041
<i>Age_55-64</i>	-0.003	0.030	-0.025
<i>Age_65+</i>	0.011	0.103	-0.049
<i>Experience</i>	0.019***	0.020***	0.016***
<i>Experience2</i>	-0.000***	-0.000***	-0.000***
<i>Male</i>	0.192***		
<i>Under secondary edu</i>	-0.132***	-0.135***	-0.108***
<i>University education</i>	0.199***	0.204***	0.203***
<i>Student</i>	-0.002	0.032	-0.036
<i>Married</i>	0.033***	0.071***	0.013
<i>Agriculture</i>	0.005	-0.051	0.092**
<i>Manufacturing</i>	0.115***	0.098***	0.147***
<i>Construction</i>	0.128***	0.088***	0.124***
<i>Trade</i>	0.037**	0.042	0.019
<i>Transportation</i>	0.180***	0.158***	0.171***
<i>Accommodation</i>	0.065***	0.073	0.055*
<i>Finances</i>	0.138***	0.092***	0.196***
<i>Public administration</i>	0.118***	0.099***	0.146***
<i>Education</i>	0.014	-0.014	0.034
<i>Director</i>	0.584***	0.522***	0.659***
<i>Professional</i>	0.459***	0.400***	0.532***
<i>Technician</i>	0.292***	0.234***	0.380***
<i>Semi-skilled</i>	0.058***	-0.010	0.153***
<i>Fulltime</i>	0.092***	0.076***	0.045***
<i>Small firm</i>	0.096***	0.089***	0.099***
<i>Medium-Large firm</i>	0.216***	0.225***	0.184***
Constant	4.877***	5.223***	4.713***
Observations	223,939	112,828	111,111
R-squared	0.341	0.297	0.387
Number of id_ind	157,463	90,509	90,121

Note: Standard errors are omitted. *** p<0.01, ** p<0.05, * p<0.1.

We performed Hausman test to compare fixed effects and random effects models. The test demonstrated that fixed effects estimates are consistent

Source: Authors

4.5.4. Oaxaca-Blinder decomposition

We also design an Oaxaca-Blinder wages decomposition (Oaxaca, 1973; Blinder, 1973) in order to determine the share of explained vs. unexplained variables as regards the difference between formal and informal employees. As in the previous models, we explain $\ln Income$ by a vector of determinants, according to the equation:

$$\ln Income_{it} = \begin{cases} \beta^{Informal} x_{it} + u_{it}^{Informal}, & \text{if Informal} \\ \beta^{Formal} x_{it} + u_{it}^{Formal}, & \text{if Formal} \end{cases} \quad [4, 4]$$

Where x is the vector of determinants and β is the vector of parameters including an intercept.

The gap between formal and informal employees is calculated as:

$$\ln Income^{Formal} - \ln Income^{Informal} = \beta^{Formal} x^{Formal} - \beta^{Informal} x^{Informal} \quad [4, 5]$$

Where x^{Formal} and $x^{Informal}$ are the vectors of explanatory variables of formal and informal employees, respectively. The income gap can be further decomposed into the explained (differences in x) and unexplained (differences in β) components (Jann, 2008). We can also produce decomposition into the endowments, coefficients and interaction components:

$$\begin{aligned} \ln Income^{Formal} - \ln Income^{Informal} &= \beta^{Informal} \Delta x + \Delta \beta x^{Informal} + \Delta \beta \Delta x = \\ &= E + C + I \end{aligned} \quad [4, 6]$$

Where $\Delta x = x^{Formal} - x^{Informal}$, $\Delta \beta = \beta^{Formal} - \beta^{Informal}$ E represents the endowments, C – the coefficients and I – the interaction between endowments and coefficients. The endowments quantify the mean increase in the income of informal employees if they had the same characteristics as formal employees. The coefficients represent the change in the income of informal employees when applying the coefficients of formal employees to the characteristics of informal employees. Finally, interaction term measures simultaneous effect of both endowments and coefficients (Jann, 2008).

See **Table 4.10** (and **Table 4.12**) for all employees and **Table 4.11** (and **Table 4.13**) for male and female employees. There is not much difference in so far as overall explained variables (endowments and interaction) account for two thirds of the difference (0.21 out of 0.31), whereas unexplained variables (coefficients) account for one third of the difference (0.10). There is also not much difference between the male and female samples as regards the decomposition output, however, these samples differ between formal and informal employees by the mean of log income: the mean log income of formal employees is estimated at 6.28 for males and 6.11 for females. The mean log income of informal employees is estimated at 5.99 for males and 5.74 for females. The difference between formal and informal employees is higher for females (0.36 compared to 0.29 of males).

Table 4.10. Oaxaca-Blinder decomposition, formal vs. informal, all employees (2009-2013)

Variables	Overall	Explained	Unexplained
<i>Hrs_wu</i>		0.019*** (0.003)	0.157** (0.063)
<i>Age_25-39</i>		-0.001** (0.000)	-0.020 (0.018)
<i>Age_40-54</i>		0.003* (0.002)	-0.027 (0.017)
<i>Age_55-64</i>		0.001** (0.001)	-0.009 (0.009)
<i>Age_65+</i>		-0.000 (0.000)	0.001 (0.002)
<i>Experience</i>		0.062*** (0.005)	0.227*** (0.086)
<i>Experience2</i>		-0.033*** (0.003)	-0.075 (0.048)
<i>Male</i>		-0.010*** (0.002)	0.018 (0.011)
<i>Below secondary education</i>		0.031*** (0.002)	0.012*** (0.005)
<i>University education</i>		0.019*** (0.001)	-0.005 (0.006)
<i>Student</i>		-0.002*** (0.001)	0.003 (0.004)
<i>Married</i>		-0.001** (0.001)	-0.036*** (0.011)
<i>Agriculture</i>		-0.002*** (0.001)	-0.007 (0.004)
<i>Manufacturing</i>		0.009*** (0.001)	-0.012 (0.010)
<i>Construction</i>		-0.008*** (0.001)	-0.018* (0.010)
<i>Trade</i>		0.001** (0.000)	-0.012 (0.008)
<i>Transportation</i>		0.004*** (0.001)	-0.004 (0.003)
<i>Accommodation</i>		0.000 (0.000)	-0.001 (0.003)
<i>Finances</i>		0.000 (0.001)	0.006 (0.005)
<i>Public administration</i>		0.005*** (0.001)	0.002 (0.003)
<i>Education</i>		0.002* (0.001)	0.001 (0.005)
<i>Director</i>		0.021*** (0.002)	0.008*** (0.001)
<i>Professional</i>		0.049*** (0.002)	0.008** (0.003)
<i>Technician</i>		0.030*** (0.002)	0.010*** (0.003)
<i>Semi-skilled</i>		-0.005*** (0.001)	0.021*** (0.007)
<i>Fulltime</i>		-0.018*** (0.001)	-0.164*** (0.029)
<i>Small firm</i>		0.000 (0.000)	0.015 (0.009)
<i>Medium-Large firm</i>		0.031*** (0.002)	0.004 (0.007)
Formal	6.200***(0.002)		
Informal	5.886*** (0.010)		
Difference	0.313*** (0.010)	0.210*** (0.005)	0.104***(0.009)
Observations	231,053	231,053	231,053

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors

Table 4.11. Oaxaca-Blinder decomposition, formal vs. informal, male/female employees (2009-2013)

Variables	Male			Female		
	Overall	Explained	Unexplained	Overall	Explained	Unexplained
<i>Hrs_wu</i>		0.001 (0.003)	0.288*** (0.086)		0.047*** (0.004)	0.035 (0.088)
<i>Age_25-39</i>		0.000 (0.000)	-0.007 (0.024)		-0.001 (0.001)	-0.026 (0.025)
<i>Age_40-54</i>		0.002 (0.002)	-0.015 (0.025)		0.006* (0.003)	-0.037 (0.023)
<i>Age_55-64</i>		0.001* (0.001)	-0.003 (0.014)		0.001 (0.001)	-0.012 (0.010)
<i>Age_65+</i>		0.000 (0.000)	0.001 (0.002)		0.000 (0.000)	-0.001 (0.003)
<i>Experience</i>		0.057*** (0.006)	0.153 (0.131)		0.063*** (0.007)	0.261** (0.114)
<i>Experience2</i>		-0.035*** (0.005)	-0.068 (0.069)		-0.029*** (0.005)	-0.065 (0.066)
<i>Below secondary education</i>		0.035*** (0.002)	0.010 (0.007)		0.023*** (0.002)	0.018*** (0.006)
<i>University education</i>		0.018*** (0.001)	-0.001 (0.007)		0.018*** (0.002)	-0.012 (0.010)
<i>Student</i>		-0.002** (0.001)	0.005 (0.005)		-0.002* (0.001)	-0.000 (0.005)
<i>Married</i>		0.007*** (0.001)	-0.024 (0.017)		-0.008*** (0.001)	-0.044*** (0.015)
<i>Agriculture</i>		0.005*** (0.001)	-0.007 (0.008)		-0.004*** (0.001)	-0.004 (0.005)
<i>Manufacturing</i>		0.015*** (0.002)	-0.008 (0.017)		0.004*** (0.001)	-0.015 (0.011)
<i>Construction</i>		-0.012*** (0.003)	-0.032 (0.025)		-0.000 (0.000)	0.002 (0.002)
<i>Trade</i>		0.000 (0.000)	-0.006 (0.010)		0.003*** (0.001)	-0.024* (0.013)
<i>Transportation</i>		0.004*** (0.001)	-0.008 (0.006)		0.003*** (0.001)	0.001 (0.002)
<i>Accommodation</i>		0.000 (0.000)	-0.001 (0.003)		0.001 (0.001)	-0.002 (0.005)
<i>Finances</i>		0.001 (0.001)	0.005 (0.008)		-0.002 (0.001)	0.009 (0.008)
<i>Public administration</i>		0.006*** (0.001)	0.001 (0.004)		0.004*** (0.001)	0.003 (0.005)
<i>Education</i>		-0.000 (0.001)	0.004* (0.003)		0.002 (0.002)	-0.006 (0.010)
<i>Director</i>		0.022*** (0.002)	0.009*** (0.002)		0.021*** (0.002)	0.005*** (0.001)
<i>Professional</i>		0.034*** (0.002)	0.004 (0.004)		0.069*** (0.005)	0.020*** (0.006)
<i>Technician</i>		0.020*** (0.002)	-0.002 (0.005)		0.044*** (0.003)	0.026*** (0.005)
<i>Semi-skilled</i>		0.000 (0.000)	0.007 (0.005)		-0.025*** (0.003)	0.061*** (0.015)
<i>Fulltime</i>		-0.017*** (0.002)	-0.252*** (0.046)		-0.021*** (0.002)	-0.097*** (0.035)
<i>Small firm</i>		-0.000 (0.000)	0.024* (0.014)		0.001** (0.001)	0.005 (0.012)
<i>Medium-Large firm</i>		0.033*** (0.002)	0.006 (0.010)		0.028*** (0.002)	-0.003 (0.010)
Formal	6.284***(0.003)			6.106***(0.003)		
Informal	5.995***(0.013)			5.741***(0.014)		
Difference	0.289***(0.014)	0.195*** (0.007)	0.094*** (0.013)	0.364***(0.015)	0.246*** (0.008)	0.118*** (0.013)
Observations	117,253	117,253	117,253	113,800	113,800	113,800

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors

Table 4.12. Oaxaca-Blinder decomposition, formal vs. informal, all employees (2009-2013), detailed

Variables	Overall	Endowments	Coefficients	Interaction
<i>Hrs_wu</i>		0.015*** (0.003)	0.157** (0.063)	0.004** (0.002)
<i>Age_25-39</i>		-0.002* (0.001)	-0.020 (0.018)	0.001 (0.001)
<i>Age_40-54</i>		0.016* (0.008)	-0.026 (0.017)	-0.013 (0.008)
<i>Age_55-64</i>		0.004 (0.003)	-0.009 (0.009)	-0.003 (0.003)
<i>Age_65+</i>		0.000 (0.000)	0.001 (0.002)	-0.000 (0.001)
<i>Experience</i>		0.021 (0.016)	0.225*** (0.086)	0.042*** (0.016)
<i>Experience2</i>		-0.018* (0.010)	-0.075 (0.047)	-0.015 (0.010)
<i>Male</i>		-0.009*** (0.002)	0.018 (0.011)	-0.001 (0.001)
<i>Below secondary education</i>		0.038*** (0.003)	0.014*** (0.005)	-0.009*** (0.003)
<i>University education</i>		0.022*** (0.004)	-0.005 (0.006)	-0.003 (0.004)
<i>Student</i>		-0.001 (0.002)	0.003 (0.004)	-0.002 (0.002)
<i>Married</i>		0.008*** (0.003)	-0.035*** (0.011)	-0.010*** (0.003)
<i>Agriculture</i>		-0.002 (0.003)	-0.008 (0.005)	0.005 (0.003)
<i>Manufacturing</i>		0.014*** (0.005)	-0.012 (0.010)	-0.006 (0.005)
<i>Construction</i>		-0.018*** (0.006)	-0.020* (0.010)	0.011* (0.006)
<i>Trade</i>		-0.001 (0.001)	-0.012 (0.008)	0.001 (0.001)
<i>Transportation</i>		0.006*** (0.002)	-0.004 (0.003)	-0.002 (0.002)
<i>Accommodation</i>		-0.000 (0.001)	-0.001 (0.003)	0.000 (0.001)
<i>Finances</i>		0.000 (0.000)	0.006 (0.005)	0.000 (0.000)
<i>Public administration</i>		0.004** (0.002)	0.002 (0.003)	0.001 (0.002)
<i>Education</i>		0.000 (0.004)	0.001 (0.004)	0.001 (0.004)
<i>Director</i>		0.009*** (0.002)	0.007*** (0.001)	0.012*** (0.002)
<i>Professional</i>		0.039*** (0.005)	0.007** (0.003)	0.010** (0.005)
<i>Technician</i>		0.020*** (0.004)	0.009*** (0.003)	0.010*** (0.004)
<i>Semi-skilled</i>		-0.002 (0.001)	0.021*** (0.007)	-0.003*** (0.001)
<i>Fulltime</i>		0.004 (0.004)	-0.162*** (0.029)	-0.023*** (0.004)
<i>Small firm</i>		-0.000 (0.000)	0.015 (0.009)	0.000 (0.000)
<i>Medium-Large firm</i>		0.029*** (0.005)	0.004 (0.007)	0.002 (0.005)
Formal	6.200*** (0.002)			
Informal	5.886*** (0.010)			
Difference	0.313*** (0.010)			
Endowments	0.197*** (0.010)			
Coefficients	0.105*** (0.009)			
Interaction	0.012 (0.009)			
Constant			0.003 (0.072)	
Observations	231,053	231,053	231,053	231,053

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors

Table 4.13. Oaxaca-Blinder decomposition, formal vs. informal, male/female employees (2009-2013), detailed

Variables	Male				Female			
	Overall	Endowments	Coefficients	Interaction	Overall	Endowments	Coefficients	Interaction
<i>Hrs_wu</i>		0.001 (0.002)	0.288*** (0.086)	0.000 (0.001)		0.043*** (0.007)	0.036 (0.087)	0.002 (0.006)
<i>Age_25-39</i>		0.000 (0.001)	-0.007 (0.024)	-0.000 (0.000)		-0.005 (0.003)	-0.026 (0.025)	0.004 (0.004)
<i>Age_40-54</i>		0.007 (0.009)	-0.014 (0.025)	-0.005 (0.009)		0.029** (0.014)	-0.036 (0.022)	-0.024 (0.015)
<i>Age_55-64</i>		0.002 (0.003)	-0.003 (0.014)	-0.001 (0.004)		0.006 (0.005)	-0.012 (0.010)	-0.005 (0.005)
<i>Age_65+</i>		-0.000 (0.000)	0.001 (0.002)	0.000 (0.000)		-0.000 (0.002)	-0.001 (0.003)	0.001 (0.002)
<i>Experience</i>		0.034* (0.021)	0.152 (0.130)	0.024 (0.021)		0.007 (0.025)	0.259** (0.113)	0.059** (0.026)
<i>Experience2</i>		-0.023* (0.013)	-0.067 (0.068)	-0.013 (0.013)		-0.014 (0.015)	-0.065 (0.066)	-0.015 (0.015)
<i>Below second.</i>		0.041*** (0.005)	0.011 (0.007)	-0.007 (0.005)		0.033*** (0.005)	0.019*** (0.007)	-0.011*** (0.004)
<i>University</i>		0.020*** (0.006)	-0.001 (0.006)	-0.001 (0.006)		0.023*** (0.005)	-0.012 (0.010)	-0.005 (0.005)
<i>Student</i>		0.001 (0.003)	0.006 (0.006)	-0.004 (0.003)		-0.002 (0.003)	-0.000 (0.005)	0.000 (0.003)
<i>Married</i>		0.014*** (0.005)	-0.023 (0.016)	-0.007 (0.005)		0.003 (0.004)	-0.043*** (0.015)	-0.012*** (0.004)
<i>Agriculture</i>		0.001 (0.005)	-0.007 (0.008)	0.004 (0.005)		-0.007 (0.004)	-0.005 (0.006)	0.004 (0.005)
<i>Manufacturing</i>		0.019* (0.010)	-0.007 (0.017)	-0.005 (0.010)		0.008** (0.004)	-0.015 (0.011)	-0.005 (0.004)
<i>Construction</i>		-0.028** (0.014)	-0.033 (0.026)	0.018 (0.014)		0.000 (0.000)	0.002 (0.002)	-0.000 (0.000)
<i>Trade</i>		-0.000 (0.000)	-0.006 (0.010)	0.000 (0.000)		-0.001 (0.003)	-0.024* (0.014)	0.005* (0.003)
<i>Transportation</i>		0.008*** (0.003)	-0.008 (0.006)	-0.004 (0.003)		0.002 (0.002)	0.001 (0.001)	0.001 (0.002)
<i>Accommodation</i>		-0.000 (0.001)	-0.001 (0.003)	0.000 (0.001)		-0.000 (0.002)	-0.003 (0.005)	0.001 (0.002)
<i>Finances</i>		0.000 (0.001)	0.004 (0.008)	0.000 (0.001)		-0.001 (0.001)	0.009 (0.008)	-0.001 (0.001)
<i>Public admin.</i>		0.005 (0.003)	0.001 (0.004)	0.001 (0.003)		0.003 (0.002)	0.003 (0.005)	0.001 (0.002)
<i>Education</i>		-0.006* (0.003)	0.005* (0.003)	0.006* (0.003)		0.005 (0.006)	-0.005 (0.010)	-0.003 (0.006)
<i>Director</i>		0.006* (0.003)	0.009*** (0.002)	0.015*** (0.004)		0.012*** (0.002)	0.005*** (0.001)	0.009*** (0.002)
<i>Professional</i>		0.028*** (0.006)	0.003 (0.003)	0.006 (0.006)		0.049*** (0.008)	0.019*** (0.006)	0.022*** (0.007)
<i>Technician</i>		0.022*** (0.005)	-0.002 (0.005)	-0.002 (0.005)		0.017*** (0.005)	0.025*** (0.005)	0.028*** (0.005)
<i>Semi-skilled</i>		-0.000 (0.000)	0.007 (0.005)	0.000 (0.000)		-0.010** (0.004)	0.062*** (0.015)	-0.016*** (0.004)
<i>Fulltime</i>		0.008* (0.005)	-0.250*** (0.045)	-0.027*** (0.005)		-0.002 (0.007)	-0.096*** (0.035)	-0.020*** (0.007)
<i>Small firm</i>		0.001 (0.001)	0.024* (0.014)	-0.001 (0.001)		0.001 (0.001)	0.005 (0.012)	0.000 (0.001)
<i>Med-Large firm</i>		0.029*** (0.007)	0.005 (0.010)	0.004 (0.007)		0.030*** (0.006)	-0.003 (0.010)	-0.002 (0.005)

Formal	6.284*** (0.003)				6.106*** (0.003)			
Informal	5.995*** (0.013)				5.741*** (0.014)			
Difference	0.289*** (0.014)				0.364*** (0.015)			
Endowments	0.190*** (0.013)				0.227*** (0.016)			
Coefficients	0.095*** (0.013)				0.120*** (0.013)			
Interaction	0.004 (0.012)				0.017 (0.014)			
Constant			0.009 (0.103)				0.022 (0.100)	
Observations	117,253	117,253	117,253	117,253	113,800	113,800	113,800	113,800

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Source: Author

For the sample of all employees (See **Table 4.10** and **Table 4.12**), variables are consistent with both descriptive data and model estimates. Working hours is positive and mostly unexplained; hence, it does not account for the difference between formal and informal employees. Age is explained and positive for 40-64 years old workers; hence, it does account for the difference. Experience is positive; whereas experience squared is negative and both are mostly unexplained. Male is negative and mostly unexplained. Educational attainment is positive and mostly explained; hence, it does account for the difference. Married is negative and mostly unexplained. According to ranking order and as regards industries, manufacturing, public administration and transportation are positive and mostly explained, accounting for the difference, whereas construction and agriculture are negative, whereas finances is positive and all are unexplained. According to ranking order, job position (professional, technician, director) is positive and mostly explained, accounting for the difference, whereas semi-skilled is negative. Fulltime occupation is negative and mostly unexplained. The firm size is positive but unexplained for small firms whereas it is explained for medium up to large firms. Overall, the mean increase in the income of informal employees if they had the characteristics of formal employees would be 0.197. The variables that account for the wage gap between formal and informal employees (0.313) are (from the highest): being a professional, working in medium or large firm, educational attainment, being experienced and being between 40 to 54 years old.

In the subsample of male employees (See **Table 4.11** and **Table 4.13**), working hours remains positive and unexplained. Age becomes negative and unexplained. Experience and experience squared, respectively positive and negative, remain mostly unexplained. Educational attainment remains positive and mostly explained. Married is positive but remains mostly unexplained. According to ranking order and as regards industries, manufacturing, public administration, and transportation remain positive and mostly explained, as well as agriculture, whereas construction remains negative and unexplained. According to ranking order, job position (professional, director and technician) is positive and mostly explained, accounting for the difference, whereas semi-skilled becomes positive although unexplained. Fulltime occupation remains negative and mostly unexplained. The firm size is positive but unexplained for small businesses whereas it is explained for medium up to large businesses. For males, the mean increase in the income of informal employees if they had the characteristics of formal employees would be 0.190. The variables that account for the wage gap between formal and informal employees (0.289) are: educational attainment, work experience, working in medium or large firm, being a professional or technician, working in manufacturing and being married.

In the subsample of female employees (See **Table 4.11** and **Table 4.13**), variables are quite similar to those for male employees, namely experience and experience squared, age, educational attainment, fulltime and the firm size. However some variables do change. Married becomes negative and mostly unexplained. Working hours remains positive and becomes explained. Almost all industries, whether positive (manufacturing, trade and transportation) or negative (agriculture, finances and construction) are mostly unexplained, whereas only public administration is weakly positive and explained. According to ranking order, job position (professional, technician and director) is positive and mostly explained, whereas semi-skilled becomes positive although unexplained. For women, the mean increase in the income of informal employees if they had the characteristics of formal employees would be 0.227, one fifth higher than males. The variables that account for the wage gap between formal and informal employees (0.364) are: being a professional, hours worked, educational attainment, working in medium or large firm, being between 40 and 54 and being a director.

Summing up, the difference between formal and informal employees seems to be better explained on the demand side by characteristics of the firms (industry, job position and size) than on the supply-side by the workers characteristics (age, education, experience and marital status).

4.6. Conclusions

To the best of our knowledge, among the few papers that analyse informal employment using the EU-SILC, this chapter provides the first analysis devoted to a set of nine EU transition countries, using panel data and wages decomposition.

We define informal employment, following the legalistic definitions, as employment without receiving employer's social insurance contribution and at the same time do not having a permanent contract at the main job. Using the EU-SILC for the years 2009, 2010, 2011 and 2013, we demonstrate that the share of informal employees is increasing over time, with the exception of Bulgaria, Latvia and Romania. Informal employees earn significantly less (between 25-30%) in real terms (398-490 euro per month compared to 580-662 euro of formal employees), are on average eight years younger and six years less experienced than formal employees. There are about 10 percent more employees with a university degree in the formal

employment. In addition, more married individuals are present among formal employees. Most of informal employees have low-skilled occupations.

Application of a pooled OLS Mincer model supports human capital theory in as much as education, skills and experience prove to be highly significant in wages determination, whereas males and married individuals tend to have higher income. Moreover, about 25 percent of wage penalty for informal employment for all employees is explained by both individual and job characteristics. We observe that about 24 percent of wage penalty for informal employment for male employees (and 28 percent for female employees) is explained by both individual and job characteristics. However, 15 percent of overall wage penalty remain unexplained, 12 percent for male and 18 percent for female employees.

The conditional quantile regressions show that there is no wage premium for participation in the informal employment in a pooled sample of nine EU transition economies. Both male and female employees experience wage penalty for informality, being the highest at the bottom decile (-0.25 for all employees, -0.24 for male employees and -0.27 for female employees) and the lowest at the top decile (-0.17, -0.13 and -0.20, respectively). Finally, fixed effects regression demonstrates that even when accounting for unobservable characteristics, wage penalty for informality does not disappear and reaches 22 percent for female employees and 7 percent for male employees.

According to an Oaxaca-Blinder wages decomposition, the difference between formal and informal employees is rather balanced and it seems that characteristics of the firms (industry, job position and size) on the demand side better explain this difference than the workers characteristics (age, education, experience and marital status) on the supply-side.

Appendix

Table 4.14. Dictionary of variables

Variable	Description
<i>Informal</i>	1 if informal employee, 0 otherwise
<i>Hrs_wu</i>	Number of hours usually worked per week by an employee in the main job
<i>Age cohorts</i>	1 – from 16 to 24 2 – from 25 to 39 3 – from 40 to 54 4 – from 55 to 64 5 – above 65
<i>Experience</i>	Number of years spent in paid work (as employee or self-employed)
<i>Male</i>	1 if male, 0 if female
<i>Education level categories</i>	1 – below secondary education (no education and lower secondary education) 2 – completed secondary education 3 – vocational training and university degree
<i>Student</i>	1 if enrolled as a student, 0 otherwise
<i>Married</i>	1 if married, 0 otherwise
<i>Industry (NACE)</i>	1 – Agriculture 2 – Manufacturing and utilities 3 – Construction 4 – Trade 5 – Transportation 6 – Accommodation and food 7 – Finances and real estate 8 – Public administration 9 – Education and health 10 – Other services
<i>Occupation (ISCO)</i>	1 – Director, manager or CEO 2 – High level professional 3 – Technician 4 – Semi-skilled white collar (sales, clerks) worker 5 – Low-skilled and low-unskilled (elementary professions, domestic) worker
<i>Fulltime</i>	1 if full time worker, 0 otherwise
<i>Firm size categories</i>	1 – Micro, 1-9 workers 2 – Small, 10-49 workers 3 – Medium and large, above 50 workers
<i>Log real monthly income</i>	Log of full time equivalent real monthly income. Calculated as the sum of “gross employee cash or near cash income” and “gross non-cash employee income” adjusted for a full-time equivalent and a CPI (World Bank Development Indicators (World Bank, 2017b), latest version available (release September 2017)) with 2010 as a base year

Source: Authors

Chapter 5

Informal Employment and Earnings Determination in Ukraine

5.1. Introduction

This *Fifth Chapter* is published in Nezhyvenko & Adair (2017). It examines the informal employment in Ukraine within four categories of workers (formal employees, formal self-employed, informal employees and informal self-employed) and with the help of the ULMS for 2007.

Following 27 years of independence, informal employment remains “one of the main challenges for Ukraine during its economic transformation period” (Nezhyvenko, 2015, p. 69). The transition in Ukraine went through a two-step process, experiencing a severe output decline from 1991 to 1999 and a recovery from 2000 to the 2008 recession. However, real wages lagged behind real GDP from 1992 to 2004. By 2007, GDP had reached 88% of the 1992 level. However, total employment has not increased substantially since then, approaching about 85.3% of its 1992 level in 2007 (ETF, 2009).

Informal employment in Ukraine has increased dramatically over the period of 2000-2007 from 14.8% up to 22.3% of total employment for people aged 15-70, namely 4.7 million people. According to LFS data in 2007, the age groups at the two extremes of the age structure (15-19 years and 60-70 years) have larger shares in informal than in formal employment. The incidence of informal employment decreases with educational attainment for both sexes as well as for urban vs. rural areas, wherein it is higher (ETF, 2009). In 2016¹⁰, the informal employment in Ukraine is estimated at the rate of 24.3% which is 4.0 million people. Among the informally employed population the majority (66.2%) has either the vocational or complete secondary education (SSSU, 2017).

In as much as informal employment drives pervasive cash payment to employees, it cheats on fiscal revenues for both the employees and the employers. Tax compliance is a major issue, the lack of which hampers growth and paves the way to bribery. According to a study upon a representative sample (2,082 active, private companies for the tax year 2007 and 1,000 active

¹⁰ The latest available data as of May 2018.

sole proprietors in for tax year 2008), small businesses pay on average the equivalent of an 8% on their turnover in complying with tax requirements, which is 0.5% of GDP. One out of four companies used unofficial ways to “solve” tax-related problems (IFC, 2009). In fact, this practice is known as “blat” (“блат” in Ukrainian) and depicts the “*practice of using personal networks to gain preferential access to goods and services, or to circumvent formal procedures*” (Williams & Onoshchenko, 2015, p. 46). Williams & Onoshchenko (2015) stress that “blat” may have both monetary and non-monetary form. Approximately 18% of wages and salaries are paid to employees “in envelope”, without taxes or mandatory social contributions, using fictitious companies (which is clearly illegal), engaging individual sole proprietors (IFC, 2009).

Besides salaried workers, private entrepreneurs (“physical entities”) is a legal form of self-employment that amounted to 1.6 million in 2016 (SSSU, 2018e) which corresponds to 9.6% of the employed population in 2016. In 2009, the share of “physical entities” constituted 5.6% of the employed population (SSSU, 2013a).

Ukraine lags behind other transition countries as regards private sector employment. The privatisation of state-owned enterprises started in 1992 and the creation of private firms brought about dramatic changes in the ownership structure of employment. However, according to the State Statistical Establishment Survey (the LFS does not provide information on the type of employer’s ownership), the share of employment in the public sector consisting in both state-owned and municipal organisations was still 51.9% in 2006, whereas the private sector represented a 48.1% share. Despite considerable growth in the number of small businesses (up to 50 employees)¹¹ over the period 1991-2017, the share in total wage employment and in total output were around 18.4% and 4.4%, respectively, for 2007 (ETF, 2009). In 2016, the share of employment in small enterprises reached 27.4% and the share of total output grew to 16.7% (SSSU, 2018a).

Indeed, informal employment and related cash payments as well as tax evasion, fuel an extensive shadow economy or the NOE of Ukraine, which should be accounted for in the GDP. However, figures are controversial (Ogreba, 2012; Bochi & Povoroznyk, 2014), depending on the various definitions, sources and measurement methods that are used.

¹¹ By the size, Ukrainian enterprises are classified as microenterprises (with less than 10 employees and annual income under 2 million euros), small (with less than 50 employees and annual income under 10 million euros), large (with more than 250 employees and annual income above 50 million euros) and medium (the rest).

Presence of substantive informal employment hinders economic development of Ukraine and its perception on the international level, being one of the main reasons of the fluctuating acceptance of Ukraine as a trustworthy and honourable economic partner. This is reflected in consistently low ranking of the country by the Worldwide Governance Indicators, Doing Business report and other independent foreign cross-country comparisons (Shumska & Nezhyvenko, 2013). The informal sector poses unfair competition for formal firms. In addition, it can become a source for independent changes in the economy whether procyclical and/or countercyclical, affecting both the direction and strength of economic policy (Ott, 2002).

The abovementioned Worldwide governance indicators (WGI) (World Bank, 2013) is an analytical approach which develops and provides information about the cross-country study of 6 particular dimensions of governance: voice and accountability, political stability and absence of violence/terrorism, government effectiveness, regulatory quality, rule of law, and control of corruption. Three of them are particularly relevant for our research because they are the most determinant for individuals to make a decision in which way (formally or not) to participate in economic activities. Those are:

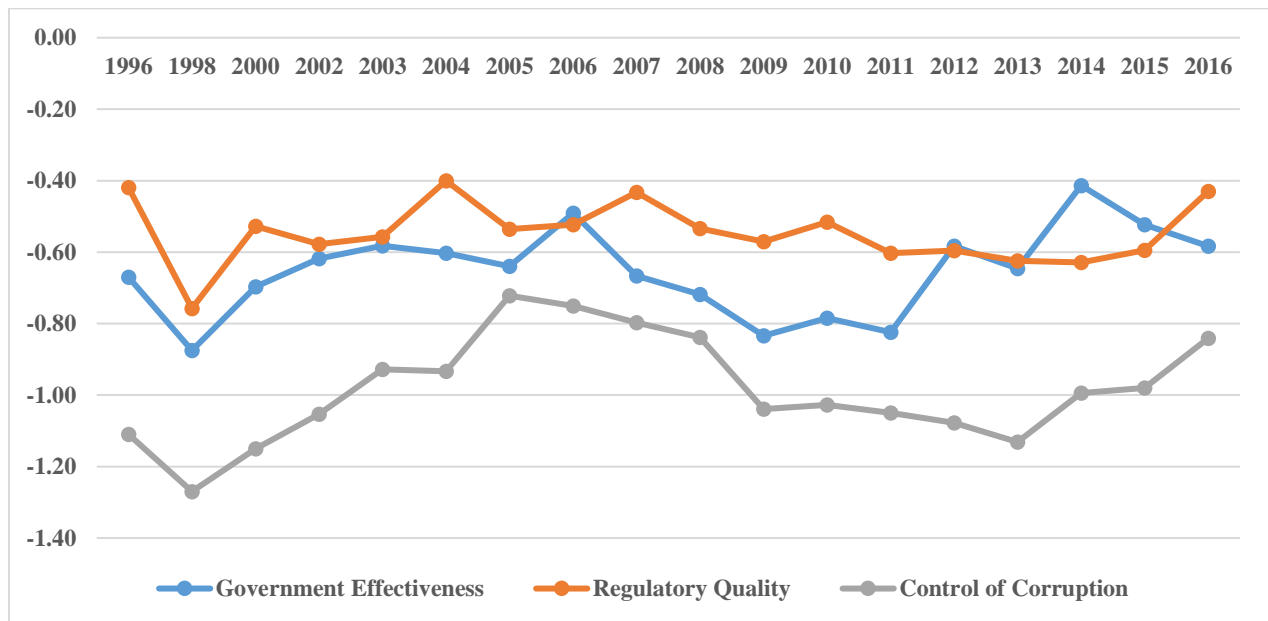
Government effectiveness captures perceptions of the quality of public services, the quality of civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of government's commitment to such policies.

Regulatory quality defines perceptions of the ability of government to formulate and implement sound policies and regulations that permit and promote private sector development.

Control of corruption illustrates perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.

The indicators are measured in units ranging from -2.5 to 2.5, with higher values corresponding to better governance outcomes. The results are reported in **Figure 5.1**.

Figure 5.1. The Worldwide Governance Indicators, Ukraine (1996-2016)



Source: World Bank (2017c)

All the indicators have negative values. Moreover, they have nearly similar fluctuating dynamics during the whole period and represent a descending trend during 2007-2013 for both regulatory quality and control of corruption. Still worth is that any of these indicators never cross the “zero” mark which serves as a mean value for the WGI. This suggests that the perception of reforms, improvements and provision is weak, at least in the short-term.

The Doing Business 2004 report (WB & IFC, 2004) positioned Ukraine to the “least-flexible regulations” category of countries in terms of conditions of employment. As for business registration, it took 14 procedures, 40 days and about \$210 to start a business (with \$110 as the average wage in economy) in 2004. The Doing Business 2013 report (WB & IBRD, 2012) calculated that 7 procedures, 22 business days and 1.5% of income per capita was required to start business in Ukraine in 2013. Even though the number of procedures, as well as time and costs, have decreased since 2004, Ukrainian data does not correspond to the requirements for Eastern Europe and Central Asia region as regards number of days requires, is only 7 as average for the region (Shumska & Nezhyvenko, 2013). The Doing Business 2018 (WB & IBRD, 2018) states that there are 6 procedures, 6.5 business days, and 0.8% of income per capita required to start business in Ukraine in 2018.

The informal sector is the main feature of the dynamics of transition. Whether it will have a positive or negative role in the transition depends on the speed with which the government will redefine its role in the market. Large informal employment and unbalanced labour market have

serious consequences for the official economy, in as much as there is an impact of human capital availability on the growth rate (Tkachenko & Mosiychuk, 2014). Informal employment is low-paid and does not provide social protection for the worker from the labour legislation of the country. Moreover, this situation creates barriers to the economic inclusion of certain groups of population.

The social costs of informality are translated in forgone tax revenues, lower productivity and lack of social security coverage – outweigh the potential social benefits such as a social safety net, a trampoline to formal business. Accordingly, effective policies to promote formal employment enhance social welfare (Kuddo & Rutkowski, 2011).

Thus, it is worth investigating the determinants of individuals who participate in formal or informal employment according to their characteristics. Thanks to the *Ukrainian Longitudinal Monitoring Survey* (ULMS) for year 2007 and 2012, we apply a Mincer earnings distribution function in order to determine the factors that influence wages. Section 2 provides literature review on the topic; section 3 explains the data source and methodology; section 4 presents the results; and section 5 concludes.

5.2. Literature review

This chapter stands at the crossroads of two literatures: the literature on informal employment and the literature on the human capital theory. We first present the achievements of Mincer's contribution, followed by its application to various countries as regards informal employment and similarly we end up with the case of Ukraine.

Mincer (1974) was the first to treat schooling and occupation as investment opportunities. He develops his human capital theory in further works stating that education and training act as a link both for the causes and effects of economic and demographic changes. He proves it by showing that the indexes of human capital (for example, average levels of education) are better correlated with average income levels across countries than measures of physical capital per unit of labour. According to Mincer (1981), the growth of human capital is both a condition and a consequence of economic growth, although the growth of a considerable level of human capital is a lengthy process that involves deep social and cultural changes. Hence, investing in human capital is the main explanatory variable of income distribution and the occupations that

require more training are better paid in order to compensate the individuals not only for the direct costs of training, but especially for the postponement of their earning period. Most earnings functions include numerous supplementary variables in addition to the schooling and potential experience terms used by Mincer. These include race, gender, regional dummy categorical variables, health status, ethnicity, marital status, children, union membership, city size, and numerous other variables. They serve as exogenous control variables (Polachek, 2007).

Angel-Urdinola and Tanabe (2012) study informal employment in the Middle East and North Africa region in 2010, by estimating the impact of human capital. They provide evidence that the sizes of public and agricultural sector are the main determinants of informal sector in the region: the bigger the agricultural sector is, the higher the informality would be; and the stronger the public sector is, the less would be the informal sector. They document that the youth aged 15-24 years old are the more susceptible to participate in informality. By applying Mincer equations, they show that the returns to education in the informal sector are very low, compared to public and private sectors.

Clementi and Giammatteo (2014) use four waves of the data from the Participation Labour Unemployment Survey, addressing the question of earnings dispersion in Italy between 2005 and 2010. They calculate Theil index for income inequality between “rich” and “non-rich” and decompose inequality by population groups and income sources. The authors show that self-employment plays an important role in income distribution of “rich” earners. Standard employment has also positive effect on income distribution, whereas atypical earnings impact negatively on shaping total inequality. At the same time, economic crisis between 2008 and 2010 may have substituted non-standard employment with “false” employment in order to reduce the employer’s labour costs.

Gorodnichenko and Sabirianova Peter (2005) used semiparametric decomposition techniques for the data on Ukraine (ULMS) and Russia (RLMS) during 1985-2002 to analyse the sources of cross-country differences in returns to schooling by comparing the Mincerian earnings functions. The authors conclude that skill wage inequality in Ukraine increased less over the same period than in Russia. Constructing counterfactual distribution of wages for Ukrainian university and secondary school graduates with the Russian characteristics demonstrates that labour market returns (pricing schedules) have the strongest explanatory power on skill premium differences between Russia and Ukraine.

Pagés and Stampini (2009) study wage differentials and labour market segmentation across formal and informal salaried jobs as well as self-employment in six countries including Ukraine. They look separately at the markets for skilled and unskilled labour, inquiring if segmentation is an exclusive feature of the latter. The analysis exhibits a formal wage premium relative to informal salaried jobs in the three Latin American countries (Argentina, Mexico and Venezuela), but not in transition economies (Albania, Georgia and Ukraine). The authors also reveal the evidence of extensive mobility, particularly from informal salaried to formal jobs. These findings demonstrate a preference for formal over informal salaried jobs in all countries. At the same time, there is little mobility between self-employment and formal salaried jobs, which may indicate the existence of entry barriers or a strong assortative matching between firms and workers based on preferences or productivity. For both wage differentials and mobility, there is no statistical difference across skill (education) levels, suggesting that the markets for skilled and unskilled labour are similarly affected by segmentation, which is not driven by minimum wages.

Commander et al. (2013) use the 2003 and 2004 waves of the ULMS and estimate that the share of employment in the informal sector in Ukraine increased from 10-16% in 1991 up to 17-23% in 2004, excluding people involved in agricultural production for their own use. They also focus on multiple job holding as a prevalent feature of the informal economy, which is connected with the formal economy. They design an analytical model of an economy with state and private sectors, incorporating formal and informal as well as full and part-time work, to study the impact of changes in non-monetary compensation on the reallocation of labour. The results of a mixed multinomial logit regression reveal that the likelihood of switching into the informal sector will be decreasing in the size of the firm (a proxy for the probability of detection in payroll tax evasion), and increasing in predicted relative wages in the informal sector. Moreover, the likelihood of switching into the formal/informal sector will be affected positively by the social benefits and negatively by subsidy.

Lehmann (2014) posits that the incidence and determinants of informal employment in transition economies depend on the definition used, legalistic either productivity-based definition. Studies that attempt to test for labour market segmentation in transition economies along the formal-informal divide provide inconclusive results. Hence, more work needs to be done before making definitive statements about whether labour markets are integrated or segmented in transition economies. At last, he introduces a model that measures the probability of being in informal employment depending on the risk proclivity and shows that non-risk

averse workers have an increased likelihood to select to join informal employment and self-employment.

Shehu and Nilsson (2014) use standardized “school-to-work transition” survey data across 20 countries, including Ukraine, taking jobs as the observation units as regards both components of informal employment defined in the 17th ICLS: within the informal sector and the formal sector including unprotected jobs. Main findings are that informal and formal wage earners seem to share many wage determinants. In both sectors, educational attainment generates a higher income, except at the primary level where it is only significant for informal workers. Experience at the current job is highly significant for formal workers, but insignificant for informal workers. Average hourly wage of formally and informally youth employees by educational attainment does not show a wage premium for education. However, the distribution of average hourly wage is positively (negatively) associated with educational attainment for the unprotected jobs in the formal sector vs the jobs in the informal sector.

Lehmann & Pignatti (2018) use the three waves of the ULMS (2003, 2004 and 2007) to discuss the segmentation between formality and informality in Ukraine, voluntary vs. involuntary choice to participate in informal employment, as well as transition between different employment statuses. For this, the authors assign five employment categories: formal salaried (FS), *voluntary* informal salaried (VI), *involuntary* informal salaried (INVI), formal self-employed (SEF) and informal self-employed (SEI). Lehmann & Pignatti show that INVI receive the lowest earnings and the self-employed (SEF and slightly less SEI) earn more than all the other employment statuses. This paper is of particular importance as Lehmann & Pignatti use the longitudinal sample of the ULMS, which when applying the fixed effects estimates eliminates unobserved heterogeneity since the unobserved characteristics are time-invariant. The panel study also discovers that such unobserved features of INVI are worse compared to FS, which is why INVI experience wage penalty. The quantile regression presents no substantial differences along the wage distribution, unless the sample is split into male and female. Finally, Lehmann & Pignatti conclude that FS and SEF are the most desirable employment statuses, moreover, they mention that the labour market “in post-transition countries like Ukraine is far too heterogeneous and complex” (Lehmann & Pignatti, 2018, p. 37).

5.3. The case of Ukraine: data sources, definition, methodology

5.3.1. Data

Various data sources are available as regards the labour market in order to investigate informal employment.

On the demand side, the World Bank designed a pilot Labour Demand Study in 2007 upon 1,127 respondents, in order to identify the occupational profile of jobs destroyed, jobs created and vacancies; and to assess the difficulties the employers face with filling vacancies (World Bank, 2009).

Three sources focus on the supply side. The Labour Force Survey (LFS) is designed alongside the guidelines from the ILO upon a multi-level stratified monthly sample of 18,500 households. As for 2007, there were 141,900 respondents and the response rate among urban and rural households was 80.3% and 89.2%, respectively (ETF, 2009).

Two rounds of the ILO School-to-work transition survey (SWTS) were held in Ukraine in 2013 and 2015. This survey investigated the determinants of (successful or unsuccessful) transition from education to the labour market upon a samples of 3,526 and 3,202 individuals aged 15-34 years old, respectively. The findings remonstrate that the transition from school to a stable job takes 4.4 months if the individual has tertiary education, as compared to 6.5 months for secondary school graduates and 16 months for individuals with primary education. In Ukraine, there is a substantial share of overeducated young workers of 41% in 2015 and only 4% of young individuals are considered as undereducated. In fact, Kupets (2015) studies skill mismatch in non-EU transition economies and demonstrates that overeducated workers may possess a relatively worse bundle of skills and undereducated workers may perform better than well-matched individuals. Interestingly, 37% of the SWTS respondents showed a preference to start own business, while 30% wanted to work for a private company and 26% of youth expressed interest to work in the public sector. The survey estimated the youth unemployment rate at the level of 12% in 2015 and youth inactivity as 42%. Final finding of the survey was that most of the youth employment was informal both in 2013 and 2015 with 57% and 58%, respectively. Out of informal employment, 20% is employment in the informal sector and 80% is informal employment outside the informal sector (ILO, 2016b).

The main data source for our study is the Ukrainian Longitudinal Monitoring Survey (ULMS). It consists in three waves of panel data (2003, 2004, 2007 and 2012)¹² and provides an in-depth overview of household life conditions and employment of the individuals. It is designed as a statistically representative sample of the Ukrainian working-age population stratified by age, gender, rural/urban area and regional structure. The 2007 wave collected questionnaire results from 3,101 households and 6,774 individuals, the 2012 wave – 4,232 households and 9,902 individuals. Although the waves differ between survey waves by the structure, the main questions in the ULMS questionnaires were saved in order to trace information. Such is the case for primary and secondary employment (as well as multiple job holding), job search efforts, non-employment and participation in labour market programs, education and skills, changes of residence, spatial mobility, wages, in kind payments, unpaid leave, etc. (Lehmann, Muravyev, & Zimmermann, 2012).

We present preliminary results for the 2007 and 2012 waves of the ULMS. As far as our knowledge is concerned, no Mincer earnings function was applied to these waves and we provide some value added in this connection.

5.3.2. Defining informal employment for the Ukrainian labour market

Informality in the labour market may be defined as “unreported income from the production of legal goods and services, either from monetary or barter transactions, hence all economic activities that would generally be taxable were they reported to the tax authorities” (Schneider & Enste, 2000). However, two approaches to define informal employment are the most commonly used: productivity definition and legalistic definition (Khamis, 2009).

The *productivity definition* identifies informal employment by the job characteristics: according to this definition under the category of “informal” fall less-skilled, domestic workers, workers in small firms up to five employees. The *legalistic approach* defines informal employment by non-compliance with the regulations in terms of labour market rules and social security system. According to the second definition, the informality is characterized by employees and self-employed that are not compliant with the labour market rules, or in another words – are not registered.

¹² The Fourth wave (2012) of the ULMS was not yet open for public use at the time of paper publication, but available at the time of defending PhD thesis.

Current trends of informal employment in Ukraine are estimated since 1999 according to the methodology approved by the SSSU. As mentioned in Chapter 2, the estimation is based on the Resolution on employment in the informal sector, adopted on the 15th ICLS in 1993 (ILO, 2013a), the Guidelines concerning a statistical definition of informal employment, adopted at the 17th ICLS (ILO, 2003a) and the Guidelines on the definition of informal employment of the population (SSSU, 2013c).

According to the SSSU and following the approach of the ILO, the enterprise belongs to informal sector when it has market orientation of economic activity, employs less than five people and has no official registration of entrepreneurial activity. This understanding of the informal sector is based rather on productivity approach because, in line with the national methodology, the informal sector includes all persons who were employed in unregistered enterprises, which belong to the households' sector by their size (number of employees) according to the UN System of National Accounts.

In accordance with the 17th ICLS Resolution (ILO, 2004) and to take into account national peculiarities, the definition of employment in informal sector was expanded to include those people who worked on oral agreement with the employer in the formal sector, without a formal labour contract, which results in the absence of minimum social guarantees (SSSU, 2013a). We follow legalistic definition because this consistent approach is well observable based on the available data.

We use data from the ULMS 2007 and 2012 in order to investigate individuals according to their employment status: formal employee, informal employee, formal self-employed, informal self-employed and unemployed. The individuals are classified into these five categories based on their survey responses. To be regarded as an employee or self-employed, an individual needs to have worked at least one hour during the reference week. From the response to the question whether the employee/self-employed is officially registered or not (based on a written contract) we can identify the status: formal employee (FE) and formal self-employed (FSE) or informal employee (IE) and informal self-employed (ISE). The individual that has not worked during the reference week but was looking for the job is classified as unemployed (U).

5.3.3. Methodology

We study labour market divide into five categories according to job position or status: formal employees, informal employees, formal self-employed, informal self-employed and unemployed within the labour force. The entry of workers on each of these segments may vary and we assume that experience both with educational attainment plays a part of this entry cost. Hence, we apply the following Mincer model to the Ukrainian labour market:

$$\ln Income_{ij} = \alpha_j + \sum_r \beta_j x_{ij} + \gamma_j Education_{ij} + \delta_j Experience_{ij} + u_{ij} \quad [5, 1]$$

Where $\ln Income_{ij}$ denotes the log real monthly income of the employee i at the state j ; x is the set of individual, household and job characteristics (age, gender, place of residence, working schedule, children, marital status, size of the household, multiple job holding); $Education$ and $Experience$ are the main explanatory variables; α , β , γ and δ are unknown coefficients; and u represents a random disturbance and measurement error.

5.4. Results

5.4.1. Personal background characteristics

First, we look at the Ukrainian labour market distribution in 2007. According to **Table 5.1**, formal working population (formal employee and formal self-employed) constitute 86%, and informal employment (informal employee and informal self-employed) results in 14% of the overall workforce. Unemployed individuals amount to 10% and are excluded from “employed population”.

Table 5.1. Distribution of the individuals by labour market status (2007)

<i>Labour market status</i>	<i>Number of individuals</i>	<i>To employed population</i>
Employed population	3,300	1.00
Formal employee (FE)	2,674	0.81
<i>Informal employee (IE)</i>	303	0.09
Formal self-employed (FSE)	160	0.05
<i>Informal self-employed (ISE)</i>	163	0.05
Unemployed	337	0.10
Total formal employment (FE + FSE)	2,834	0.86
Total informal employment (IE + ISE)	466	0.14

Source: own calculations based on the ULMS 2007 wave

According to SSSU (2009) and derived from the LFS, the economically active population (aged 15-70) in 2007 amounted to 22.3 million, which makes it a 62.6% activity rate. The

economically inactive population was 13.3 million (37.4% inactivity rate). As regards the age distribution of economically active population, the 15-24 years old age group constituted 13.9% of working age population; the 25-39 years old group represented 37.4%; the 40-59 years old age group amounted to 43.7%; the 60-70 years old age group was 5.1% (ETF, 2009).

Table 5.2. Personal background characteristics by labour market status: means and standard deviations (in brackets) (2007)

Variable	Formal employee FE	Informal employee IE	Formal self-employed FSE	Informal self-employed ISE	Unemployed U	Average
<i>Male</i>	0.52 (0.5)	0.61 (0.5)	0.57 (0.5)	0.74 (0.47)	0.54 (0.5)	0.54 (0.5)
<i>Age</i>	40.33 (12.3)	33.43 (12.3)	40.25 (9.24)	38.27 (12.4)	35.91 (12.5)	39.26 (12.41)
<i>Married</i>	0.73 (0.45)	0.55 (0.5)	0.82 (0.39)	0.70 (0.46)	0.59 (0.49)	0.70 (0.46)
<i>Size of the household</i>	2.73 (1.11)	2.91 (1.17)	2.58 (1.14)	2.80 (1.28)	2.76 (1.13)	2.74 (1.13)
<i>Children</i>	1.68 (0.68)	1.74 (0.99)	1.66 (0.68)	1.87 (0.96)	1.95 (0.89)	1.71 (0.74)
<i>Educational attainment</i>	2.56 (0.88)	2.26 (0.67)	2.71 (0.91)	2.29 (0.77)	2.27 (0.7)	2.5 (0.86)
<i>Education years</i>	13.43 (2.01)	12.52 (2.01)	13.86 (1.97)	12.67 (2.26)	12.71 (1.83)	13.28 (2.04)
<i>Urban</i>	0.58 (0.49)	0.59 (0.5)	0.77 (0.44)	0.45 (0.49)	0.42 (0.49)	0.57 (0.5)
<i>Experience years</i>	23.89 (12.47)	17.73 (12.24)	23.43 (9.46)	23.49 (12.23)	22.49 (12.23)	20.21 (12.70)
<i>Full-time</i>	0.96 (0.19)	0.91 (0.28)	0.93 (0.27)	0.67 (0.45)	-	0.94 (0.24)
<i>Multiple jobs</i>	0.02 (0.13)	0.01 (0.11)	0.04 (0.17)	0.02 (0.17)	-	0.02 (0.13)
<i>Permanent</i>	0.98 (0.13)	0.79 (0.41)	0	0	-	0.80 (0.41)
<i>Firm size</i>	2.56 (0.68)	1.85 (0.80)	1.25 (0.58)	1.31 (0.68)	-	2.37 (0.79)
<i>Private</i>	0.37 (0.48)	0.96 (0.19)	0.93 (0.21)	0.92 (0.25)	-	0.47 (0.49)
<i>Hours worked usually</i>	41.01 (9.78)	46.12 (14.47)	50.64 (15.81)	43.74 (19.14)	-	41.98 (11.52)
<i>Hours worked actually</i>	41.16 (10.08)	45.85 (14.80)	50.65 (15.75)	43.78 (20.03)	-	42.08 (11.83)
<i>Income</i>	948.62 (608.73)	825.35 (627.19)	1682.31 (2088.78)	957.25 (1068.33)	-	961.53 (742.36)
Number	2674	303	160	163	337	3637

Note: weighted sample

Source: own calculations based on the ULMS 2007 wave

According to the ULMS 2007, the distribution of age groups of the total work force and informal work force is as follows: 15-24 years old age group – 18.9% and 24.9%, respectively; 25-39 years old age group – 21.9% and 35.6%; 40-59 years old age group – 37.2% and 36.3%;

60-72 years old age group – 22% and 3%. The ULMS sample is obviously younger than the LFS sample and the same applies to informal work force.

We first analyse means and standard deviations of the variables chosen for each of the labour market statuses in order to understand the Ukrainian labour market divide. **Table 5.2** displays personal background characteristics by the labour market category: formal employee (FE), informal employee (IE), formal self-employed (FSE), informal self-employed (ISE) and unemployed (U) in 2007. See **Table 5.7** in the Appendix for the description of variables.

As reported in **Table 5.2**, there are no strong gender disparities in formal employment and self-employment, but men prevail in informal self-employment (74%). The proportion of unemployed men and women is almost the same. According to SSSU (2012), men are slightly more engaged in informal employment in Ukraine than women (22.4% and 22.2% respectively). **Table 5.2** is in accordance.

The age group with the lowest participation is that of the informal employees (average age of 33.4 years), followed by unemployed (35.9 years). Formal workers and self-employed are the oldest (40.3 and 40.2 years respectively).

Marital status shows that all the groups are represented by the majority of “non-single” individuals, however, there are more married among formal employees (73%) and self-employed (82%). The variable “size of household” varies slightly among five categories and shows that a labour market participant in Ukraine lives in a household of on average 2.74 persons. The average number of children is less than two (1.71) and proves quite similar across all labour market statuses, although slightly higher for informal self-employed (1.87), but the highest for unemployed (1.95).

Educational attainment¹³ indicates that workers with the highest level (higher education, or university) of education are formal self-employed (2.71) and formal employees (2.56). Interestingly, unemployed are not less educated by the educational attainment than informal self-employed and informal employees (2.27, 2.29 and 2.26, respectively). The variable “education years” displays the same pattern and accounts for an obvious formal/informal divide.

¹³ Respondents were asked about the highest level of education they attained, see Table 5.4 for variable description.

Regarding the type of settlement, informal self-employed and unemployed tend to be more present in rural areas, the highest share of urban workers is in the formal self-employed category (0.77). Working schedule does not show a significant difference between categories, although the less engaged in full-time job are informal self-employed (0.67).

Interestingly, “experience” demonstrates strong variations within different labour market statuses: the highest experience is relevant to formal employees (23.9 years), the lowest – informal employees (17.7 years). Formal self-employed and informal self-employed have almost the same average number of years of experience (23.4 and 23.5, respectively). The variable “multiple jobs” does not show a significant difference across categories, suggesting that work arrangements in most cases are full-time for one job.

Employees (both formal and informal) in most cases have permanent contract arrangements. Formal employees are the ones who prevail in the public sector and the rest of labour market statuses – in the private sector. Firm are the largest in case of formal employees (2.56) and the smallest in case of informal self-employed (1.25). Hours worked usually and hours worked actually slightly differ with hours worked actually being higher for all the labour market statuses suggesting strong work intensity. The number of hours worked is the highest for informal self-employed (almost 51 hours per week) and the lowest for informal self-employed (almost 44 hours per week).

Income varies across categories, which proves labour income inequality, being the highest for formal self-employed (UAH 1,682.31) followed by informal self-employed (UAH 957.25) and formal employees (UAH 948.62), and the lowest – for informal employees (UAH 825.35). For the year 2007, minimum salary increased from UAH 420 to UAH 460 (UAH 440 on average) and the living wage rose from UAH 492 to UAH 532 (UAH 516 on average), whereas unemployment benefit increased from UAH 292.6 to UAH 313.7.

Income distribution varies also within the four categories. The most dispersed income is for formal self-employed with the standard deviation of UAH 2,088.78. Formal employees experience the lowest income dispersion with the standard deviation of UAH 608.73 Slightly higher dispersion characterizes informal employees with the standard deviation of UAH 627.19. As for informal self-employed, the standard deviation is UAH 1,068.33.

We apply the same analysis to the 2012 wave of the ULMS in order to compare the development of the labour market of Ukraine.

Table 5.3. Distribution of the individuals by labour market status (2012)

<i>Labour market status</i>	<i>Number of individuals</i>	<i>To employed population</i>
Employed population	3,588	1.00
Formal employee (FE)	2,867	0.80
<i>Informal employee (IE)</i>	316	0.09
Formal self-employed (FSE)	156	0.04
<i>Informal self-employed (ISE)</i>	249	0.07
Unemployed	562	0.16
Total formal employment (FE + FSE)	3,023	0.84
Total informal employment (IE + ISE)	565	0.16

Source: own calculations based on the ULMS 2012 wave

What raises concern is the fact that unemployment has grown from 10% to 16% and informal employment (due to the increase of informal self-employment) from 14% to 16%. In 2012, informal employment was estimated at the level of 24.1% (SSSU, 2014c). This may be partly explained by the effect of financial crisis on the economy of Ukraine.

According to **Table 5.4**, there appear stronger gender disparities in informal employment (60%), formal self-employment (65%) and informal self-employment (68%), women seem to prevail in formal self-employment (48%). The age group with the lowest participation is again informal employees (average age of 36 years), followed by unemployed (36 years). Formal workers and self-employed are the oldest (40.3 and 42.5 years respectively).

Marital status shows that all the groups are represented by the majority of “non-single” individuals, however, there are more married among formal employees (71%) and self-employed (87%). The variable “size of household” again varies slightly among five categories and shows that a labour market participant in Ukraine lives in a household of on average 2.81 persons, slightly more than in 2007. The average number of children is less than two (1.71) and proves quite similar across all labour market statuses, although slightly higher for informal self-employed (1.89) and the lowest for formal employees (1.68).

Educational attainment indicates that workers with the highest level of education are formal self-employed (2.73) and formal employees (2.67). The variable “education years” displays the same pattern.

Table 5.4. Personal background characteristics by labour market status: means and standard deviations (in brackets) (2012)

Variable	Formal employee FE	Informal employee IE	Formal self-employed FSE	Informal self-employed ISE	Unemployed U	Average
<i>Male</i>	0.48 (0.50)	0.60 (0.49)	0.65 (0.48)	0.68 (0.47)	0.67 (0.47)	0.53 (0.50)
<i>Age</i>	40.27 (11.93)	36.03 (11.74)	42.54 (10.16)	40.70 (12.16)	36.05 (11.78)	39.53 (11.98)
<i>Married</i>	0.71 (0.45)	0.59 (0.49)	0.87 (0.34)	0.69 (0.46)	0.53 (0.50)	0.69 (0.46)
<i>Size of the household</i>	2.80 (1.08)	2.80 (1.24)	2.74 (1.00)	2.82 (1.25)	2.85 (1.08)	2.81 (1.10)
<i>Children</i>	1.68 (0.68)	1.72 (0.70)	1.71 (0.77)	1.89 (1.08)	1.81 (0.84)	1.71 (0.74)
<i>Educational attainment</i>	2.67 (0.95)	2.19 (0.75)	2.73 (0.99)	2.21 (0.73)	2.32 (0.77)	2.56 (0.92)
<i>Education years</i>	13.08 (1.69)	12.06 (1.97)	13.19 (1.41)	11.97 (1.73)	12.52 (1.74)	12.87 (1.75)
<i>Urban</i>	0.51 (0.50)	0.58 (0.49)	0.70 (0.46)	0.40 (0.49)	0.36 (0.48)	0.50 (0.50)
<i>Experience years</i>	20.20 (11.82)	16.88 (11.70)	22.20 (10.07)	21.24 (12.04)	16.45 (11.56)	19.62 (11.83)
<i>Full-time</i>	0.95 (0.22)	0.91 (0.29)	0.84 (0.37)	0.72 (0.45)	-	0.92 (0.27)
<i>Multiple jobs</i>	0.01 (0.11)	0.01 (0.11)	0.02 (0.14)	0.01 (0.11)	-	0.01 (0.10)
<i>Permanent</i>	0.98 (0.15)	0.79 (0.41)	0	0	-	0.74 (0.44)
<i>Firm size</i>	2.45 (0.67)	1.61 (0.73)	1.09 (0.35)	1.02 (0.12)	-	2.18 (0.82)
<i>Private</i>	0.46 (0.50)	0.98 (0.13)	1.00 (0.00)	1.00 (0.05)	-	0.57 (0.50)
<i>Hours worked usually</i>	41.53 (10.28)	45.73 (13.57)	44.69 (16.66)	40.31 (18.73)	-	41.90 (11.72)
<i>Hours worked actually</i>	41.32 (10.58)	45.36 (14.35)	44.20 (17.25)	38.01 (19.27)	-	41.54 (12.13)
<i>Income</i>	2032.60 (2191.68)	1932.70 (1281.47)	3564.76 (2457.24)	1912.59 (1639.16)	-	2286.31 (2125.46)
Number	2867	316	156	249	562	4150

Note: weighted sample

Source: own calculations based on the ULMS 2012 wave

Regarding the type of settlement, informal self-employed and unemployed again tend to be more present in rural areas, the highest share of urban workers is in the formal self-employed category (0.7à). Working schedule again does not show a significant difference between categories, although the less engaged in full-time job are informal self-employed (0.72).

“Experience” demonstrates strong variations within different labour market statuses: the highest experience is relevant to formal self-employed (22.2 years), the lowest – informal self-employed (16.9 years). The variable “multiple jobs” does not show a significant difference across categories, suggesting that work arrangements in most cases are full-time for one job.

Employees (both formal and informal) in most cases have permanent contract arrangements. Formal employees are the ones who prevail in the public sector and the rest of labour market statuses – in the private sector. Firm are the largest in case of formal employees (2.45) and the smallest in case of informal self-employed (1.02). Hours worked usually and hours worked actually slightly differ with hours worked usually being higher now for all the labour market statuses suggesting possibly the decrease in jobs which would explain the growing unemployment and informal employment. The number of hours worked is now the highest for informal self-employed (almost 46 hours per week) and the lowest for informal self-employed (40 hours per week).

Income varies across categories, which proves labour income inequality, being the highest for formal self-employed (UAH 3,564.76) followed by formal employees (UAH 2,032.60) and informal self-employed (UAH 1,932.70), and the lowest – for informal employees (UAH 1,912.59). We should note the growth in real income from 2007 to 2012: the average sample monthly income grew from UAH 961.5 to UAH 2286.3. In the US dollar equivalent this corresponds to approximately USD 283 and USD 376 per month (See **Figure 3.1**)

Income distribution again varies within the four categories. The most dispersed income is for formal self-employed with the standard deviation of UAH 2,457.24. Informal employees experience the lowest income dispersion with the standard deviation of UAH 1,281.47. Slightly higher dispersion characterizes informal self-employed with the standard deviation of UAH 1,639.16. As for formal employees, the standard deviation is UAH 2,191.68.

Overall, changes in some of the characteristics between 2007 and 2012 prove the dynamic nature of the labour market of Ukraine and potential to gradually adjust the level of real income to the level of the European Union.

5.4.2. The Mincer model

We build a Mincer model to study key factors that determine the income of individuals. **Table 5.5** presents the coefficients of Mincer equations using OLS regressions for the four categories of workers. The model includes variables generally included in a standard human capital accumulation model (years of education, educational attainment dummies, experience, experience squared, and other control variables). We use “education” variable both as continuous (years of schooling) and categorical (educational attainment). Results indicate very clearly that returns to education are very low in the informal sector.

Comparing the results for the four categories of employed population for the year 2007, we see that “male” is not significant for any categories except for formal employees, demonstrating very strong wage premium for males (30%). Age is not significant for any group and in both models (with education as continuous variable and as levels).

“Urban” is highly significant and positive for the categories of formal employees and self-employed. Marital status has poor explanatory power in our model, being significant and positive only for informal self-employed. Size of the household and number of children do not explain our dependent variable.

“Full-time” working schedule is highly significant and positive for only formal employees. This is relevant also for “permanent” working contract and for “hours worked usually”. Holding “multiple jobs” seems to explain the models for formal employees and formal self-employees (negative sign) and informal employees (positive sign). As regards the size of firms, we observe an interesting pattern: for formal employees, that medium and large firms have wage premium over small firms; even more surprising is the finding that micro firms (under 10 employees) as well receive wage premium over small firms, and this premium is slightly smaller compared to medium and large firms. For informal employees firm size is not significant. For formal self-employed, there is a wage penalty for micro-entrepreneurs compared to small firms.

Interestingly, education variables (continuous and discrete) behave slightly in a different way with the same set of factors, which is why we decided to present both configurations of variables. The model with “educational attainment” (categorical) variable has slightly higher significance, suggesting that educational achievement is better valued than duration of schooling and diploma has a signalling impact on the demand side. Returns to education are positive and the highest for formal employees, but negative and not significant for others. Hence, educational attainment generates a higher income only for those who are formally employed. Others factors, such as social capital, may explain the formal/informal divide, but we did not capture them. Continuous variable of education suggests that, for formal employees, one additional year of education brings on average 7.6 percentage points higher wages, taking other variables constant.

Experience variable is very important, that is why positive and highly significant for informal employees, it is significant and negative for formal self-employed and interestingly, not significant for other categories. This may suggest that either there are more young individuals

among formal self-employment in Ukraine, or this status is chosen as a temporary labour market state.

Table 5.5. OLS Mincer regression, log monthly income as a dependent variable (2007)

	FE	IE	FSE	ISE	FE	IE	FSE	ISE
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Male</i>	0.304*** (0.043)	0.342 (0.241)	-0.091 (0.402)	0.097 (0.365)	0.300*** (0.044)	0.353 (0.222)	-0.136 (0.434)	0.036 (0.402)
<i>Age</i>	0.003 (0.012)	0.075 (0.058)	0.141 (0.201)	0.084 (0.139)	0.007 (0.012)	0.059 (0.053)	0.152 (0.155)	0.172 (0.167)
<i>Age2</i>	-0.000 (0.000)	-0.001 (0.001)	-0.002 (0.002)	-0.001 (0.002)	-0.000 (0.000)	-0.001 (0.001)	-0.002 (0.002)	-0.003 (0.002)
<i>Education (years)</i>	0.076*** (0.011)	-0.062 (0.054)	-0.032 (0.141)	-0.011 (0.058)				
<i>At most primary school</i>					-0.015 (0.093)	-0.210 (0.318)	-0.452 (0.817)	-0.010 (0.803)
<i>Medium school</i>					-0.004 (0.078)	-0.440** (0.193)	-0.496 (0.515)	-0.566 (0.822)
<i>Secondary</i>					<i>Reference group</i>			
<i>Higher education</i>					0.378*** (0.085)	-1.055 (0.856)	-0.375 (0.738)	-0.651 (0.977)
<i>Vocational training</i>					0.450*** (0.167)			-0.196 (0.907)
<i>Experience</i>	0.007 (0.007)	0.194*** (0.057)	-0.432* (0.248)	-0.085 (0.099)	0.008 (0.007)	0.201*** (0.054)	-0.426* (0.254)	-0.099 (0.117)
<i>Experience2</i>	-0.000 (0.000)	-0.012*** (0.002)	0.027* (0.015)	0.005 (0.007)	-0.000 (0.000)	-0.013*** (0.002)	0.027* (0.015)	0.007 (0.008)
<i>Urban</i>	0.115*** (0.041)	0.132 (0.221)	1.325** (0.637)	-0.013 (0.221)	0.123*** (0.040)	0.171 (0.213)	1.327** (0.637)	0.217 (0.296)
<i>Full-time</i>	0.503*** (0.102)	-0.127 (0.321)	1.001 (0.738)	0.436 (0.325)	0.503*** (0.099)	-0.230 (0.350)	1.177 (0.874)	0.453 (0.375)
<i>Children</i>	-0.049 (0.039)	-0.070 (0.115)	0.075 (0.276)	-0.643 (0.506)	-0.050 (0.038)	-0.078 (0.124)	0.095 (0.276)	-0.570 (0.505)
<i>Married</i>	-0.002 (0.054)	0.081 (0.256)	-0.530 (0.463)	0.653* (0.351)	-0.010 (0.055)	-0.039 (0.281)	-0.582 (0.455)	0.643 (0.407)
<i>Size of the household</i>	0.025 (0.018)	0.075 (0.119)	0.033 (0.199)	0.142 (0.129)	0.027 (0.018)	0.075 (0.117)	0.026 (0.188)	0.012 (0.137)
<i>Multiple jobs</i>	-0.494** (0.242)	0.500* (0.255)	-6.484*** (0.811)	-0.344 (0.800)	-0.488** (0.235)	0.613* (0.349)	-6.696*** (0.648)	0.219 (1.072)
<i>Permanent</i>	0.425** (0.169)	0.122 (0.343)			0.461*** (0.155)	0.047 (0.332)		
<i>Micro firm</i>	0.197*** (0.061)	-0.152 (0.240)	-1.133** (0.432)	0.380 (0.495)	0.201*** (0.061)	-0.080 (0.226)	-1.114** (0.464)	0.157 (0.622)
<i>Small firm</i>	<i>Reference group</i>							
<i>Medium and large firm</i>	0.217*** (0.050)	-0.161 (0.253)	-1.608 (1.995)	1.755** (0.862)	0.218*** (0.050)	-0.212 (0.243)	-1.733 (2.098)	0.561 (0.986)
<i>Private</i>	0.006 (0.046)	0.359 (0.944)	1.618 (2.199)		0.002 (0.047)	0.133 (0.716)	1.450 (2.319)	
<i>Hours worked usually</i>	0.006** (0.003)	0.001 (0.011)	0.006 (0.017)	0.015 (0.010)	0.006** (0.003)	0.002 (0.011)	0.004 (0.017)	0.012 (0.012)
Constant	4.184*** (0.319)	4.605** (1.912)	3.317 (3.713)	4.486* (2.267)	5.005*** (0.293)	4.827*** (1.546)	3.087 (3.467)	3.936 (2.633)
Observations	1,927	166	82	58	1,934	167	83	59
F-test (P<0.001)	0.0000	0.0000	0.0349	0.0133	0.0000	0.0000	0.0440	0.2833
R-squared	0.131	0.184	0.375	0.409	0.134	0.201	0.381	0.450

Note: weighted sample

Source: own calculations based on the ULMS 2007 wave

Finally, we run the same regression for the 2012 wave (See **Table 5.6**). “Male” became significant all the categories except for informal employees, demonstrating again even stronger wage premium for males (31% for formal employees, 47% for formal self-employed and 86% for informal self-employed). Age is now significant and positive for formal labour force.

“Urban” is highly significant and positive now for three categories: formal employees, informal employees and informal self-employed. Marital status and having children do not explain our dependent variable. Size of the household is highly positive for informal self-employed, but the small sample size and inconsistency with the previous table raise doubts in interpreting this.

“Full-time” working schedule is highly significant and positive for formal employees and informal self-employed. The same pattern corresponds to “hours usually worked” and “private” status of the firm. “Permanent” work contract is positive and significant only for formal employees. Holding “multiple jobs” does not explain our model. As for the firm size, now the formal employees of medium and large firms have wage premium over small firms and micro-entrepreneurs bear wage penalty. For informal employees and self-employed, we observe only wage penalty for micro-firms.

Education variables behave in a similar way to the results of 2007. The model with “educational attainment” again demonstrates slightly higher significance, suggesting that educational achievement is better valued than duration of schooling and diploma has a signalling impact on the demand side. Returns to education are positive and the highest for formal employees, but not significant for others. Continuous variable of education suggests that, for formal employees, one additional year of education brings on average 9.6 percentage points higher wages and for informal self-employed 9.3, taking other variables constant.

Experience variable is now more significant; it is highly positive for formal employees and informal employees, it is significant and negative for informal self-employed.

Table 5.6. OLS Mincer regression, log monthly income as a dependent variable (2012)

	FE	IE	FSE	ISE	FE	IE	FSE	ISE
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Male</i>	0.314*** (0.039)	0.149 (0.162)	0.471** (0.190)	0.863*** (0.198)	0.309*** (0.039)	0.099 (0.154)	0.467** (0.205)	0.823*** (0.197)
<i>Age</i>	0.027** (0.013)	0.098*** (0.035)	-0.016 (0.058)	0.054 (0.058)	0.026** (0.013)	0.107*** (0.033)	0.035 (0.064)	0.044 (0.055)
<i>Age2</i>	-0.000*** (0.000)	-0.001*** (0.000)	0.000 (0.001)	-0.001 (0.001)	-0.000*** (0.000)	-0.001*** (0.000)	-0.000 (0.001)	-0.001 (0.001)
<i>Education (years)</i>	0.096*** (0.012)	0.006 (0.029)	-0.037 (0.060)	0.093** (0.036)				
<i>At most primary school</i>					0.111 (0.132)	-0.349 (0.384)	1.415** (0.583)	-0.300 (0.407)
<i>Medium school</i>					0.084 (0.097)	-0.075 (0.304)	0.048 (0.262)	0.010 (0.354)
<i>Secondary</i>					<i>Reference group</i>			
<i>Higher education</i>					0.439*** (0.099)	0.221 (0.324)	0.304 (0.351)	0.457 (0.397)
<i>Vocational training</i>					0.350** (0.166)		0.217 (0.418)	
<i>Experience</i>	0.024*** (0.006)	0.053*** (0.017)	0.032 (0.056)	-0.050** (0.023)	0.023*** (0.006)	0.051*** (0.018)	0.030 (0.053)	-0.051** (0.023)
<i>Experience2</i>	-0.000** (0.000)	-0.001** (0.000)	-0.002 (0.002)	0.001 (0.001)	-0.000** (0.000)	-0.001*** (0.000)	-0.001 (0.002)	0.001 (0.001)
<i>Urban</i>	0.164*** (0.035)	0.538*** (0.150)	0.182 (0.167)	0.435** (0.167)	0.179*** (0.036)	0.528*** (0.147)	0.095 (0.181)	0.429** (0.172)
<i>Full-time</i>	0.426*** (0.121)	0.574 (0.388)	-0.034 (0.320)	0.646*** (0.222)	0.414*** (0.125)	0.584 (0.383)	0.043 (0.335)	0.627*** (0.208)
<i>Children</i>	-0.006 (0.026)	0.068 (0.099)	-0.148 (0.123)	0.062 (0.070)	-0.003 (0.026)	0.071 (0.108)	-0.217 (0.150)	0.050 (0.076)
<i>Married</i>	-0.032 (0.043)	0.072 (0.168)	0.089 (0.312)	-0.144 (0.215)	-0.034 (0.042)	0.055 (0.169)	0.120 (0.310)	-0.089 (0.219)
<i>Size of the household</i>	-0.010 (0.016)	0.076 (0.056)	-0.079 (0.086)	0.305*** (0.068)	-0.005 (0.016)	0.065 (0.053)	-0.086 (0.086)	0.293*** (0.061)
<i>Multiple jobs</i>	-0.413 (0.302)	0.442 (0.406)			-0.456 (0.299)	0.165 (0.377)		
<i>Permanent</i>	0.352** (0.143)	-0.035 (0.123)			0.325** (0.135)	-0.066 (0.123)		
<i>Micro firm</i>	-0.170*** (0.060)	-0.304** (0.145)	-0.085 (0.179)	-0.850*** (0.136)	-0.173*** (0.060)	-0.271* (0.139)	0.004 (0.193)	-0.969*** (0.143)
<i>Small firm</i>					<i>Reference group</i>			
<i>Medium and large firm</i>	0.132*** (0.036)	0.036 (0.119)	0.584 (0.444)		0.142*** (0.037)	0.042 (0.126)	0.511 (0.511)	
<i>Private</i>	0.116*** (0.038)	0.166 (0.283)		2.437*** (0.408)	0.111*** (0.040)	0.187 (0.280)		2.820*** (0.485)
<i>Hours worked usually</i>	0.006*** (0.002)	-0.002 (0.006)	-0.001 (0.008)	0.014*** (0.005)	0.007*** (0.002)	-0.001 (0.006)	-0.003 (0.008)	0.015*** (0.005)
Constant	4.408*** (0.361)	4.248*** (1.034)	9.172*** (1.563)	1.055 (1.494)	5.516*** (0.343)	4.199*** (0.913)	7.373*** (1.483)	2.103 (1.387)
Observations	1,827	157	95	115	1,827	159	95	115
F-test (P<0.001)	0.0000	0.0000	0.2491	0.0000	0.0000	0.0000	0.1727	0.0000
R-squared	0.234	0.312	0.228	0.555	0.243	0.340	0.278	0.559

Note: weighted sample

Source: own calculations based on the ULMS 2007

5.5. Conclusions

We use the individual data from the Ukrainian Longitudinal Monitoring Survey for the year 2007 and 2012 in order to investigate the current state of labour market and informal employment in Ukraine by dividing individuals into five employment statuses: formal employee, informal employee, formal self-employed, informal self-employed and unemployed. We show that Ukrainian labour market is quite heterogeneous across the five categories, as regards size of each of these categories, income distribution and personal background characteristics of the individuals.

In 2007 and 2012, according to the official data, informal employment constitutes 22.3% and 24.1% of the total employed population, respectively. The ULMS data demonstrates informal employment for the same years at the level of 14% and 16%. We show that formal labour market participants tend to be older and no single, reside in an urban area, have higher educational attainment, be more experienced and receive higher incomes (especially for self-employed). These three last characteristics are consistent with human capital theory. Interestingly, unemployed are not less educated than informal workers. We also show that the income for formal self-employed is less stable and has the highest dispersion across all labour market segments.

We further design a Mincer earnings function for the Ukrainian labour market. Empirical evidence documents inequality in earnings between formal and informal workers according to various factors, especially education. Education plays an important role for formal employment; moreover, educational achievement in terms of level may be better valued than duration of schooling as the diploma has a signalling impact on the demand side. Education has significant and positive impact on the earnings of formal employees. Experience is also significant and generates higher income, especially in the 2012 wave. Other important factors that determine earnings are urban, working schedule, multiple job holding, firm size, private status of the firm and hours worked.

ETF (2009) points out that the ULMS data are likely to be less reliable than official LFS data because of the smaller size of the sample and the lower response rate, which may explain the variability of some characteristics and the changing nature of some variables. In the first wave of the ULMS, the response rate averaged about 66% for individuals and 87% for households; with unchanging samples, the rate is falling from one wave to another. Furthermore, the ULMS

is not as regular as the LFS. However, the ULMS provides more information than the LFS in order to understand the trajectories of individuals.

One of the main findings of this Chapter is the importance of education for the formally employed population. It suggests that among policy actions in order to decrease informal employment, access to a good quality education (higher learning as well as vocational training) should be improved. Implementing career guidance is an effective measure to assist youth in choosing the right direction among the variety of professional activities. Furthermore, at the State level, an information campaign should promote the formalization of work targeting all the employment categories of employers, self-employed and employees, especially some of the most vulnerable (e.g. women, migrants and unpaid family helps). The registration process for starting a business should be simplified in order to reduce the costs, alongside providing social protection to employees.

Appendix

Table 5.7. Dictionary of variables

Variable	Description
<i>Male</i>	1 – Male 0 – Female
<i>Age</i>	Age of the individual in the year of survey
<i>Married</i>	1 – Registered/non-registered marriage 0 – Single, widowed, divorced, separated;
<i>Size of the household</i>	Number of members of the household
<i>Children</i>	Number of children
<i>Educational attainment</i>	Highest level of education attained: 1 – None or at most primary school; 2 – Medium school; 3 – Secondary school; 4 – Higher education; 5 – Vocational or professional training
<i>Education (years)</i>	Duration of schooling, continuous in years
<i>Urban</i>	1 – Urban: medium town (20 – 99,000), city (100–499,000), large city (over 500,000) 0 – Rural: village, urban settlement, small town (up to 20,000 inhabitants)
<i>Experience (years)</i>	Duration in years: year of survey minus the year when the main job was started
<i>Full-time</i>	1 – Full-time 0 – Part-time, sometimes full-time and sometimes part-time
<i>Multiple jobs</i>	1 – Yes 0 – No
<i>Permanent</i>	1 – Permanent job contract 0 – Otherwise
<i>Private</i>	1 – Private sector 0 – Public sector
<i>Firm size</i>	1 – Micro, 1-9 workers 2 – Small, 10-49 workers 3 – Medium and large, above 50 workers
<i>Hours worked usually</i>	Number of hours usually worked per week by an employee or a self-employed
<i>Hours worked actually</i>	Number of hours actually worked per week by an employee or a self-employed
<i>Labour market status</i>	1 – Formal employee (FE); 2 – Informal employee (IE); 3 – Formal self-employed (FSE); 4 – Informal self-employed (ISE); 5 – Unemployed (U)
<i>Income</i>	Net monthly income for employees; net income for self-employed, in UAH In the 2012 wave for employees to the net monthly income were also added: 13th salary, performance-based bonuses, compensations for non-normal work conditions, profit-sharing, monthly bonuses (as money and in kind), tips and other additional payments.

Chapter 6

Informal vs. illegal economy, earnings and mobility: the case for prostitution

6.1. Introduction

The *Sixth Chapter* comes from Adair & Nezhyvenko (2015) and various versions are published in Adair & Nezhyvenko (2016, 2017 and 2018). In this chapter, we deliberate on one of the most controversial issues, the prostitution. So-called “oldest profession” (Kipling, 1888), it raises moral and economic issues that few philosophers and economists addressed, such as social stigma, health risks and tax evasion. Mandeville (1714, 1724) was a forerunner considering prostitution as a legal trade subject to taxes and advocating regulation for brothels and sanitation for prostitutes (Nacol, 2015). Bentham in 1797, whilst rejecting both open prostitution without control and strict prohibition, proposed decriminalisation of prostitution (Sokol, 2009). The early Malthus (1798, Chapter 1, 14) sketched a theory of sexual impulse and considered prostitution as a preventive check lowering the birth rate and hence adjusting population to resources. In this connection, prostitution is a second best whereas moral restraint is the first best. Malthus (1803, Chapter 2) argues that when a general corruption of morals, with regard to sex, pervades all the classes of society, prostitution is conducive to misery, evil for social happiness, as well as distressful for the prostitutes themselves. Malthus stands for virtue, making it clear that prostitution is a moral offence for both men and women, although he states no conclusive recommendation as regards the population check vs. virtue trade-off. Lecky (1869) contends that virtue, as the basis of moral conduct, is all but dubious, regarding prostitution as a “safety valve” (Stuart Mill, 1870). He supports sanitary measures for prostitutes in order to prevent contagious diseases. In contrast with both Malthus and Lecky, Stuart Mill (1870) denies that prostitution should be regulated on the supply side (that of the women); rather should impulse be tamed thanks to reason on the demand side (that of men). He suggests that the State should prosecute customers on the demand side. He holds that forced medical examination will lead to a great amount of clandestine prostitution. He objects to consigning prostitutes to hospitals against their will. He argues that diseases are not transmitted at first by women but by men. Hence, he advocates abolition.

Since the 1960s, sex and procreation are clearly disentangled and the Malthusian check does not hold anymore, although the plague of AIDS is still underway. Advocacy for free sex including prostitution (Hakim, 2015) confronts the virtuous stance on abolition (Charpenel, 2012), echoing the philosophers and economists whose doctrines inspired current legislation and the various policy regimes regarding prostitution in the European Union (EU). Prostitution is back again on the agenda: the issue is discussed in the EU political arena (Mendes Bota, 2014; Schulze, 2014) and deserves special attention from Eurostat since illegal production is included into the national accounts.

The paper is structured as follows. Section 2 sketches a typology of prostitution regimes in the EU – the prohibition *vs.* regulation *vs.* abolition of prostitution. Section 3 provides an overview of the data sources on the demand-side and the supply-side in order to assess how large is the sex market and employment for sex workers. We calculate Estimate 1, thanks to data from an international NGO checked against other miscellaneous sources, whereas HIV prevalence provides Estimate 2. Section 4 is a focus upon the patterns and magnitude of sexual exploitation trafficking according to Europol, the ILO, Eurostat and the UNODC in 2010; we calculate Estimate 3 from victims of sexual exploitation. Section 5 designs an OLS model to test the Estimates 1, 2 and 3 for prostitution according to GDP per capita, legislation, supply-side and demand-side variables; it also presents an ordered probit that sheds light upon the distribution of countries as for employment figures. Section 6 gauges prostitution as regards GDP enhancement in 2010, with respect to National Accounts adjustment for illegal production as well as from consumption expenditure. Conclusion discusses what might be the most plausible Estimates according to adjusted National Accounts figures.

6.2. A typology of prostitution regimes: prohibition *vs.* regulation *vs.* abolition

Three different policy regimes rule prostitution in the European countries (EU-28): *prohibition*, *regulation* and *abolition* (Jakobsson & Kotsadam, 2013; Mendes Bota, 2014).

As for *prohibition*, prostitution is all but evil and a criminal offence. It makes prostitution illegal as well as the prostitute liable to penalties. Such is the case for four EU Member States: Croatia, Lithuania, Malta and Romania (until decriminalisation in 2013). Among the EU-28, these countries account for 1.63 percent of EU GDP and 5.5 percent of total population in 2010.

As for *regulation*, in line with Mandeville (1724) and Lecky (1869), prostitution is a necessary evil as well as a trade. It refers to where prostitution in brothels is legal, with tax collection from the State and labour contracts for sex workers. Such is the case for four EU Member States that contribute 29.2 percent EU GDP and almost one fourth (23.26 percent) of total population in 2010: Austria, Germany, Greece and the Netherlands.

As for *abolition*, in line with Stuart Mill, sexual exploitation is evil and it should be extinct as well as non-coercive sex trade: prostitution must be banned by criminalising third parties such as pimps and brothels managers, but not the prostitutes themselves. This policy regime refers to the United Nations Universal Declaration of Human Rights (1948). It applies to the remaining 20 EU member states that account for 69.1 percent EU GDP and 71.2 percent of total population in 2010: Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Hungary, Ireland, Italy, Latvia, Luxembourg, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden¹⁴ and the UK.

It is worth mentioning that all three regimes ban human trafficking for sexual exploitation.

Hence, there are two distinct but related approaches concerning prostitution. One addresses the issue of prostitution as legal sex work with a general assumption of rational choice behaviour from sex work (Edlund & Korn, 2002). Hence, this is a market economic activity that deserves thorough analysis in terms of supply and demand as well as estimates with regard to employment and value added. The other one addresses the issue of coercive prostitution in terms of victims of sexual exploitation or forced labour (Kara, 2009); the emphasis is upon illegal trafficking within a given country as well as cross-border migration, which is used as an approximation in order to estimate overall prostitution including both coercive and non-coercive sex work that actually blurs such distinction.

6.3. How large is the sex market in the EU and Ukraine?

It is usually agreed that data on prostitution are scant; hence, experts' calculation is either coined as "guesstimates" or sometimes taken at face value. There are various data sources, among which we can distinguish between qualitative and quantitative surveys issued from primary as

¹⁴ Only the buyer is criminalised. Hence, *neo-abolitionism* may be added to the typology as a fourth regime.

well as secondary sources. They are used to compile the magnitude of employment and value added for national accounts.

6.3.1. The demand side

Although there are large surveys on sexual behaviour in France, Finland and the UK, they do not address the issue of paying for sex (Hakim, 2015). Demand for prostitution is little documented, albeit all studies agree that it comes from men. The issue remains controversial as regards male behaviour. Cho, Dreher, & Neumayer (2013) hold the Malthusian assumption that demand is inelastic, whereas demand is on rise according to Hakim (2015), due to male sexual deficit in Britain (from two per cent to four per cent of men between 1990 and 2000) and Finland (from ten per cent to 14 per cent between 1992 and 1999). On the other hand, the implicit assumption for abolitionists is in line with Stuart Mill contending that demand should and actually can be tamed.

Demand is both domestic and foreign. In Sweden, 80 per cent of men who have paid for sex did so abroad. In the UK, the share is two-thirds of men who paid for sex in the previous five years (Hakim, 2015). Demand depends on cultural patterns that encapsulate the social acceptance of prostitution. In Spain, the rate on men who did pay for sex at least once is three times higher than in Finland and Sweden, and amounts to nine per cent in the UK. See **Table 6.1**.

Data from quantitative surveys apply to five EU countries and date back to the 1990s, mostly before the Internet propelled easy access to sex services. The information relates to the question “did the respondent pay at least once for sex with a prostitute”. Actually, much smaller proportions of men buy sex regularly and they belong to all socio-economic groups.

Table 6.1. Men who bought sex at least once from a prostitute

Country	Percent of men	Sample size (N)	Year
Finland	11	1,103	1992
Finland	13	624	1999
Netherlands	14	392	1989
Spain	39	409	1992
Sweden	13.6	1,475	1996
Sweden	7.9	N/A	2008
UK	5.6	6,678	1991
UK	8.8	5,613	2000

Source: Månsson (2005), Farley, Macleod, Anderson, & Golding (2011)

A pilot study upon a small and non-random sample of clients (Anderson & O’Connell, 2003) has surveyed Denmark (13 interviewees) and Italy (56 interviewees), using control groups and

a survey (including Sweden for 84 respondents). The conclusion is that interview research cannot be taken as providing a snapshot of all forms of demand.

Statistics Denmark (2004) has compiled data regarding the frequency of purchase for prostitution services (25 percent at least once and 28 per cent more than 12 times) and the age groups of customers (46 per cent aged 30-49 and still 18 percent over 60). In England, Sanders (2008) designed 50 in-depth interviews in 2006, whereas in Scotland, Farley et al. (2011) used a sample of 110 men in 2008; these two studies comprise a strong self-selection bias.

What is the share of clients among the 168 million adult male EU population? Presumably, there is only a small share of clients among this population and we ignore what might be the patterns of sexual behaviours, which vary across EU countries and depend upon prices. We return to this issue in the last section of the chapter.

There are various criteria to gauge the market for sexual services depending on their prices, premises and working schedules. Prostitution encapsulates three broad distinct segments that address the customers: the upper tier or luxury prostitution (escorts and call girls); the intermediate category includes indoor prostitution (brothels, bars, clubs, massage parlours, etc.); outdoor or street prostitution is the lower tier.

Havoscope (2015) provides unchecked piecemeal data on prices from 10 EU countries (Bulgaria, Denmark, France, Germany, Greece, Ireland, Italy, Netherlands, Poland and the UK). Wiki Sex Guide (2018) provides better coverage for data on prices from 21 EU countries (Czech Republic, France, Luxembourg, Malta, Slovakia, Slovenia, Sweden are missing). According to the latter source, prices for street prostitution range from €13 up to €63 and €27 is the average price for twelve countries. Regarding brothels, the range is €30-67, with an average price of €45 (eight countries) that stands over one and a half times higher than street prostitution. Escort girls would charge from €37 up to €225 in five countries, with an average price of €125 that stands more than four and a half times as high as street prostitution.

If we assume that these are (net) hourly prices and that prostitutes earn half of the average price, whereas the other half is the pimp's cut. Hence, we may compare with median gross hourly earnings for EU-27 employees in 2010 (Eurostat), namely €11.8. There is a premium as for earnings from street prostitution (€13.5), brothels (€22.5) and escorts (€62.5).

6.3.2. The supply side

Data are less scarce on the supply side. They fuel both direct and indirect measurements. As for direct measurement, there are qualitative surveys upon small non-random samples in three EU countries that have regulatory prostitution regimes. Farley et al. (2003) interviewed 54 sex workers in Germany. Wagenaar, Altink, & Amesberger (2013) interviewed 82 sex workers in Austria and 44 in the Netherlands; they suggest there are no barriers to entry as for brothels and earnings in prostitution are generally low: hourly gross earnings rarely exceeding €8. Proprietors take usually 40-50 per cent from earnings, prescribe dress codes and working hours and make sex workers pay for various services. Hence, the sex worker would get roughly € 1,000 average monthly net earnings. There is only one recent survey addressing the various segments of prostitution from the supply side altogether with a wide range of prices (Adriaenssens & Hendrickx, 2015): it claims that the official figures for prostitution in Belgium are underestimated; we turn to this issue in the last section of the chapter.

Regarding direct measurements, TAMPEP (2007, 2009, 2010), an international foundation defending sex workers, issued a standardised questionnaire among its network, collecting 380 responses from 600 questionnaires sent to key organisations, mostly NGO (56%) and Health Services (22%) in direct contact with sex workers. It helped building up a mapping and reports for 23 EU countries: Austria, Belgium, Bulgaria, Czech Republic, Denmark, Greece, Estonia, Finland, France, Germany, Hungary, Italy, Lithuania, Latvia, Luxembourg, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and the United Kingdom. Croatia, Cyprus, Ireland, Malta and Sweden are missing, and Ukraine is included. Some answers regarding earnings suggest that the questions were misunderstood and estimates were not checked. However, country reports provide data on working conditions and vulnerability, mobility and earnings that we used rather as a qualitative assessment.

As regards location, almost two thirds of sex workers in Europe work indoors (brothels, clubs, bars, parlours, windows and escort). Indoor prostitution makes it less visible, hence more difficult to estimate.

12 EU countries wherein the share of migrants among sex workers is above 50 per cent are net importers; the UK is an outlier. Conversely, 10 EU countries wherein the share of nationals among sex workers is above 50 per cent are most likely to be exporters. One third of migrants came from EU countries in 2008. Romania (12%), Bulgaria (8%), Hungary (4%), Poland (4%), Czech Republic (3%) Slovakia (3%) Latvia (3%), Lithuania (3%) and Estonia (3%) were the most mentioned nationalities. It is worth mentioning Ukraine (7%).

In contrast with nationals that account only for 30 per cent of total number of sex workers, migrant sex workers account for almost 70 per cent. The latter are highly mobile and more vulnerable as regards working conditions and risks (including HIV as well as deportation); two thirds are prone to be exploited by third party (pimps and brothel managers) who retains a larger share of earnings. The figures for nationals are opposite: one third is prone to be exploited by third party.

Table 6.2. Sex workers in the EU according to TAMPEP (2008)

Country	Nationals (% of prostitutes)	Migrants (% of prostitutes)	Dummy	(%) Outdoor prostitution	Number of prostitutes	Year
Austria	N/A	78	<i>Import</i>	15	27,000-30,000	2008
Belgium	N/A	60	<i>Import</i>	34	15,000-20,000	2008
Bulgaria	98	N/A	<i>Export</i>	33	6,000-10,000	2008
<i>Croatia</i>	N/A	N/A	N/A	N/A	N/A	N/A
<i>Cyprus</i>	N/A	N/A	N/A	N/A	N/A	N/A
Czech Rep	59	N/A	<i>Export</i>	19	10,000-13,000	2008
Denmark	N/A	65	<i>Import</i>	25	5,560	2008
Estonia	95	N/A	<i>Export</i>	2	1,000-1,200	2008
Finland	N/A	69	<i>Import</i>	10	5,000-6,000	2008
France	N/A	61	<i>Import</i>	61	18,000-30,000	2008
Germany	N/A	65	<i>Import</i>	13	400,000	2008
Greece	N/A	73	<i>Import</i>	60	10,000	2008
Hungary	75	N/A	<i>Export</i>	40	10,000-15,000	2008
<i>Ireland</i>	N/A	N/A	N/A	N/A	N/A	N/A
Italy	N/A	90	<i>Import</i>	60	50,000	2008
Latvia	88	N/A	<i>Export</i>	40	2,000-3,000	2008
Lithuania	90	N/A	<i>Export</i>	57	1,250-1,550	2008
Luxembourg	N/A	92	<i>Import</i>	30	5,000	2008
<i>Malta</i>	N/A	N/A	N/A	N/A	N/A	N/A
Netherlands	N/A	60	<i>Import</i>	11	10,000-15,000	2008
Poland	66	N/A	<i>Export</i>	40	10,000	2008
Portugal	N/A	56	<i>Import</i>	45	9,700	2008
Romania	98	N/A	<i>Export</i>	64	2,500-3,800	2008
Slovakia	98	N/A	<i>Export</i>	73	7,500	2008
Slovenia	70	N/A	<i>Export</i>	2	1,500-3,000	2008
Spain	N/A	90	<i>Import</i>	46	6,000	2008
<i>Sweden</i>	N/A	N/A	N/A	N/A	N/A	2008
UK	N/A	41	N/A	23	80,000	2008
EU-23	N/A	N/A	N/A	N/A	693,000-730,000	N/A
Ukraine	90	N/A	<i>Export</i>	N/A	50,000-83,000	2006

Source: TAMPEP (2007, 2009, 2010)

From aforementioned TAMPEP data (See **Table 6.2**) including both nationals and migrants, we make an educated guess. It suggests that over one third (36 per cent) of sex workers might be independent from third party although not from family ties and can be considered as self-employed including part-time sex workers. Hence, the overwhelming majority of sex workers is trapped in forced labour. Migrants represent the largest share of sex workers and are more dependent on third party (TAMPEP, 2010).

Table 6.3. Estimates from miscellaneous sources (2010)

Country	Number of adult females (thousand)	Number of prostitutes (circa 2010), TAMPEP	Number of prostitutes (circa 2010), Charpenel	Estimate 1A <i>Maximin</i>	Estimate 1B <i>Minimax</i>	Prostitutes as a % of adult females	
						1A	1B
Austria	2,815.5	27,000-30,000	5,500-10,000	10,000	27,000	0.36	0.96
Belgium	3,555.9	15,000-20,000	10,000-15,000	15,000	20,000	0.42	0.56
Bulgaria	2,535.48	6,000-10,000	8,000-10,000	10,000	10,000	0.39	0.39
Croatia	1,438.29	N/A	6,700	6,700	6,700	0.47	0.47
<i>Cyprus</i>	295.125	N/A	N/A	915	1,446	0.31	0.49
Czech Rep.	3,641.35	10,000-13,000	5,000-25,000	13,000	25,000	0.36	0.69
Denmark	1,800.06	5,560	5,500	5,500	5,500	0.31	0.31
Estonia	459.12	1,000-1,200	1,000	1,000	1,200	0.22	0.26
Finland	1,756.75	5,000-6,000	12,000-15,000	6,000	15,000	0.34	0.85
France	21,197.0	18,000-30,000	18,000-20,000	20,000	30,000	0.09	0.14
Germany	26,628.5	400,000	150,000-400,000	150,000	400,000	0.56	1.50
Greece	3,684.2	10,000	1,200-20,000	10,000	20,000	0.27	0.54
Hungary	3,483.1	10,000-15,000	8,000-10,000	10,000	15,000	0.29	0.43
Ireland	1,543.8	N/A	1,000	1,000	1,000	0.06	0.06
Italy	19,501.4	50,000	50,000-100,000	50,000	100,000	0.26	0.51
Latvia	743.3	2,000-3,000	15,000-20,000	3,000	20,000	0.40	2.69
Lithuania	1,102.8	1,250-1,550	N/A	1,550	1,550	0.14	0.14
Luxembourg	169.06	5,000	N/A	5,000	5,000	2.96	2.96
Malta	141.9	N/A	N/A	467	467	0.33	0.33
Netherlands	5,519.2	10,000-15,000	20,000-30,000	15,000	30,000	0.27	0.54
Poland	13,561.5	10,000	12,000	10,000	12,000	0.07	0.09
Portugal	3,590.1	9,700	28,000	9,700	28,000	0.27	0.78
Romania	6,899.5	2,500-3,800	2,000-23,000	3,800	23,000	0.06	0.33
Slovakia	1,941.3	7,500	N/A	7,500	7,500	0.39	0.39
Slovenia	688.4	1,500-3,000	N/A	1,500	3,000	0.22	0.44
Spain	15,653.1	6,000	300,000-400,000	300,000	400,000	1.92	2.56
Sweden	3,000.7		1,500	1,500	1,500	0.05	0.05
UK	20,769.0	58,000-80,000	80,000-100,000	80,000	80,000	0.39	0.39
<i>EU-28</i>	168,116.1	693,000-730,000	740,400-1,253,700	747,970	1,309,634	0.44	0.78
Ukraine	16,739.8	50,000-83,000	50,000-83,000	50,000	83,000	0.30	0.50

Source: TAMPEP (2007, 2010), UNODC (2014), Charpenel (2012)

In order to do justice to other estimates and fill in the vacuum for the five missing countries, we picked up the estimates from the abolitionist Scelles foundation (Charpenel, 2012) and the UNODC (2014). It is worth noticing that there are not only discrepancies between estimates from the various sources, but there is also a wide gap as regards the lower bound vs. the upper bound for some countries (for instance, Romania). We compiled all estimates whatever sources

for 26 EU countries and completed the missing figures for Cyprus and Malta with the median value of the 26 EU countries. We first calculated the highest of the lowest (maximin) figures for EU-28 and came up with Estimate 1A amounting to 748,000 prostitutes in EU-28. When calculating the lowest of the highest (minimax) figures for EU-28, Estimate 1B amounts to 1,310,000 prostitutes, which is 75 per cent higher. For Ukraine, according to Estimate 1A, the number of prostitutes reaches 50,000 and according to Estimate 1B, to 83,000. See **Table 6.3**.

As a share of adult females, prostitution in the EU-28 and in Ukraine (between 0.44-0.78% for EU-28 and 0.3-0.49% for Ukraine) is well below one percent on average with respect to estimates. As for Estimate 1A, 18 countries are above EU-28 average, whereas for Estimate 1B there are 17 countries – almost the same save the Netherlands.

6.3.3. Prostitution and HIV prevalence: a tentative estimate

We assume that sex workers are overwhelmingly females (90%); hence, we do not address male and transgender prostitution that nevertheless does exist.

In **Table 6.4**, we estimate the number of female sex workers using an indirect measure from HIV prevalence. According to data collection, HIV prevalence stands as the best indicator for approximating the number of sex workers, compared with other sexual transmitted infections such as syphilis, gonorrhoea and chlamydia (ECDC, 2014). There are two series of data: in the first series, data for 23 EU countries and Ukraine relate either to 2000 or 2004 (Vandepitte et al., 2006); after adjusting for missing data with the median value of HIV prevalence in the EU (0.5 per cent), the number of females sex workers is below one million. In the second series, data for 24 EU countries and Ukraine relate to 2011 (Prüss-Ustün et al., 2013); after adjusting for missing data with the median value of HIV prevalence in the EU (0.3 per cent), the number of females sex workers shrinks to slightly over half a million. In as much as the former magnitude is almost 50 per cent higher than the latter one, such difference over the 2000s decade is puzzling.

Table 6.4. Estimate of female sex workers from HIV prevalence (2011 and early 2000s)

Country	Female +15 years old (2011)	Female sex workers as a % of females +15 years old (2011)	Estimate 2A Number of female sex workers (2011)	Female sex workers as a % of females + 15 years old (early 2000s)	Estimate 2B Number of female sex workers (early 2000s)
Austria	2 831 855	0.5 (2009)	14 160	1.0 (2000)	28 319
Belgium	3 599 767	0.2 (2011)	7 200	0.4 (2000)	14 399
Bulgaria	2 500 139	0.3 (2011)	7 500	0.6 (2000)	15 001
Croatia	1 438 394	0.2 (2006)	2 877	0.5 (2000)	7 192
<i>Cyprus</i>	304 272	N/A (0.3)*	913	N/A (0.5)*	1 521
Czech Rep	3 622 042	0.2 (2005)	7 244	0.4 (2004)	14 488
Denmark	1 801 669	0.2 (2006)	3 603	0.4 (2000)	7 207
Estonia	455 730	0.5 (2006)	2 278	1.1 (2004)	5 013
Finland	1 753 497	0.1 (2009)	1 753	0.3 (2000)	5 260
France	20 608 570	0.1 (2006)	20 608	0.2 (2000)	41 217
Germany	26 666 646	0.7 (2006)	186 666	1.4 (2000)	373 333
Greece	3 676 071	0.2 (2006)	7 352	0.4 (2000)	14 704
Hungary	3 472 528	0.3 (2000)	10 417	0.6 (2004)	20 835
<i>Ireland</i>	1 539 528	N/A (0.3)*	4 818	N/A (0.5)*	7 698
Italy	19 567 814	0.2 (2006)	39 136	0.4 (2000)	78 271
Latvia	724 906	0.7 (2007)	5 074	1.5 (2004)	10 874
Lithuania	1 063 308	0.4 (2008)	4 253	0.7 (2000)	7 443
Luxembourg	172 648	0.2 (2008)	345	0.4 (2000)	691
<i>Malta</i>	141 449	N/A (0.3)*	424	N/A (0.5)*	707
Netherlands	5 538 148	0.3 (2002)	16 614	0.6 (2000)	33 229
Poland	13 580 266	0.3 (2006)	40 741	0.6 (2004)	81 482
<i>Portugal</i>	3 582 038	N/A (0.3)*	10 746	N/A (0.5)*	17 910
Romania	6 866 235	0.4 (2006)	27 465	0.8 (2004)	54 930
Slovakia	1 938 685	0.2 (2006)	3 877	0.4 (2004)	7 755
Slovenia	689 707	0.7 (2004)	4 828	1.4 (2004)	9 656
Spain	15 637 867	0.3 (2008)	46 914	N/A (0.5)*	78 189
Sweden	3 006 611	0.05 (2007)	1 503	0.1 (2000)	3 007
UK	20 882 796	0.3 (2006)	62 648	0.5 (2000)	104 414
<i>EU-28</i>	168 316 690	0.3*	541 957	0.5*	841 583
<i>Ukraine</i>	16 746 093	0.2 (2009)	33 492	0.4 (2004)	26 944

* Median value

Source: Prüss-Ustün et al. (2013), Vandepitte et al. (2006)

Difference may be due to calculation. Prüss-Ustün et al. (2013) calculate their ratio upon total female population aged 15 and over, whereas Vandepitte et al. (2006) calculate their ratio upon female population aged 15-49, which is consistent with the fact that most prostitutes belong to young age groups albeit a restrictive assumption (ECDC, 2014).

Prostitution patterns did change throughout the decade, although it proves difficult to assume that HIV prevalence captures this change. HIV prevalence in the EU remains roughly stable from the early 2000s (Likatavicius & van de Laar, 2011), whereas data collection and HIV reporting improved over time (ECDC, 2014). The decline in numbers may be driven by a shift in risk behaviour (i.e; safer sex practices) from prostitutes alongside with the extension of indoor prostitution. In contrast, the conditions of sexual encounters did deteriorate due to the

increasing share of migrants among street prostitutes. It is uneasy to measure to what extent safer sex practices (condom use) offset risky ones (no use of condom).

Last, legislation upon prostitution and enforcement influence the supply side. In this respect, Sweden banned buying sex in 1999 that harmed the supply side, whereas the regulatory prostitution regime enacted in the Netherlands (2000) and Germany (2002) promoted sex work. Hence, the number of prostitutes should have increased over the 2000s. Competition among prostitutes do affect price elasticity but not their number.

We have no clue to decide whether the early 2000s series overstate the magnitude of sex work or that the 2011 series understate it, although this may be the case. However, the former estimate is mixing dates and encapsulating more missing data. The latter estimate from 2011 series is much closer to our reference year (2010) and it is more consistent; hence, it stands as our Estimate 2A and amounts to some 542,000 of prostitutes in EU-28 and 33,000 in Ukraine. Our Estimate 2B amounts to some 842,000 or prostitutes in EU-28 and 27,000 in Ukraine.

6.4. Sexual exploitation trafficking and forced labour in the EU

6.4.1. Estimate of prostitution from sexual exploitation

Sexual exploitation trafficking is a subsample of overall prostitution and it has been used to provide indirect measurement of the latter.

Europol (2011), the ILO (2012a), Eurostat (2013b) and UNODC (2014) provide fragmented information on the patterns of prostitution and its magnitude in the EU. All these sources assert that trafficking for sexual exploitation is the most common form of human beings trafficking. Data available across countries cover the characteristics of victims and trafficking routes. The main limitation of data is that recording depends on judicial and police effectiveness. Databases do not collect necessarily from the same source: neither UNODC nor Eurostat collect primary sources, whereas Europol does and the ILO collects data from both primary and secondary sources (Vermeulen, Balcaen, Di Nicola, & Cauduro, 2006).

6.4.1.1. Estimate of forced sexual labour trafficking from the ILO

The ILO (2009) designed from experts a list of 67 indicators related to trafficking with respect to recruitment, working conditions and coercion. The subset of indicators for sexual exploitation encapsulates very bad working conditions (including excessive working time and

hazardous work), low or no salary (including wage manipulation) and no compliance with labour regulations (including the absence of contract signed and social protection). This leaves room for non-coercive prostitution (including casual activity) that is not related to sexual exploitation. In this connection, non-coercive prostitution is similar to undeclared work or informal employment as defined by the ILO (2003a).

The ILO (2012a) computed a global estimate of forced labour for the 2002-2011 reference period from a capture-recapture investigation based on reported cases from different sources (research institutes, NGOs and the media).

Box 6.1. Computation of the ILO's estimate

T_i is the estimate of forced labour in country i based on a national survey with reference period t_i . The estimate refers to the total number of persons who experienced forced labour at some time during the t -year reference period of the survey. The corresponding number for a ten-year reference period (120 months) is $(120/\mu_i)T_i$, where μ_i is the average duration in forced labour, measured in months, for country i .

The comparison of the adjusted survey result with the capture-recapture estimate for the corresponding country provides an estimate of the share of reported number of victims in total forced labour in that country.

Conforming to these estimates, there are some 880,000 victims of forced labour in Europe, among which 270,000 (30 per cent) are enslaved in sexual exploitation, which does not cover up the overall magnitude of prostitution. Forced sexual exploitation is mostly affecting women (98 per cent) and the average duration is less than 18 months for commercial sexual exploitation. As for the prevalence of forced labour, the ratio is highest in the Central and South-Eastern Europe regions (4.2 victims per 100,000 inhabitants) and lowest in the European Union (1.5 victims per 100,000 inhabitants).

This we regards as our Estimate 3A, but it does not gauge the magnitude of overall prostitution.

6.4.1.2. Estimate of sexual exploitation trafficking from the Eurostat-UNODC

The United Nations Protocol to Prevent, Suppress and Punish Trafficking in Persons, Especially Women and Children, coined as the Palermo Protocol (2000) sets the minimum standards for the elimination of trafficking of human beings in terms of prosecuting traffickers and supporting victims. The United Nations Office on Drugs and Crime (UNODC) is in charge of the implementation and records the victims (UNODC, 2014).

Table 6.5. Victims of sexual exploitation and prevalence in the EU (2010)

EU Member States	Number of inhabitants (100,000)	Compliance with Palermo Protocol	Number of victims of sexual exploitation 2010 (Eurostat)	Average number of victims: sex exploit. over period (UNODC)	Number of victims: sex exploit. 2010 (Eurostat or UNODC)	Number of victims: sex exploit. /100,000 inhabitants	Estimate 3B Prostitution extrapolated from victims of sexual exploitation (x20x7)
Austria	83,751	Tier 1	N/A	49	49	0.585063	6,860
Belgium	110,006	Tier 1	43	N/A	43	0.390886	6,020
<i>Bulgaria</i>	73,694	<i>Tier 2</i>	366	406	366	4.966462	51,240
Croatia	42,898	<i>Tier 2</i>	2	6	4	0.093243	560
<i>Cyprus</i>	8,397	<i>Tier 2</i>	24	24	24	2.85799	3,360
Czech Rep.	104,867	Tier 1	3 (15)	36	45	0.429114	6,300
Denmark	55,606	Tier 1	50	70	50	0.899179	7,000
<i>Estonia</i>	13,296	<i>Tier 2</i>	N/A	16	20	1.504144	2,800
Finland	53,752	Tier 1	26	20	26	0.483696	3,640
France	649,787	Tier 1	726	702	726	1.117289	101,640
Germany	817,516	Tier 1	610	419	610	0.746163	85,400
Greece	111,233	<i>Tier 2</i>	N/A	69	71	0.638295	9,940
Hungary	99,857	<i>Tier 2</i>	5	68	48	0.480686	6,720
<i>Ireland</i>	45,708	Tier 1	56	44	56	1.225147	7,840
Italy	593,646	Tier 1	N/A	61	57	0.096017	7,980
Latvia	20,746	<i>Tier 2</i>	4	4	4	0.192808	560
Lithuania	30,525	<i>Tier 2</i>	N/A	15	13	0.425868	1,820
<i>Luxembourg</i>	5,118	Tier 1	6	N/A	6	1.172241	840
Malta	4,149	<i>Tier 2</i>	4	N/A	4	0.963881	560
<i>Netherlands</i>	166,558	Tier 1	749	900	749	4.496932	104,860
Poland	380,622	Tier 1	N/A	169	169	0.444004	23,660
Portugal	105,727	<i>Tier 2</i>	N/A	10	17	0.160791	2,380
<i>Romania</i>	201,990	<i>Tier 2</i>	482	520	482	2.38625	67,480
Slovakia	53,924	Tier 1	21	13	21	0.389434	2,940
<i>Slovenia</i>	20,501	Tier 1	30	22	30	1.46328	4,200
Spain	466,671	Tier 1	1605	207	1,605	3.439248	224,700
Sweden	9,41557	Tier 1	19	34	19	0.201793	2,660
UK	630,225	Tier 1	170	173	170	0.269745	23,800
EU-28	5,044,944		4,98	4,057	5,484	1.161416	767,760
<i>Ukraine</i>	455,98	<i>Tier 2 WL</i>	N/A	234	234	0.511151	32,760

Source: our compilation from Eurostat (2013b) and UNODC (2014)

The Palermo Protocol entered in force in 2003. It states that exploitation of prostitution and trafficking cannot be separated, albeit it does not apply to non-coercive prostitution. In this connection Tier 1 gathers the 17 EU Member States that fully comply with the minimum standards (Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Poland, Slovakia, Slovenia, Spain, Sweden and the UK). The

remaining 11 EU Member States that do not fully comply and belong to Tier 2 (Bulgaria, Croatia, Cyprus, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Portugal and Romania), Ukraine belongs to Tier 2 Watch List¹⁵. Tier 2 gathers countries from three-policy regimes as regards prostitution. See **Table 6.5**.

6.4.2. Factors and patterns of sexual exploitation trafficking in the EU

According to Europol (2011), there is active rotation of women forced into prostitution. It aims at triggering the demand from clients and exploring new markets, whilst avoiding victims establishing relationships, hence law enforcement detection of trafficking offences. Detection becomes more difficult with new trends such as the move to semi urban and rural areas and the use of private accommodation for purchased sex activities. Although they are likely to be former victims themselves, female offenders organise the trafficking for sexual exploitation in increasing proportion. Victims of trafficking are recruited with false promises of well-paid jobs or a better life and marriage. The criminal groups operate within family networks and/or ethnic communities that recruit women from the same background; they use widespread contacts in Europe to exploit victims in more than one country, thanks to low cost airlines.

Eurostat (2013b) collected data on human beings trafficking over the period 2008-2010. It is acknowledged that the EU currently lacks reliable and comparable statistical information on trafficking in human beings. This is mainly due to the differences between the Member States in the criminal codes, in the reporting and monitoring systems as well as for the rates of reporting cases to the police, NGOs and other entities.

In the year 2010, 24 EU Member States reported a total number of 9,528 identified and presumed victims of trafficking, whereas the total number of identified victims is 5,535. Data are broken down between other forms of forced labour and sexual exploitation, which amounts to the largest share of victims (62%) that are predominantly female (96%). Sexual exploitation includes all forms of forced prostitution whether indoor or outdoor. Most victims detected in EU Member States are citizens from Romania and Bulgaria. Suspected traffickers for sexual exploitation represent approximately 84 % of the total number of suspected traffickers over the three reference years.

¹⁵ Tier 2 Watch List has following characteristics: a) The absolute number of victims of severe forms of trafficking is very significant or is significantly increasing; b) There is a failure to provide evidence of increasing efforts to combat severe forms of trafficking in persons from the previous year; or c) The determination that a country is making significant efforts to bring itself into compliance with minimum standards was based on commitments by the country to take additional future steps over the next year.

UNODC (2014) provides some similar patterns for the period 2010-2012, focusing on economic gains involved in exploiting people, domestically or abroad. According to the gap with the origin country, the richer the destination country, the higher the profits sexual exploitation can generate, and the more the exploiter is willing to invest for a victim to be exploited there. The price of women depends on the expected profit and the perceived risk associated with carrying out the crime, as well as the demand for sex services in the destination country.

There is a significant and strong positive correlation of GDP per capita for the year 2011 and the share of the victims trafficked from outside of the region of detection. According to the shares of citizenships of foreign victims detected at destination, regional trafficking within the region is over three times higher than transregional trafficking. Geographical aggregation of European countries (here restricted to EU Member States) helps sorting out four sub regions. Western Europe (54.2 percent of EU population) comprises Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Luxembourg, the Netherlands, Sweden and the UK. Southern Europe (25.3 per cent of EU population) includes Cyprus, Greece, Italy, Malta, Portugal and Spain. Central Europe (14.2 per cent of EU population) gathers the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia. The Balkans (6.1 percent of EU population) account for Bulgaria, Croatia and Romania. According to Gravity Models that may explain half of the migration flows, cross-border flows detected in Western and Central Europe is an increasing function of the size of the countries of origin and destination, whereas population mobility is a decreasing function of distance (as the inverse of geographical proximity). Domestic trafficking accounts for about one fourth of the total number of victims detected in Western and Central Europe. Adding up sub-regional cross-border trafficking to domestic trafficking, over six in 10 victims detected in Western and Central Europe are citizens of countries within the sub-region. As for the more affluent countries in Western and Southern Europe, domestic trafficking accounts for 16 per cent of the total number of detected victims, four per cent from Europe cross-border and 40 per cent from Central Europe and the Balkans. In Central Europe and the Balkans, domestic trafficking accounts for about 80 per cent of the detected victims in accordance with previous finding (TAMPEP, 2010).

Box 6.2. Ukraine: a flourishing domestic market and export source for prostitution

The case study of Ukraine is especially interesting. First, it is the largest populated Eastern country that may become a candidate to enter the European Union. Second, despite it stands among the very few countries that prohibit prostitution, Ukraine experiences a large domestic market for prostitution. Last, it is one of the largest export source of prostitution to the EU.

In Ukraine, prostitution was criminalized until 2006 when criminal responsibility for prostitution was abolished and criminal responsibility for pimping and involving a person into prostitution was reinforced. Now prostitution in Ukraine is not a criminal offence and has semi-legal status as sex workers could be fined for receiving payments for sex and susceptible to an administrative offence.

In the Soviet Union prostitution was a taboo, thus not recognised, only in 1987 some laws prohibiting prostitution were introduced by the Soviet codes as well as by the Supreme Court of Ukraine.

Sex market in Ukraine is segmented, according to information collected from the Internet on corresponding web-sources and from the newspaper articles at the moment of research. The price range is €7.5 per hour for street sex workers, whereas “elite” prostitutes earnings top at €30.

According to the UNODC (2015), Ukraine belongs to the Tier 2 Watch List countries: (i) the **absolute number of victims** of severe forms of trafficking is very significant or is significantly increasing; (ii) there is a **failure to provide evidence of increasing efforts** to combat severe forms of trafficking in persons from the previous year. In 2010, Ukraine “improved” the rating by moving from “Tier 2 Watch List” to “Tier 2” where the country stayed until 2012, and in 2013 Ukraine was moved again to the “Tier 2 Watch List”.

The Ministry of Internal Affairs of Ukraine recorded for 2010 257 facts of human trafficking and 277 persons became victims of human trafficking, including 204 women, 73 men and 41 children (Cabinet of Ministers of Ukraine, 2012). This figure is slightly below the number of victims of human trafficking in Ukraine for 2010 – 366 among which over four out of five being females, according to the Joint United Nations Programme on HIV and AIDS (UNAIDS, 2013). On the other hand, the International Organisation of Migrations (IOM, 2014) records a number of victims of human trafficking for 2010 that is four or at least three times higher: 1085 victims were identified on the territory of Ukraine, among which over 36 percent for sexual exploitation.

Although Ukraine ratified all conventions, the implementation of the national policy on combating human trafficking falls short in allocating appropriate resources to conduct investigations, protect victims and prosecute offenders (Ministry of Social Policy of Ukraine, 2015). The criminal verdicts are reached in less than quarter of cases. It is difficult on official statistics as for human trafficking and prostitution because “the police are mostly associated in detecting small and insignificant facts of criminal activity of human trafficking. Long lasting criminal activity of organized groups on an international level is ignored” (Levchenko, 2012). The General prosecutor reports only 39 cases (19 females and 20 males), and just 16 individuals were convicted of trafficking in persons in 2010, whereas the number of victims of human trafficking in Ukraine for 2010 is either 277, 366 or 1085 according to the aforementioned sources (UNAIDS, 2013; IOM, 2014).

According to the SSSU (2014b), in 2010 the main EU countries of destination for the Ukrainians were Germany (50%), Czech Republic (19%), Spain (11%), Italy (5%) and Poland (5%). The International Women’s Rights Centre “La Strada-Ukraine” reports that most phone calls they received in 2010 (46%) were regarding job arrangement abroad. Germany is a main destination country for Ukrainians. Among

Ukrainian job-seekers in Germany in 2010, 73 per cent of them were women, and this number has a slightly growing trend (Bundesamp fur Migration und Fluchtlinge, 2014). Ukraine is often mentioned as one of the main providers of prostitutes to the Western countries.

Among the detected victims trafficked to EU countries, sexual exploitation is prevalent (66.25%). Although Western and Central Europe, especially the EU Member States do reach the worldwide highest score with respect to deterrence, half of suspected offenders is prosecuted and about 30 per cent are convicted in the first instance.

6.4.3. The magnitude of sexual exploitation in the EU-28 and Ukraine

We compared and compiled data for victims of sexual exploitation in 2010 from (Eurostat, 2013b) and UNODC (2014). **Table 6.5** reports the numbers of victims for EU countries and Ukraine. With regard to consistency, we first checked both series of data for the same 18 EU countries; the data do not match for Spain. We computed the missing data thanks to the average share of victims according to the UNODC series. At last, we completed the series for all 28 EU countries, using Eurostat series when available and UNODC otherwise. It is worth noticing that some large countries such as Italy and Poland did not provide data although they belong to the Tier 1 Palermo Protocol. We calculated the “Number of victims/100000” by dividing “Number of victims of sexual exploitation in 2010” (sixth column) per “Population in 100,000 in 2010” (second column).

In the EU-28, the average number of victims of sexual exploitation is over one (1.16) for a thousand hundred inhabitants in 2010. Bulgaria, Estonia, and Romania are the countries of Central Europe and the Balkans, alongside Cyprus that do not fully comply with the Palermo Protocol and stand above average; such is also the case for Slovenia that is compliant. Fully compliant countries from Western and Southern Europe such as Ireland, Luxembourg, the Netherlands and Spain also stand above average; France is pretty close to average. Ukraine (with the average of 0.51) that does not comply with the Palermo Protocol, stands below EU-average.

According to UNODC (2010) the detection ratio is one in 20 victims of sexual exploitation trafficking and one sex worker in seven would be a trafficking victim¹⁶. If we use these figures, there would be a flow 100,000 victims for sexual exploitation in the EU-28 in 2010 (5,000

¹⁶ Transcrime (2002) suggests a multiplier of 20 for every victim detected, which comes from a pilot survey tested in Spain, Italy and Finland. The share of victims among sex workers remains unexplained.

recorded victims times 20) and over 750,000 sex workers. However, UNODC calculates a stock from a flow, ignoring how large is the flow that leaves the market (replacement) or just moves across countries. If net inflow increases, the stock of prostitutes may be rising over time and this should lower prices, unless there is an increase in demand.

We apply the multiplier (times 20 times seven) to the number of victims of sexual exploitation in each country and extrapolate the magnitude of prostitution (See last column in table): we come up with an overall figure of 767,760 prostitutes for EU-28 and 32,760 for Ukraine, which is our Estimate 3B. Some results are obviously absurd as regards country distribution: for instance, Germany counts less prostitutes than the Netherlands albeit five times larger a population. Hence, one may be very sceptical as for the accuracy of such a proxy to gauge prostitution at country level (Savona & Stefanizzi, 2007).

6.4.4. Prostitution, employment and informal employment in 2010

Prostitution as any other activity falls within the employment framework designed by the ILO (2013a) in order to compile informal employment. Informal employment gathers employees as well as self-employed within the formal and the informal sector (Husmanns, 2004a). Employees are considered to have informal jobs if their employment relationship is, in law or in practice, not subject to national labour legislation, income taxation, social protection or entitlement to certain employment benefits (advance notice of dismissal, severance pay, paid annual or sick leave, etc.).

The reasons may be the following: non-declaration of the jobs or the employees; casual jobs or jobs of a limited short duration; jobs with hours of work or wages below a specified threshold; employment by unincorporated enterprises or in households; jobs where the employee's workplace is outside the premises of the employer's business; or jobs for which labour regulations are not applied, not enforced, or not complied with for any other reason. As for self-employed (unincorporated enterprises), their job is informal in as much as it is not registered, escaping both income taxation and social security contribution payment.

The EU countries do not compile informal employment. The absence of a fixed contract may provide a proxy for informal employment; in this connection, it applies to both the employees with a limited duration contract and to self-employed.

Sex workers do not usually have a fixed contract ensuring that they benefit from labour and social regulations, although they may have a job in massage parlours or other legal activities. In as much as prostitutes are considered as self-employed workers without fixed contract,

regardless they are trapped in (illegal) forced labour or practice (legal) non-coercive sex work, they are informal workers.

Table 6.6. Estimate of sex workers as a share of employed females without fixed contract

Country	1A (Maximin)	1B (Minimax)	2A (HIV prev.)	2B HIV prev.)	3B (UNODC)
EU-28	748,000	1,310,000	542,000	841,583	768,000
Ukraine	50,000	83,000	33,492	26,944	32,760
Prostitution as a share of employed females without a fixed contract, %					
EU-28	0.034	0.060	0.024	0.039	0.035
Ukraine	0.031	0.051	0.020	0.016	0.020

Note: females without a fixed contract in EU-28 – 21.797 million, in Ukraine – 1.6 million.

Source: our compilation from Eurostat (2011) and SSSU (2011). Rounded percentages

As regards informal employment, sex workers should be (are) included in total employed females. In as much as they are not considered officially as wage earners, sex workers belong to the category of self-employed females. However, most of them are employees without a fixed contract. Adding these two categories, we come up with a broad category of employed females without a fixed contract, as a proxy for informal workers. There are 21.797 million females without a fixed contract among 101.136 million employed females as for 2010 the EU-28: one female worker out of five. For Ukraine, we use the number of females employed in informal sector without a fixed contract, SSSU (2011) estimates it as 1.639 million. See **Table 6.6**.

6.5. Testing the estimates of prostitution

6.5.1. Literature review

The literature review as regards the economics of prostitution is scarce and three papers address the issue of sexual exploitation trafficking we briefly review.

First, Akee, Bedi, Basu, & Chau (2011) use a game-theoretic model to explore three characteristics of the human trafficking market – the cross-border ease of mobility of traffickers, the relative bargaining strength of traffickers and final buyers, and the elasticity of buyers' demand. They estimate upon a sample of 190 countries a gravity model of trafficking depending on GDP per capita and distance as well as governance indicators. Results show some evidence that domestic and foreign enforcement do mutually reinforce one another, due to ease of mobility, there is partial bargaining power, and demand is inelastic. They find that legalised prostitution exerts no effect on human trafficking in a two-country pairs cross-sectional sample (country source to host country); whereas using instrumental variables shows there is a negative effect on human trafficking. Cho et al. (2013) point out that the issue of legal prostitution as such is not addressed, because the authors implicitly and wrongly assume that such legalisation

is equivalent to weak enforcement of anti-trafficking laws, whereas human trafficking is illegal even if prostitution is legal.

In contrast, Jakobsson & Kotsadam (2013) find a positive effect of legal prostitution on human trafficking in a cross-sectional dataset of 31 European countries. Using the ILO and UNODC datasets, they investigate the relationship between legislation on prostitution and the prevalence of trafficking. They find that the sexual exploitation trafficking of women is least prevalent in countries where prostitution is illegal, most prevalent in countries where prostitution is legal, and in between in those countries where prostitution is legal but procuring illegal. Case studies of Norway and Sweden that have criminalised buying sex support the possibility of a causal link from harsher prostitution laws to reduced trafficking.

Cho et al. (2013) address the effect of legalising prostitution on the demand, supply, and thus equilibrium quantity of prostitution upon a global dataset of 150 countries. On the demand-side, some clients will be deterred from consuming commercial sex services if prostitution is illegal. Hence, legalising prostitution will increase demand for prostitution. On the supply side, legalising prostitution will induce some potential sex workers (or their pimps) to enter the market, those who were deterred from offering such services by the threat of prosecution. Supply might decline due to tax collection from legalised prostitution, whereas illegal prostitution pays no taxes. However, those unwilling or unable to operate legally (including tax payment), can continue to operate illegally. Before, their business was illegal because prostitution was illegal; now their business is illegal, due to their tax evasion in the shadow economy. Authors argue that theoretically the legalisation of prostitution has two opposite effects on the incidence of trafficking, a substitution effect away from trafficking and a scale effect increasing trafficking. Hence, the overall effect is theoretically indeterminate and becomes an empirical issue.

6.5.2. Methodology and results: an OLS model

Our OLS regressions are based on cross-section data for 28 and 29 countries (EU-28 plus Ukraine), referring to the year 2010.

We test the following model:

$$y_i = \alpha + \beta_1 Prostitution_i + \beta_2 Brothels_i + \beta_3 X_i + \varepsilon_i \quad [6, 1]$$

Where y_i represents the various estimates for sex work in country i : Estimates 1A and 1B from miscellaneous sources, Estimates 2A and 2B from HIV prevalence and Estimate 3B for reported

number of victims of sexual exploitation. *Prostitution* is our dummy variable indicating whether prostitution is legal or not. *Brothels* is the dummy variable indicating whether brothels are legal or not. X is the vector of explanatory variables and ε is the error term (See **Table 6.15** in the Appendix for the dictionary of variables).

We inspired from Cho et al. (2013) as well as Jakobsson & Kotsadam (2013) for the variable *Prostitution_i*. We test both legal status either prostitution or brothels in country i , by testing two dummy variables. First, whether or not prostitution is legal, being 1 in this case and 0 otherwise; second, whether or not third-party involvement (such as brothel manager or pimp) is legal, being 1 in the case that brothels are legal and 0 otherwise. In both cases, the sign is expected to be positive.

We impute a number of *explanatory country* variables X^{17} . *GDP per capita* takes into account the level of economic development that should influence the presence of a high number of sex workers. We include *Total adult population* to take into account the scale effect and we disentangle *Adult female population* on the supply-side from *Adult male population* on the demand-side. Focusing on the supply side, *International female migrant stock per 100 thousand of population* takes into account the importance of female migration in Western and Southern European countries; its sign is expected to be positive. *Unemployment rate of females younger than 25 years* tackles the assumption that the higher is unemployment, the more women may become sex workers; its sign is expected to be negative. *Rate of female part-time workers* tackles the assumption that prostitution may be a part-time job; its sign is expected to be negative. *Control of corruption* and *Tier* are, respectively, the indicators for countries government effectiveness and compliance with the Palermo protocol. Regarding *Sub-region_i*, the divide between rich Western and Southern Europe and poorer other countries from Eastern Europe (including the Balkans) is designed to catch the imbalance between net sex importers and net sex exporters.

As we use a cross-section dataset, we cannot control for unobserved country heterogeneity by including country fixed effects.

Our sample comprises two series: one for EU-28 (28 countries) and the other one includes Ukraine (29 countries).

¹⁷ In order to design the best models we run numerous regressions with several different variables such as the size of households, urbanisation, Internet use, earnings, educational attainment, status in employment and rate of activity for females. All variables regressions are available upon request.

The variables *Legal prostitution* and *Legal brothels*, *Adult female population* and *Adult male population* as well as *Total adult population*, *Control of corruption* and *Tier* were tested separately to avoid multicollinearity. All continuous variables were taken in logarithms.

Eventually, we dropped *Control of corruption* and *Tier* and well as *Sub-region_i*, which were relevant only for Estimate 3B and proved insignificant.

We ranked Estimates according to correlation coefficient and the number of significant variables. Our ranking is as follows: Estimates 2A, 2B, 1A, 1B and 3B (See **Table 6.7** and **Table 6.8**).

Table 6.7. Testing the estimates with the OLS model, 28 EU countries

Variables	Estimate 2A	Estimate 2B	Estimate 1A	Estimate 1B	Estimate 3B
	HIV preval.	HIV preval.	<i>Maximin</i>	<i>Minimax</i>	Victims
<i>GDP per capita</i>	-0.849***	-0.876***	0.336	0.054	-0.115
<i>Adult female population</i>	1.032***				0.572***
<i>Legal brothels</i>	0.571**	0.548***	0.725	1.095**	1.327**
<i>Legal prostitution</i>			0.742**	0.836*	0.671
<i>Female migrant stock</i>	0.412***	0.407***	0.216	0.234	-0.635*
<i>Unemployment young females</i>	-0.038***	-0.036***	-0.000	-0.010	
<i>Part-time female workers</i>	-0.006	-0.005	-0.024*	-0.025*	0.021*
<i>Adult male population</i>		1.021***	0.884***	0.907***	
<i>Constant</i>	11.357***	12.322***	0.716	3.856	12.191***
Observations	28	28	28	28	28
F-test (P<0.001)	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.931	0.936	0.816	0.792	0.747

Robust standard errors are omitted. *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors

Table 6.8. Testing the estimates with the OLS model, 29 countries (EU-28 + Ukraine)

Variables	Estimate 2A	Estimate 2B	Estimate 1A	Estimate 1B	Estimate 3B
	HIV preval.	HIV preval.	<i>Maximin</i>	<i>Minimax</i>	Victims
<i>GDP per capita</i>	-0.517*	-0.393	-0.224	-0.409	0.000
<i>Adult female population</i>					0.698***
<i>Legal brothels</i>		0.647**	0.624	1.018**	1.310**
<i>Legal prostitution</i>	0.703*	0.692*	0.810*	0.937*	0.437
<i>Female migrant stock</i>	0.173	-0.015	0.342**	0.286	-0.468
<i>Unemployment young females</i>	-0.016	-0.008	0.002	-0.003	
<i>Adult male population</i>	0.925***	0.814***	0.873***	0.864***	
<i>Constant</i>	9.281***	10.373***	4.603	7.338**	9.955***
Observations	29	29	29	29	29
F-test (P<0.001)	0.0000	0.0000	0.0000	0.0000	0.0000
R-squared	0.893	0.882	0.790	0.772	0.715

Robust standard errors are omitted. *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors

As regards the series for EU-28, our comments are the following (See **Table 6.7**).

GDP per capita is only significant for Estimate 2A and 2B and negative, which suggests that poorer countries tend to have more prostitutes.

Adult female population on the supply-side is always very significant (p-value is 1%) and positive, making sure that prostitutes are women.

As for all models in Estimates 2A, 2B, 1B and 3B, *Legal brothels* is significant (p-value is 5%) and always positive, in line with the results of existing literature (Cho et al., 2013; Jakobsson & Kotsadam, 2013). However, it is not the case for Estimate 1A, wherein which *Legal prostitution* is significant (p-value is 5%) and positive (as it is also for 1B).

International female migrant stock per 100,000 of population is very significant (p-value is 1%) for all models in Estimates 2 and positive in all Estimates save Estimate 3B.

Unemployment rate of females below 25 is only significant for all models in Estimates 2 and negative in all other Estimates, suggesting that unemployment does not drive prostitution.

Rate of female part-time workers is weakly significant and negative in all Estimates save Estimates 2 and 3B, suggesting that prostitution is rather a full-time job.

As for all Estimates, *Adult male population* on the demand-side is always very significant (p-value is 1%) and positive, making sure that customers are men.

Table 6.8 reports the results for the series of 29 countries (EU-28 plus Ukraine) our comments are quite similar. Hence, Ukraine is not an outlier.

GDP per capita is weakly significant for Estimate 2A (p-value is 10%) and negative, which again suggests that poorer countries tend to have more prostitutes.

Adult female population on the supply-side is very significant for Estimate 3B (p-value is 1%) and positive, making sure that prostitutes are women.

Only for Estimates 2B, 1B and 3B, *Legal brothels* is significant (p-value is 5%) and positive, in line with the results of existing literature (Cho et al., 2013; Jakobsson & Kotsadam, 2013). *Legal prostitution* is weakly significant and positive for Estimates 2A, 2B, 1A and 1B.

International female migrant stock per 100,000 of population is only significant for Estimate 1A (p-value 5%). *Unemployment rate of females below 25* is not significant, suggesting that unemployment may not drive prostitution.

For all Estimates, *Adult male population* on the demand-side is always very significant.

6.5.3. Checking estimates: an ordered probit model

Finally, we create five variables that represent the ranking of 29 countries. To rank the countries, we divided the five estimates of the number of sex workers that we produced by the number of females workers aged 15-64 to obtain the share of prostitutes among the female workers according to the data from Eurostat (2011) and SSSU (2011) for year 2010. Next, for each estimate, we rank the countries by four categories where category 1 includes the countries with the lowest number of prostitutes per employed females and category 4 includes the countries with the highest number of prostitutes per employed females. Categories for each estimate are almost equal between each other with 7-8 countries per category (See **Table 6.9**).

Table 6.9. Countries ranking by the share of prostitutes according to five estimates

Country/Estimate	2a	2b	1a	1b	3
Austria	4	4	3	4	2
Belgium	2	1	4	3	2
Bulgaria	2	3	3	2	4
Croatia	2	3	4	3	1
Cyprus	3	2	3	3	4
Czech Republic	1	1	3	4	2
Denmark	1	1	2	1	3
Estonia	4	4	1	1	4
Finland	1	1	2	4	2
France	1	1	1	1	3
Germany	4	4	4	4	3
Greece	3	3	4	4	3
Hungary	3	3	3	3	3
Ireland	3	2	1	1	3
Italy	2	2	3	3	1
Latvia	4	4	3	4	1
Lithuania	3	3	1	1	1
Luxembourg	1	1	2	2	3
Malta	4	3	4	3	4
Netherlands	2	2	2	3	4
Poland	3	4	1	1	2
Portugal	2	2	2	4	1
Romania	4	4	1	2	4
Slovakia	2	2	4	2	2
Slovenia	4	4	2	2	4
Spain	3	3	4	4	4
Sweden	1	1	1	1	1
United Kingdom	2	2	3	2	1
Ukraine	1	1	2	2	2

Source: Authors

As our outcomes have natural ordering, we apply an ordered probit model:

$$P(y_i = m) = 1 - \phi(\mu_{m-1} - x_i\beta) \quad [6, 2]$$

Where P is the probability of one of four ordinal outcomes (in our case $m = 4$), ϕ is the standard normal cumulative density function and x is a set of our predictors. Y is the observed ordinal variable that takes on values $y_i = j$, following the scheme $\mu_{j-1} < y_i^* \leq \mu_j$, where y_i^* is a latent variable that has linear combination with the predictors, x , and a disturbance term that has standard Normal distribution:

$$y_i^* = x_i\beta + \varepsilon_i, \quad \varepsilon_i \sim N(0,1), \quad \forall i = 1, \dots, N \quad [6, 3]$$

As x , we use several covariates mostly focusing on the supply-side¹⁸: *GDP per capita*, *Legal brothels*, *Adult female population (aged 15-64)*, *International female migrant stock per 100,000 population*, *Rate of unemployment for females below 25* and *Part-time female workers*. We use the same ranking as before for convenience. See **Table 6.10** for EU-28 and **Table 6.11** for EU-28 and Ukraine. As the data for part-time female workers is not available for Ukraine, we tested to substitute it with proxies, but the results proved to better without them.

Table 6.10. Ordered probit model, 28 EU countries

Variables	Estimate 2A	Estimate 2B	Estimate 1A	Estimate 1B	Estimate 3B
	HIV preval.	HIV preval.	<i>Maximin</i>	<i>Minimax</i>	Victims
<i>GDP per capita (in € 1,000)</i>	-0.108*** (0.031)	-0.204*** (0.060)	0.005 (0.018)	0.007 (0.022)	-0.017 (0.022)
<i>Legal brothels (binary variable)</i>	1.837*** (0.533)	2.588*** (0.828)	1.680*** (0.486)	2.891*** (0.529)	1.040 (0.741)
<i>Adult female population (in hund thsd)</i>	0.001 (0.003)	0.004 (0.003)	0.000 (0.003)	-0.001 (0.003)	-0.003 (0.003)
<i>Female migrant stock per 1,000 population</i>	0.023** (0.009)	0.025*** (0.008)	-0.002 (0.008)	-0.002 (0.010)	0.000 (0.009)
<i>Unemployment for females below 25 (percentage rate)</i>	-0.072*** (0.027)	-0.072** (0.032)	0.005 (0.029)	-0.002 (0.029)	-0.060* (0.034)
<i>Part-time female workers (percentage rate)</i>	-0.008 (0.020)	0.018 (0.032)	-0.029** (0.012)	-0.037** (0.014)	-0.005 (0.015)
<i>Observations</i>	28	28	28	28	28
<i>Wald Chi-Squared</i>	20.38	20.38	14.10	36.70	4.981
<i>Prob>chi2</i>	0.00237	0.00237	0.0286	0.0000	0.546
<i>Pseudo R-squared</i>	0.307	0.432	0.109	0.186	0.0973

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors

¹⁸ We cross checked the demand side including total adult male population and the scale effect as regards total population. Detailed results are available upon request.

Looking at the **Table 6.10** for the best estimate, Estimate 2A (541,957 prostitutes in EU and 33,492 in Ukraine) is an obvious candidate, followed by Estimate 2B (841,583 and 26,944 prostitutes, respectively), Estimate 1B (1,309,634 and 83,000 prostitutes), Estimate 1A (747,970 and 50,000 prostitutes) and Estimate 3B (767,760 and 32,760 prostitutes).

Table 6.11. Ordered probit model, 29 countries (EU-28 + Ukraine)

Variables	Estimate 2A	Estimate 2B	Estimate 1A	Estimate 1B	Estimate 3B
	HIV preval.	HIV preval.	<i>Maximin</i>	<i>Minimax</i>	Victims
<i>GDP per capita (in € 1,000)</i>	-0.065** (0.029)	-0.083** (0.040)	-0.008 (0.014)	-0.011 (0.017)	-0.015 (0.016)
<i>Legal brothels (binary variable)</i>	1.605*** (0.465)	1.839*** (0.493)	1.370*** (0.511)	2.216*** (0.612)	1.084 (0.724)
<i>Adult female population (in hund thsd)</i>	-0.003 (0.003)	-0.001 (0.003)	-0.000 (0.003)	-0.002 (0.002)	-0.004 (0.003)
<i>Female migrant stock per 1,000 population</i>	0.011 (0.009)	0.009 (0.009)	0.000 (0.007)	0.001 (0.008)	-0.001 (0.008)
<i>Unemployment for females below 25 (percentage rate)</i>	-0.031 (0.030)	-0.022 (0.030)	0.018 (0.026)	0.014 (0.022)	-0.054* (0.031)
<i>Observations</i>	29	29	29	29	29
<i>Wald Chi-Squared</i>	27.80	26.51	8.519	17.14	4.498
<i>Prob>chi2</i>	0.0000	0.0000	0.130	0.00424	0.480
<i>Pseudo R-squared</i>	0.179	0.225	0.0712	0.134	0.0947

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors

Figures from HIV prevalence are more reliable than Estimates 1B and 1A from miscellaneous sources (NGOs, the police, etc.), whereas Estimate 3B from victims of sexual exploitation is the least reliable. As regards numbers, our best estimate is also the most conservative one, albeit it may stand as a lower bound.

Table 6.11 represents Estimates 2B and 2A as more reliable than the other models.

GDP per capita is very significant for Estimates 2A and 2B (p-value is 0.01) in both samples and negative.

Legal brothels is significant for almost all Estimates (p-value is 0.01) in both samples, with the exception of Estimate 3B; it proves always positive, in line with the results of existing literature (Cho et al., 2013; Jakobsson & Kotsadam, 2013).

Adult female population is insignificant for all Estimates. *International female migrant stock per 1,000 of population* is significant and proves positive for Estimates 2A and 2B only for EU-28. For a sample with Ukraine, it is not significant.

Unemployment rate of females below 25 is very significant for the sample of EU-28 for Estimates 2A and 2B (p-value is 0.01 and 0.05) and weakly significant for Estimate 3B (p-value is 0.1); it proves negative, suggesting that unemployment does not drive prostitution. For a sample with Ukraine, this variable is only weakly significant and negative for Estimate 3B.

The final step of checking our estimates is in obtaining marginal effects for the ordered probit regressions. As the dependent variables are categorical with four outcomes, there will be four sets of marginal effects for each of the estimates. That is why, we report marginal effects on one estimate per sample of countries: Estimate 2A for 28 countries and as well Estimate 2A for 29 countries.

Table 6.12. Marginal effects from the ordered probit model (Estimate 2A), 28 EU countries

Variables	Dependent variable – Estimate 2A			
	1	2	3	4
<i>GDP per capita (in € 1,000)</i>	0.0185* (0.009)	0.0242* (0.013)	-0.0211* (0.012)	-0.0216** (0.008)
<i>Legal brothels (binary variable)</i>	-0.316* (0.163)	-0.414* (0.230)	0.361* (0.203)	0.369*** (0.123)
<i>Female population aged 15-64 (in hund thsd)</i>	0.0000 (0.000)	-0.0001 (0.000)	0.0001 (0.000)	0.0001 (0.000)
<i>Female migrant stock per 1,000 population</i>	-0.0038 (0.002)	-0.0051* (0.003)	0.0044* (0.002)	0.0045** (0.002)
<i>Unemployment for females below 25 (percentage rate)</i>	0.0123** (0.005)	0.0161 (0.010)	-0.0141* (0.007)	-0.0144* (0.007)
<i>Part-time female workers (percentage rate)</i>	0.0013 (0.003)	0.0017 (0.004)	-0.0015 (0.003)	-0.0015 (0.003)
<i>Observations</i>	28	28	28	28
<i>Probability to be in this category</i>	0.097	0.435	0.347	0.120

Note: Estimates are from an ordered probit model using 28 observations, where 1, 2, 3, 4 represent the categories from countries with the lowest share of prostitutes as of female workers (category 1) to the countries with the highest share of prostitutes (category 4)

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors

Table 6.12 (sample of 28 countries) suggests that, according to Estimate 2A, increase in *GDP per capita* increases the probability of being in the lower categories (1 and 2) by the number of female sex workers. On the contrary, increase in *GDP per capita* decreases the probability of being in the higher corresponding categories (3 and 4).

Legal brothels decreases the probability of being in lower categories and increases the probability of being in higher categories.

Increase in *Female migrant stock* decreases the probability of having less prostitutes but increases the probability of belonging to the countries with more prostitutes.

Finally, growing *Unemployment of young females* decreases the probability of being in the higher category of female sex workers.

Table 6.13. Marginal effects from the ordered probit model (Estimate 2A), 29 countries (EU-28 + Ukraine)

Variables	Dependent variable – Estimate 2A			
	1	2	3	4
<i>GDP per capita (in € 1,000)</i>	0.0169*** (0.006)	0.0088 (0.008)	-0.0096 (0.006)	-0.0161** (0.007)
<i>Legal brothels (binary variable)</i>	-0.419** (0.171)	-0.219 (0.153)	0.238* (0.123)	0.399*** (0.151)
<i>Female population aged 15-64 (in hund thsd)</i>	0.0007 (0.000)	0.0004 (0.000)	-0.0004 (0.000)	-0.0007 (0.000)
<i>Female migrant stock per 1,000 population</i>	-0.0028 (0.002)	-0.0015 (0.001)	0.0016 (0.001)	0.0027 (0.002)
<i>Unemployment for females below 25 (percentage rate)</i>	0.0081 (0.006)	0.0042 (0.005)	-0.0046 (0.004)	-0.0077 (0.007)
<i>Probability to be in this category</i>	0.178	0.359	0.298	0.165
<i>Observations</i>	29	29	29	29

Note: Ordering of estimates same as before.

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors

Table 6.13 (sample of 29 countries) suggests that, according to Estimate 2A, increase in *GDP per capita* increases the probability of being in the lowest category (1) by the number of female sex workers. On the contrary, increase in *GDP per capita* decreases the probability of being in the highest corresponding category (4).

Legal brothels decreases the probability of being in lower categories and increases the probability of being in higher categories.

Female migrant stock and *Unemployment of young females* are not significant with the current countries sample.

6.6. Prostitution and National Accounts adjustment: a GDP enhancement?

6.6.1. The Non Observed Economy (NOE) and illegal prostitution

In search for exhaustiveness dating back to SNA 1993 and ESA 1995 (Eurostat, 2013a), the definition and measurement of the Non Observed Economy (NOE) was codified in the early 2000s under the aegis of the OECD and with the support of the ILO. Eurostat developed a new typology of NOE that is consistent with the standards of National Accounts in terms of coverage and computation of the value added. It includes seven components (N1 to N7), which can be aggregated for purpose of parsimony into four or five categories of unrecorded activities (Gyomai & Van de Ven, 2014).

Illegal production (N2) gathers all prohibited activities that are neither registered nor licensed; it encapsulates illegal prostitution as well as trafficking drug and smuggled or regulated goods (tobacco, alcohol, firearms, etc.).

Underground production (N1 + N6) covers the non-prohibited activities of both registered and unregistered businesses, which hide out to escape tax and social security duties. This includes legal prostitution that misreports income.

Households production for own account (N3) addresses not recorded activity such as imputed rentals and agriculture; it can be added to the next category.

Informal production includes the non-prohibited activities of both households and businesses that are not covered or registered (N4 + N5).

The missing production or statistical deficiency (N7), or so-called underground production for statistical reasons, gathers activities not included in the above categories.

In 2012, the OECD surveyed a sample of 17 EU countries among which 12 countries provided an estimate of NOE. In a previous survey dating back to 2006 (Adair, 2012) eight of the EU countries were already included in the sample (See **Table 6.14**).

There are discrepancies across countries that provide estimates for illegal production and especially prostitution, due to lack of coverage as well as poor computation of the related value added, Austria and the Czech Republic standing as the two exceptions. Adjustments are significantly disparate: illegal production is not explicitly addressed either in France, because it is already included in prior GDP adjustments, or in the UK, because it is not compiled in this survey.

Table 6.14. NOE components and percentage of GDP in some EU countries and Ukraine (2012 and 2006)

Categories	N1+N6	N2	N3+N4+N5	N7	NOE-2012	NOE-2006
Production	Underground, %	Illegal, %	Informal, %	Statistical Deficiencies %	% GDP (year)	% GDP (year)
Austria	2.4	0.2	1.5	3.5	7.5 (2008)	7.9 (2001)
Belgium	3.8	0.7	N/A	N/A	4.6 (2009)	3-4 (2002)
Bulgaria	N/A	N/A	N/A	N/A	N/A	N2 = 1.3 (1999)
Croatia	N/A	N/A	N/A	N/A	N/A	N2 = 0.86 (2006)
<i>Cyprus</i>	N/A	N/A	N/A	N/A	N/A	
Czech Rep.	6.3	0.4	1.3	0.2	8.1 (2009)	6.6 (2000)
<i>Denmark</i>	N/A	N/A	N/A	N/A	N/A	
Estonia	N/A	N/A	N/A	N/A	N/A	N2 = 0.6 (2006)
Finland	N/A	N/A	N/A	N/A	Not provided	Not provided
France	2.6	N/A	0.8	3.3	6.7 (2008)	Missing in sample
<i>Germany</i>	N/A	N/A	N/A	N/A	Not provided	Not provided
<i>Greece</i>	N/A	N/A	N/A	N/A	N/A	N/A
Hungary	3.1	0.8	3.1	3.9	10.9 (2009)	11.6 (2000)
<i>Ireland</i>	N/A	N/A	N/A	N/A	Missing in sample	4 (1998)
Italy	16.2	N/A	N/A	1.2	17.5 (2008)	14.8 (2003)
Latvia	N/A	N/A	N/A	N/A	N/A	N2 = 1.5 (2000)
Lithuania	N/A	N/A	N/A	N/A	N/A	N2 = 0.9 (2002)
<i>Luxembourg</i>	N/A	N/A	N/A	N/A	N/A	N/A
<i>Malta</i>	N/A	N/A	N/A	N/A	N/A	N/A
Netherlands	0.8	0.5	0.5	0.5	2.3 (2007)	1 (1995)
Poland	12.7	0.9	0.0	1.8	15.4 (2009)	15.7 (2002)
<i>Portugal</i>	N/A	N/A	N/A	N/A	Missing in sample	Missing in sample
<i>Romania</i>	N/A	N/A	N/A	N/A	N/A	N/A
Slovakia	12.1	0.5	2.9	0.2	15.6 (2009)	Missing in sample
Slovenia	3.9	0.3	2.8	3.1	10.2 (2007)	Missing in sample
<i>Spain</i>	N/A	N/A	N/A	N/A	Not available	11.2 (2000)
Sweden	3	N/A	N/A	N/A	3 (2009)	1.3 (2000)
UK	1.5	N/A	0.5	0.3	2.3 (2005)	Not provided
Total MS	N/A	8 MS	N/A	N/A	17 MS	13 MS
Ukraine	N/A	N/A	N/A	N/A	N/A	N2 = 2.2 (2005)

Source: Adair (2012), Blades (2011), Gyomai & Van de Ven (2014), UNECE (2008)

Box 6.3. Compiling estimates for illegal prostitution in various countries

Austria provides an estimate for illegal prostitution as follows: the number of illegal prostitutes times average turnover minus intermediate consumption. The Czech Republic provides data on the various segments of the sex market (prostitution in clubs, private prostitution and street prostitution) from police reports, hygiene stations and an NGO; the estimate is computed as follows: the prostitutes' number times number of contacts in year times average price minus intermediate consumption. Hungary does not provide an estimate for prostitution alone, which is encapsulated within the overall illegal production (N2). Poland also provides data on prostitution in clubs, private prostitution and street prostitution from police reports, the media and an NGO; the estimate is computed as follows: the number of prostitutes times number of contacts in year times average price; in as much as intermediate consumption is not computed, there is no estimate for value added. Slovakia provides an estimate for prostitution from expert calculations and surveys. Slovenia provides an estimate (considered poor) for the number of

prostitutes based on expert and police calculations. In Sweden, estimates dating back to 2003 come from interviews and cover the number of workers and turnover; in the absence of computed prices, the consumer price index is used but there is no estimate for the value added of prostitution. Similarly, in the UK there is no explicit estimate either for prostitution or for N2, excepted for smuggled goods.

It is worth noticing that the most populated EU countries that also account for two thirds of the overall value added, did not estimate illegal prostitution. However, the implementation of the updated version of the European System of Accounts – ESA 2010 (Eurostat, 2013a) brings in some improvement.

6.6.2. Prostitution and GDP adjustment according to ESA 2010

By September 2014, all Member States adjusted their National Accounts to ESA 2010 as for data used to estimate European indicators, in order to ensure comparability. In this connection, member States were requested to compile N2. The core issue is not that the inclusion of illegal production in the GDP count is morally unacceptable, but that calculating the illegal economy in itself is prone to inaccuracies due to coverage.

As for the revision of National Accounts, N2 coverage is focused on narcotics, prostitution and smuggling alcohol and tobacco. However, some countries extend the coverage to piracy and illegal gambling. On the one hand, an abolitionist country such as France is reluctant to include prostitution in the GDP, arguing on moral grounds that it is not a voluntary exchange, although prostitution is already included to some extent. On the other hand, Germany wherein prostitution is regulated does not bother to include illegal prostitution, arguing that sex work is legal, although some evidence from Estimate 1B suggests that the number of illegal sex workers may supersede the legal ones.

The overall contribution of illegal activities to the EU-28 GDP comes from the countries that did not account so far for these activities; hence, it does not account for all illegal activities encapsulated within N2, especially prostitution. According to Dunn, Akritidis, & Biedma (2014), upwards adjustment amounts to 0.4 per cent of EU-28 GDP, which may be a proxy for N2, whereas it is only 0.2 percent for EU GDP as for OECD countries according to Van de Ven (2015).

We compiled estimates for N2 and for prostitution from the supply side as of 23 EU Member States, which account for a 61.4 per cent share of EU-28 GDP in 2010, unfortunately five countries (France, Germany, Greece, Lithuania and Slovakia) are missing in the sample. With

such piecemeal data, we calculated that N2 could amount to 0.48 percent of EU-28 GDP in 2010, whereas prostitution could amount for almost 0.18 per cent of EU-28 GDP in 2010. Coverage for prostitution from the demand side (expenditure) is recorded in Eurostat files as CP122 in the households' final consumption expenditure by consumption purpose (COICOP) for 19 EU countries in 2010: prostitution could amount for 0.18 per cent of EU-28 GDP in 2010. Unfortunately, nine missing countries account for almost two-thirds (65 per cent) of EU-28 GDP in 2010.

6.6.3. Back to supply and demand for assessing estimates

We inspire from Kazemier, Bruil, Van de Steeg, & Rensman (2013) to estimate prostitution as a whole, in as much as there are no available country data to compile the various segments of prostitution whether indoor (illegal *vs.* legal brothels, clubs, escorts and home prostitution) or outdoor (street prostitution).

The turnover of the prostitution industry (P) or receipt is the product of the number of prostitutes (sw), the number of customers per prostitute ($cust$) and the average price per client (p):

$$P = sw * cust * p \quad [6, 4]$$

We assume that the average prices per client is €50; the number of clients is 20 a week, and there are 43 working weeks a year.

Turnover encapsulates domestic consumption (C) and exports (E), sexual services to customers from abroad: $P = C + E$

The value added (VA) of the prostitution industry is the sum of the domestic consumption (C) and exports minus imports (M) minus intermediate consumption (IC). Imports are the sexual services provided by foreign prostitutes resident in the country plus the consumption of sexual services brought abroad by residents. Intermediate consumption are the expenses of the prostitutes themselves (clothing, condoms and travel expenses) we assume to be 20 percent of turnover: $VA = C + E - M - IC$

Gross earnings of the prostitutes is the turnover or receipt minus intermediate consumption, namely the value added (VA). Net earnings or income (NI) is gross earnings minus the share of the managers or pimps (the rent, rooms and brothels). We assume that prostitutes pay half the value added (VA) to the managers or pimps: $NI = (0.5) VA$.

Using the 0.178% mean share of prostitution in GDP, overall share in EU-28 GDP would amount to €21.919 billion. Gross sales turnover (including intermediate consumption for 20%) would then reach €26.302,8 billion.

We assume that prostitutes have 20 customers a week during at least 43 weeks a year, making an average number of 860 clients per prostitute. Dividing €26.302,8 billion Gross sales turnover by this average number of clients times the €50 average price; we come up with 611,693 prostitutes. If €40 were the average price per client, the number of prostitutes would reach 764,616.

If we divide €26.302,8 billion Gross sales turnover by 611,693 prostitutes, each prostitute would earn €43,000 per year from 860 clients, at an average price of €50. A lower average price of €40 per client would require an increase in the number of clients.

If we divide €26.302,8 billion Gross sales turnover by 764,616 prostitutes, each prostitute would earn €34,400 per year from 860 clients, at an average price of € 40.

We assume that the pimp retains 50% of total earnings (TAMPEP, 2010; Kazemier et al., 2013). In so far there are 611,693 prostitutes; each prostitute would get average net earnings of €21,500 per year and €1,791 per month. In as much there are 764,616 prostitutes, each prostitute would get average net earnings of €17,200 per year and €1,433 per month. In both cases, net earnings are above minimum wages as well as above mean annual earnings for all 10 countries of Eastern and Central Europe as well as for Cyprus, Malta and Portugal (Eurostat_earnings); hence, there is a premium for prostitution as well as for migration.

On the demand side, dividing €22.165,2 billion total expenditure spent on prostitution by the € 50 average price for sexual services, we come up with 443.3 million sexual services or clients out of 168 million adult male EU population. A crude assumption would be that 5% of EU adult males purchase sexual services every week on average. Perhaps, the €50 price is too high an average for EU-28, especially for Eastern Europe and some Southern countries. An alternative calculus based on a €40 average price would only increase the number of clients up to 554.1 million sexual services or clients. According to the same crude assumption, over 6% of EU adult males would purchase sexual services every week on average.

We assume again that prostitutes have 20 customers a week during at least 43 weeks a year that amounts to an average of 860 clients per prostitute at an average price of €50 for sexual service. Dividing €22.165,2 billion total expenditure by this average number of clients, we come up

with 515,470 prostitutes. As for an average price of €40 per client, the number of prostitutes would reach 644,340.

What might be the most likely guesstimates?

Adjusted National Accounts may not capture the full magnitude of prostitution, whereas assumptions regarding both customers and prices are disputable. At best, we can assess a few plausible figures for prostitution in the EU-28 as follows. Estimate 2 (542,000 prostitutes) is consistent with National Accounts, in as much as it stands within the range of 515,470-611,693 prostitutes with respect to the demand side and the supply side. This Estimate is likely to be a lower bound for prostitution in the EU-28 as of 2010. Estimate 1A (748,000 prostitutes) is consistent with National Accounts, in as much as it stands within the range of 644,340-764,616 prostitutes with respect to the demand side and the supply side. This Estimate is likely to be a median bound for prostitution in the EU-28 as of 2010. Estimate 3B (768,000 prostitutes) stands outside the aforementioned range and is less consistent. Estimate 1B (1,310,000 prostitutes) is not the upper bound for prostitution in the EU-28 as of 2010. Otherwise, it would imply the National Accounts underestimate prostitution by factor 2.4, which seems quite unlikely.

6.7. Conclusions

Data sources on prostitution are scant and rather inconsistent, especially as regards country distribution. To our best knowledge, the four EU-28 estimates we have compiled are the first ones in the economic literature on prostitution. Our purpose was to test these estimates in order to get a benchmark for the EU-28 in 2010, according to some reasonable assumptions. The OLS tests suggest that Estimates 2A and 2B (HIV prevalence), Estimate 1A (maximin) and Estimate 1B (minimax) are robust according to ranking order. Although we made best use of data provided by Eurostat and the UNODC, Estimate 3B (victims of sexual exploitation trafficking) is the least robust and a loose proxy for illegal prostitution, due to the bias in recording across countries. With regard to the distribution of population across countries, Estimates 2A and 2B look most reliable, whereas Estimates 1A and 1B as well as Estimate 3B are less reliable. We crosschecked these estimates with data from National Accounts in order to avoid major inconsistencies: Estimate 2A (542,000 prostitutes in EU and 33,000 in Ukraine) and Estimate 1A (748,000 and 50,000, respectively) seem to match with respect to the lower and median bound as for the number of prostitutes.

To our best knowledge, the five Estimates we have compiled as for the EU-28 are the first ones in the economic literature on prostitution. We designed ordered probit models according to which Estimates 2A and 2B issued from HIV prevalence prove most robust. Conversely, other Estimates from miscellaneous sources (1A and 1B) and Estimate 3B from victims of sexual exploitation trafficking prove far less robust. Estimate 1A provides a lower bound figure (542,000 prostitutes in EU) as for 2010 that may be used as a benchmark for macroeconomic purposes.

Our sample is small (28 and 29 countries) albeit consistent because EU membership is binding with respect to budget issues and the requested harmonisation of National Accounts. Moreover, the EU is an open area for both labour and capital mobility, which makes cross-border trafficking easy.

Recalling that the share of countries legalising brothels is close to one fourth of total EU-28 population, our main finding for all models is that the legalisation of brothels is positively correlated with three Estimates; our results are in line with those of the existing literature. We bring in value added with the testing of variables related to the supply side (adult females), the demand side (adult males) and the scale effect (adult population) that all prove relevant to the number of sex workers throughout EU-28.

Last, prostitution may possibly be the tip of iceberg as regards the sex industry, including sex shops and the pornographic movie business industry that the Internet has triggered, we know little about. In this connection, investigation is lacking with respect to the spillover effects of prostitution on hotel occupation rate and cabaret dancing entertainment, etc.

Appendix

Table 6.15. Dictionary of variables

Code	Name and explanation	Data source
numb_prost_highoflowest Estimate 1A	<i>Number of prostitutes: highest of the lowest, circa 2010</i>	TAMPEP (2007, 2010), UNODC (2014), Charpenel (2012)
numb_prost_lowofhighest Estimate 1B	<i>Number of prostitutes: lowest of the highest, circa 2010</i>	TAMPEP (2007, 2010), UNODC (2014), Charpenel (2012)
numb_femsexwork Estimate 2A	<i>Number of female sex workers, 2011</i>	Prüss-Ustün et al (2013)
numb_femsexwork2 Estimate 2B	<i>Number of female sex workers, 2000s</i>	Vandepitte et al. (2006)
prost_extrapol Estimate 3B	<i>Prostitution extrapolated from victims of sexual exploitation trafficking, 2010</i>	Our calculations based on Eurostat and UNODC
lgdp_pc_eu	<i>GDP per capita</i>	World Bank, GDP per capita (current US\$) converted to average for 2010 US \$/€ exchange rate
leg_broth	<i>Legal brothels</i>	Charpenel (2012), Mendes Bota (2013)
leg_prost	<i>Legal prostitution</i>	Charpenel (2012), Mendes Bota (2013)
lpop_fem15_64_hund	<i>Adult female population</i>	Eurostat, Population statistics
labs_mig_fem_100 th	<i>International female migrant stock per 100 thousand of population</i>	United Nations, Population Division
unemp_less25_fem	<i>Unemployment rate of females below 25</i>	Eurostat, Employment Statistics Ukraine: State Statistics Service, Labour Participation Statistics
rate_fem_part_time	<i>Rate of female part-time workers</i>	Eurostat, Employment Statistics
lpop_mal15_64_hund	<i>Adult male population</i>	Eurostat, Population statistics
lpop_tot15_64_hund	<i>Total adult population</i>	Eurostat, Population statistics
contr_of_cor	<i>Control of corruption</i>	World Bank, World Governance Indicators
tier	<i>Tier</i>	UNODC (2014)
imp	<i>Import dummy variable</i>	Dummy variables for the import countries
region	<i>Sub-region dummy variable for the countries that are sex work importers by the region: Western and Southern Europe</i>	Dummy variables for the region

Source: Elaborated by the authors

Conclusions

The objective of this thesis was to contribute to the better understanding of the nature of informal employment as an economic phenomenon in general, and in transition countries in particular. Being a feature of the labour market, an outcome, an obstacle or an opportunity – informal employment was, is and will be on the agenda of the economic policy and research. The main findings are as follows.

In the *First Chapter*, we addressed the terminology that defines “informality” with and in spite of all its shades. Under the definition of “non-observed economy” (NOE), we understand the activities that are underground, illegal, undertaken by households for their own final use, informal or missed because of statistical deficiencies in the basic data collection process. Turning to the three most utilized definitions, the main distinguishing characteristic between them is the level at which they are analysed, and there are three levels: an enterprise, a job and an activity. The first of them (enterprise-level) looks at the level of organisation, scale of production and the size of the enterprise; if it is small, the enterprise is regarded to belong to the “informal sector”. The second (job-level) considers the type of employment relationship that arise; there is “informal employment” if an employed person lacks social or legal protections. The third (activity-level) defines a work (or activity) as informal based on its registration. If the activity is not declared to the public authorities but legal, there is an incidence of “undeclared work”.

In the following two chapters, we addressed the methods that are utilized to measure the NOE, shadow economy and informal employment. The *Second Chapter* presented indirect measurement methods, such as electricity consumption method, income – expenditure difference method, currency demand method, labour force participation rate, labour input method and structural model; and demonstrated how indirect methods are applied in Ukraine to measure the NOE and the shadow economy of Ukraine. Indirect methods operate on macroeconomic level and in general are based on one indicator, for instance electricity consumption level, currency demand or labour participation rate. With different assumptions, these indicators are perceived as proxies for NOE or shadow economy. Structural modelling method that we described on the example of the MIMIC model, estimates the shadow economy with the help of several causal and indicator variables. Overall, indirect methods tend to produce

the upper bound estimates of the NOE or shadow economy and are more fruitful both on an aggregate level and in dynamics.

We also demonstrated the application of indirect methods in estimating the NOE and the shadow economy of Ukraine whose magnitude varies from less than one fifth to over two fifths of GDP. The SSSU collects information from the household, enterprise and labour force surveys, from the farming sector, administrative and official data. The NOE in 2016 composed almost one fifth of the GDP in Ukraine. As for the shadow economy, the MEDTU employs four methods to estimate it and in the end, produces the integral indicator. The shadow economy of Ukraine for the year 2017 amounted one third of the GDP. At the same time, the MIMIC method of Schneider produces the estimate of the shadow economy of Ukraine at the level of 43% of the GDP.

In the *Third Chapter*, we defined the direct methods that are employed to estimate informal employment, such as tax audits and labour market surveys. In contrast to indirect methods, direct estimation methods are inclined to underestimate the informal part of employment. Direct estimation methods are microeconomic methods and contribute to understanding the motives, reasons, attitudes and perceptions of the individuals as for their “rational” choice to move into or outside of the informal labour market. Tax audits compare the data from tax returns and the estimated income of the individuals. Labour market surveys may be more accurate compared to the former because they illustrate the characteristics of individuals and the economic environment they work in, their desirable working conditions and the incentives and attitudes of these individuals. Therefore, labour market surveys assist in elaborating policy actions to understand and improve the labour market. Frequent application of surveys such as the LFS, EU-SILC, EWCS, ESS, Eurobarometer, etc. – testify their accuracy and benefits.

Next, we outlined how informal employment is measured in Ukraine. The LFS is carried out annually by the SSSU and is the main statistical method of measuring informal employment. The latest data available as of 2016 estimates the informal employment of Ukraine at the rate of 24.3% of the employed population; this indicator has been increasing over the last years. We illustrated findings of the first Ukrainian Undeclared Work Survey (UUDWS) that was recently carried out in Ukraine. Finally, we sketched a comparison between the UUDWS-2017 and the Eurobarometer-2013, the “predecessor” of the UUDWS.

We contend that there is a degree of the acceptability of tax evasion in Ukraine from the entrepreneurs’ point, for which we found evidence in the UUDWS likewise. Notwithstanding,

the tax discipline in Ukraine has improved considerably, which placed Ukraine from the position #181 in 2011 by the *Paying taxes* index at the position #43 in 2018. The UUDWS illustrates that 18.2% of respondents admitted to have paid for undeclared goods or services. From the supply side, around 7% of the respondents admitted having worked undeclared in the last 12 months (we consider this as a lower bound estimate), around 46% know someone that works undeclared and one third of the respondents estimate that at least half of the population of Ukraine work without declaration. The UUDWS results also suggest that the majority of Ukrainian undeclared workers are between 35 to 54 years old, live in urban areas and are unemployed, employed in other occupation or self-employed. The main undeclared activities provided include home maintenance or home improvement services, selling farm produced food, gardening, car repairs and selling goods/services associated with their hobbies. The reasons that justified the undeclared work were the difficulties to find a regular job, the seasonal nature of the work, the fact that the undeclared work is the way such activities are usually done and low level of trust to the State.

The comparison of the UUDWS-2017 and the Eurobarometer-2013 proves that Ukrainians are more eager to be on the demand side and on the supply side of undeclared work than Europeans are. We found evidence that in the EU it is more common to buy undeclared goods or services from someone you know, whereas in Ukraine in the majority of cases the undeclared work comes from unknown individuals or households. The same applies for the clients: in the EU, they tend to be out of the circle of acquaintances, which is not the case in Ukraine. The reasons that drive both Europeans and Ukrainians to purchase undeclared production are in most cases the same, such as lower price, faster service and better service. As the main reason in Europe to work undeclared is mutual benefit, in Ukraine is it the difficulty to find a regular job. The prevalence of paying envelope wages is about three times higher in Ukraine. More than half of those who receive envelope wages in Ukraine receive such wages both for regular and overtime work; in the EU, in most cases this payment is made not for regular work. Undeclared income distribution suggests higher inequality in Ukraine between the lowest and the highest quantiles of undeclared workers. Finally, we observed lower unacceptance, lower perception of risk and sanctions from undeclared work in Ukraine, in comparison to the EU.

We also contend a significantly lower level of trust to the government in Ukraine as to the EU. Lastly, the necessity driven reasons that push workers to undeclared work prevail both in the EU and in Ukraine, for instance insufficient income from regular job, lack of regular jobs on the labour market.

The *Fourth Chapter* includes the analysis devoted to informal employment in a set of nine EU transition countries with a gender divide, using panel data and wages decomposition technique. To the best of our knowledge, among the few papers that analyse informal employment using the EU-SILC, our study adds a contribution by introducing our own proxy for informal employment status. Complying with the definition from the ILO (2003a), we define employees as “informal” if they receive zero social insurance contribution from the employer and at the same time do not have a permanent contract at the main job. This definition attributes the informal status to on average 5.0% of informal wage employment, in line with other labour market surveys for the same group countries.

Using the EU-SILC for the years 2009, 2010, 2011 and 2013, we demonstrate that the share of informal employees is increasing over time, with the exception of Bulgaria, Latvia and Romania. Informal employees earn at least 25% less in real terms than formal employees (398-490 euro per month compared to 580-662 euros of formal employees), are on average eight years younger and six years less experienced than formal employees. There are more employees with a university degree in the formal employment. In addition, more married individuals are present among formal employees. By contrast, most of informal employees have low-skilled occupations.

Application of a pooled OLS Mincer model supports human capital theory in as much as education, skills and experience prove to be highly significant in wages determination, whereas males and married individuals tend to have higher income. Moreover, about 25% of wage penalty for informal employment for all employees is explained by both individual and job characteristics. We observe that about 24% of wage penalty for informal employment for male employees (and 28% for female employees) is explained by both individual and job characteristics. However, 15% of overall wage penalty remain unexplained, 12% for male and 18% for female employees.

However, the conditional quantile regressions finds no evidence of wage premium for participation in the informal employment in a pooled sample of nine EU transition economies. Both male and female employees experience wage penalty for informality, being the highest at the bottom decile (-0.25 for all employees, -0.24 for male employees and -0.27 for female employees) and the lowest at the top decile (-0.17, -0.13 and -0.20, respectively). Finally, fixed effects regression demonstrates that even when accounting for unobservable characteristics, wage penalty for informality does not disappear and reaches 22% for female employees and

7% for male employees. Oaxaca-Blinder wages decomposition underlines that the difference between formal and informal employees is rather balanced, and leaves us with a conclusion that characteristics of the firms on the demand side better explain this difference than the individual characteristics on the supply side.

Our work in progress will allow us to further analyse the gender issue as regards the participation of men and women in the informal employment and gender gap in terms of earnings and employment status. We extend our investigation to the EU-SILC for 2015 and compare with the ESWC for 2015. We also investigate wage inequality in the selected nine countries in order to support or to refute the Kuznets curve for transition economies.

The *Fifth Chapter* examines one country, Ukraine by employing the individual data from the Ukrainian Longitudinal Monitoring Survey for the years 2007 and 2012. We assign five employment statuses to the individuals: formal employee, informal employee, formal self-employed, informal self-employed and unemployed. Across these five categories of employment, the Ukrainian labour market behaves quite heterogeneous by the size of each of these categories, income distribution and personal background characteristics of the individuals.

The official data estimates informal employment of Ukraine as 22.3% of the total employed population in 2007, whereas according to the ULMS data, this estimate amounts to 14%. In 2012, informal employment was estimated at the level of 24.1%, the ULMS sample demonstrated a figure of 16%. Our data presents formal labour market participants as older and no single, they reside in an urban area, have higher educational attainment and more years of experience. Last but not least, they receive higher income (especially self-employed). These characteristics are consistent with human capital theory. Interestingly, unemployed are not less educated than informal workers. We also show that the income for formal self-employed is less stable and has the highest dispersion across all the labour market segments.

Our Mincer earnings function documents inequality of the earnings between formal and informal workers according to various factors, especially education. Education plays an important role for formal employment; moreover, educational achievement in terms of level seems to be better valued than duration of schooling as we observe that the diploma has a signalling impact on the demand side. Education has significant and positive impact on the earnings of formal employees. Experience is also very significant and generates higher income for all labour market segments, except for informal self-employed. Other important factors that

determine earnings are urban, working schedule, multiple job holding, firm size, private status of the firm and hours worked. Taken together, we prove the Mincer theory for Ukrainian labour market, although a special importance of the diploma status rather than the quality of education raises question for future study.

At the same time, we acknowledge the disadvantages of the ULMS data compared to the official LFS (probably the closest substitute to the ULMS) data because of the smaller sample size, lower response rate and regularity. Moreover, we use the data only for two years. That is why, in our future research we also will incorporate all the waves of the ULMS to have a larger sample and profit from the longitudinal advantage of it.

In the *Sixth Chapter*, we concentrate on one sector (or rather an occupation, although illegal in some countries) – prostitution. We challenge this topic by deducing four estimates of the number of sex workers in the EU-28 and Ukraine and we presume that they are the first estimates in the economic literature on prostitution. The OLS tests of these estimates suggest that Estimates 2A and 2B (HIV prevalence), Estimate 1A (maximin) and Estimate 1B (minimax) are robust according to ranking order; the fourth Estimate 3B (victims of sexual exploitation trafficking) is the least robust, probably due to the bias in recording across countries. As for the distribution of population across countries, Estimates 2 looks most reliable, whereas Estimates 1A, 1B and Estimate 3 are less reliable.

The design of an ordered probit model demonstrates Estimates 2A and 2B as the most robust. Conversely, other Estimates (1A, 1B and 3B) prove far less robust. Finally, our Estimate 2A (542,000 prostitutes in EU and 33,000 in Ukraine) and Estimate 1A (748,000 and 50,000, respectively) seem to be reliable with respect to the lower and median bound as for the number of prostitutes in the EU-28.

Our sample is small (28 or 29 countries) albeit consistent because EU membership is binding with respect to budget issues and the requested harmonisation of National Accounts. Moreover, the open area of labour mobility in the EU makes cross-border trafficking easy.

Another value added that we bring consists in the results of all models that the legalisation of brothels is positively correlated with three Estimates in the EU-28 and Ukraine. Additionally, we contribute to the literature by testing the variables related to the supply side (adult females), the demand side (adult males) and the scale effect (adult population) that all prove relevant to the number of sex workers throughout EU-28.

Our study, however, disregards several issues. The first limitation is the small sample size. We could have extended the sample to neighbouring countries in Europe such as Norway, Switzerland, and Turkey; however, we expect that it should reinforce the impact of regulation in as much as these last two countries legalise brothels. In the absence of a reliable database for prostitution, we did not use panel data; hence, we did not address the dynamics of prostitution. We have no robust variable dealing with the demand side such as a proxy for customers that deserves dedicated surveys upon sexual behaviour as well as National Accounts data for prostitution expenditure. Last, we have little evidence regarding either the share of sexual exploitation (namely coercive prostitution) *vs.* non-coercive prostitution, or the share of salaried *vs.* self-employed prostitutes that deserve dedicated surveys. The above-mentioned aspects will be addressed in our future research.

Therefore, our general analysis of informal employment and wages of occupations in a group of transition countries and specific example of one transition country, Ukraine, and one “on the edge between formal and informal” occupation, prostitution, challenge us to persevere to contribute to better understanding of the diversity of informality patterns. For example, as we demonstrate, almost every tenth Ukrainian suffers from under-declared employment. In other words, a worker is registered, but his salary is regularly split into official and unofficial (“envelope”) part. This takes place in the majority of cases by the employer’s initiative, thus a worker is pushed to vulnerable employment relationship. The same corresponds to European countries, although with lower intensity.

This and other findings of the thesis should be of interest for policy makers who work on the labour market in transition countries to address the issues of non-compliance, tax evasion, labour laws violation in order to develop appropriate responses and necessary measures. Whether participation in informal employment is a voluntary choice or is driven by an exclusion – it should be addressed accordingly, by creating proper incentives to formalize the activity, at the same time by ensuring regulatory discipline on the labour market with a perceived high level of risk to be detected and punished for any violations.

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Abstract

This thesis contributes to a better understanding of the nature of informal employment in transition countries in particular. We present the results of the first Ukrainian Undeclared Work Survey and compare its results with the Eurobarometer-2013. Undeclared work and envelope wages prevail in Ukraine and the EU, and the reasons for working undeclared are mostly driven by necessity. Second, we investigate the wage differentials and determinants in a set of nine EU transition economies with respect to informal employment, and the gender disparities of wage distribution. The significant wage penalty for informal employment proves always higher for females than for males. Regardless gender, individual and job characteristics explain more than half of wage penalty. A wage decomposition suggests that the difference between formal and informal employees is better explained on the demand side of the firms than on the supply-side of the workers. Third, we focus attention on informal employment in Ukraine. The division of all the employed population (formal employees, formal self-employed, informal employees and informal self-employed) suggests strong heterogeneity between these four categories and proves the human capital theory to be robust in as much as educational attainment is a major explanatory factor for formal employees only. Last, we examine prostitution as an informal activity from the demand side and the supply side. We produce four estimates of the number of sex workers in the EU and Ukraine. Our lower bound estimate from the data on HIV prevalence suggests that there are circa 542,000 prostitutes in the EU and 33,000 in Ukraine as of 2010. The legalisation of brothels is positively correlated in all our models with three Estimates in the EU-28 and Ukraine.

Keywords: Earnings function; European Union; Informal employment; National Accounts, OLS; Panel data; Probit; Prostitution; Quantiles; Transition; Ukraine; Wage determinants.

Résumé

Cette thèse contribue à une meilleure compréhension de la nature de l'emploi informel dans les pays en transition en particulier. Nous présentons les résultats de la première enquête ukrainienne sur le travail non déclaré et comparons ses résultats avec l'Eurobaromètre 2013. Le travail non déclaré et les salaires en espèces prévalent en Ukraine et dans l'UE, et les raisons du travail non déclaré sont d'abord motivées par la nécessité. Deuxièmement, nous étudions les différences et les déterminants des salaires dans un ensemble de neuf économies en transition de l'UE en ce qui concerne l'emploi informel et les disparités de genre dans la répartition des salaires. La pénalité salariale est significative pour l'emploi informel et s'avère toujours plus élevée pour les femmes que pour les hommes. Indépendamment du sexe, les caractéristiques individuelles et professionnelles expliquent plus de la moitié de la pénalité salariale. Selon une décomposition des salaires, la différence entre les employés formels et informels est mieux expliquée du côté de la demande des entreprises que du côté de l'offre des caractéristiques des travailleurs. Troisièmement, nous analysons l'emploi informel en Ukraine. La répartition de l'ensemble de la population active (salariés formels, indépendants formels, salariés informels et indépendants informels) suggère une forte hétérogénéité entre ces quatre catégories et prouve que la théorie du capital humain est robuste dans la mesure où le niveau d'instruction est un facteur explicatif majeur pour les employés formels seulement. Enfin, nous examinons l'activité informelle de la prostitution du côté de la demande et de l'offre. Nous produisons quatre estimations du nombre de prostituées dans l'UE et en Ukraine. Selon notre estimation basse, issue de la prévalence du VIH, il y a environ 542 000 prostituées dans l'UE et 33 000 en Ukraine en 2010. La légalisation des bordels est positivement corrélée dans tous nos modèles avec trois estimations dans l'UE-28 et en Ukraine.

Mots-clés: comptes nationaux, déterminants des salaires, données de panel, emploi informel, fonction de gains, MCO, probit, prostitution, quantiles, transition, Ukraine, Union européenne.