# Mapping the shadow economy

## A systematic review of shadow economy measurement methods and policy measures in Baltic States, Cyprus, Georgoa, Malta, and Moldova

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**About the report**

This report*, Mapping the shadow economy: A systematic review of shadow economy measurement methods and policy measures in Baltic States, Cyprus, Georgia, Malta and Moldova*, takes stock of the available evidence on the size of the shadow economy and on the effectiveness of policies addressed tackling shadow economy in Estonia, Latvia, Lithuania, Malta, Cyprus, Georgia, and Moldova.

**Review process**

This report was reviewed by Dr. Andrea Floridi (Evaluation Specialist, 3ie), Dr. Sylwia Kilford (Program Manager, University of Birmingham), Professor Paul Jackson (Academic Director, RCC and Professor of African Politics, University of Birmingham), Kane Baguley (FCDO), Dr Ieva Birka (FCDO), and one external reviewer.

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# CONTENT

# List of Figures



# List of Tables

## *Executive summary*

This report aimed to enhance understanding of how to measure and address the shadow economy in the Baltic States, Cyprus, Georgia, Malta, and Moldova. To achieve this overarching goal, the study included two systematic reviews and three stakeholder workshops, each aligned with specific research objectives.

The first systematic review, focused on the effectiveness of policy measures, aimed to gather, evaluate, and synthesize existing evidence on measures to reduce the shadow economy. It addressed four key questions: the availability of evidence on policies targeting the shadow economy, the types of studies and methods used to evaluate these policies, the direction and magnitude of their effects, and existing evidence gaps with recommendations for future research.

Due to the severe scarcity of literature specifically evaluating policy measures in the countries addressed in this review, a broader approach was adopted to gather a more comprehensive body of previous research and evidence. This approach utilized the principles of concentric circles and constellation research. As a result, the findings were organized into three primary clusters:

- *Cluster 1*: Includes papers on specific policy measures aimed at addressing the shadow economy, focusing solely on individual countries in the review.
- *Cluster 2*: Comprises papers exploring broader aspects of the shadow economy (e.g., drivers, agent characteristics) that provide policy implications, mainly focused on multiple countries, including at least one from the review region.
- *Cluster 3*: Contains grey literature examining specific policy measures targeting the shadow economy, based on data from institutions such as Labour Inspectorates, Social Security Agencies and Tax Authorities, focusing on individual countries in the review.

The review of policy measures reveals a lack of rigorous policy evaluation studies (i.e., experimental and quasi-experimental studies), with most of the attempts relying on secondary data and lacking experimental designs, which limits the ability to establish cause-and-effect relationships. Grey literature from enforcement authorities provides some insights but remains mostly descriptive. The scarcity of data and limited access to administrative records may explain this gap. Strengthening collaboration between researchers and enforcement authorities could improve data access and support field experiments, offering valuable insights for policy development. Despite these challenges, some key policy implications emerge from the consulted studies. These policy measures useful in tackling shadow economy can be grouped in five categories: **(1) boosting detection capabilities, (2) implementing more effective sanctions, (3) improving the accessibility and benefits associated with engagement in formal economy, (4), conducting education and awareness campaigns**, and **(5) modernizing enforcement authorities to foster public trust and cooperation**. For **detecting** shadow economy, unannounced inspections, whistleblowing programs, hotlines with incentives for non-compliance reports, and improved tax auditor training should be considered. Inspections should focus on high-risk sectors such as construction and agriculture, as well as, for example, firms employing many minimum wage workers, as these firms often evade taxes. Although digitalization can help conceal revenues (via e-commerce), it is generally considered efficient for detecting shadow economic activities. **Estonia's** Electronic Employment Register and **Lithuania's** QR code system for workers are examples of good practices in this regard. Concerning **sanctions** for shadow economic activities, the first step should be reducing the general perception of impunity, as people tend to evade taxes when they believe the risk of

detection is low. Additionally, focusing on those who could facilitate tax evasion, such as accountants, is more effective than directly penalizing tax evaders. While sanctions remain important, they should be gradual and not overly harsh to avoid instilling fear among citizens. Overall, both detection and sanction measures are considered less effective than fostering voluntary adherence to formal economy through the other three types of measures tackling shadow economy described in this review: **improving the accessibility and benefits associated with engagement in formal economy**, **conducting education and awareness campaigns** about formal economy and **modernising enforcement authorities to foster public trust and cooperation.** Starting with the first one, key recommendations suggest that both businesses and citizens should receive state support to formalise economic activities. This includes amnesties, credits, and financial support. A more commonly used strategy is that of reduced tax burden. While this proved to be effective, it can also have some unintended consequences. For example, in **Latvia**, linking parental benefits to reported income boosted wage declarations only during the qualifying period, suggesting collusion between employers and employees to inflate wages and thus, receive higher benefits. In **Georgia**, tax cuts encouraged businesses to register formally but also prompted revenue underreporting to stay below tax thresholds. In **Cyprus**, tax deductions for charitable donations revealed instances of tax evasion through altered reporting. Beside tax reductions, another common measure implemented in the states included in this review is aimed at simplifying business operations (as **Malta** did through its National Business Portal). Digitalisation plays an essential role in this process. E-taxation has improved **Estonia's** tax collection since 2004, and artificial intelligence helps match job seekers to employers. To **educate citizens about formal economy**, offering trainings (as in **Cyprus**), instructional materials about tax declarations (as in **Georgia**), sending informational letters (like in **Lithuania**) and running awareness campaigns (like **Estonia's** 'Thank you for paying taxes' and **Latvia's** 'FraudOff!' campaigns) are some representative examples. Lastly, to **modernise enforcement authorities,** some key recommendations include increasing transparency of public institutions', reducing corruption of civil servants (as seen in **Georgia** with salary increases for such employees), improving communication with citizens (like **Lithuania's** State Labour Inspectorate did through Facebook Messenger consultations) and digitalizing services while adapting laws to the digital era.

To enrich the findings of the systematic review on policy measures, three workshops were organized to engage a diverse range of stakeholders: one focusing on the Baltic countries, one on Georgia and Moldova, and one on Cyprus and Malta. Key findings emphasized the need for a holistic, context-specific approach integrating detection, sanctions, increased accessibility and benefits of formal economy, education, and institutional modernization efforts. Enhancing detection capacity through data-driven tools, inter-institutional cooperation, and innovative strategies like tax risk ratings proved effective in identifying informal activities, particularly in sectors prone to undeclared work. Clear, enforceable sanctions and visible enforcement actions were highlighted as critical deterrents. Stakeholders stressed the importance of simplifying tax systems, reducing compliance costs, and offering incentives to promote formal economic engagement. Education and awareness campaigns, while pivotal, require tailored, sustained efforts to foster a culture of compliance. Finally, modernizing enforcement authorities by enhancing transparency, communication, and trust in institutions emerged as essential for long-term success.

Both the review and workshops reinforce that there is no single solution to the phenomenon of shadow economy. As such, a holistic approach, combining deterrence measures (aimed at detection and sanctions) with methods aimed at improving accessibility and benefits of formal economy, educating citizens about the benefits of it, and building trust both among citizens and

in state institutions, is needed. The systematic review of methods for quantifying the shadow economy examined why estimates diverge and how to account for these differences, evaluated the strengths and weaknesses of the methods used to measure the shadow economy and related practices, and identified the current best practices in quantifying these phenomena. The review concluded that while there have been improvements in measuring the shadow economy, challenges persist in accurately estimating its size. The available methods still exhibit significant variability, with some underestimating and others overestimating the true scale of the shadow economy. Recognizing that no single method is entirely sufficient, there is increasing support for multi-method strategies that combine different approaches to reduce estimation errors and offer a more reliable understanding of the shadow economy.

In conclusion, these systematic reviews reinforced that the shadow economy is a multifaceted concept, with no 'one-size-fits-all' approach, both in terms of measurement methods and policy measures for addressing it. As such, identifying the optimal 'policy mix' for a specific country requires a thorough diagnosis of the shadow economy. This process goes beyond simply obtaining accurate estimates of its size; it also involves a comprehensive understanding of the key drivers of the shadow economy, the demographic groups engaged in informal economic activities, and the existing legislative framework and social protection systems. Only by examining these interconnected factors tailored policies can be designed to address the shadow economy's complexities and challenges.

# 1. Introduction – a clarification of the definitions of shadow/informal economy

Almost seven decades after the first study on this topic, there is still no universally accepted term and accompanying definition for activities that remain hidden from the authorities (Franic, 2019; Williams & Schneider, 2016). This is, however, not surprising given the multifaceted nature of such activities, their intertwining with the registered ones, and the complexity of human interactions in general (Andrews *et al.*, 2011).

Broadly speaking, every single activity can be scrutinized through the lens of its ethics, productivity and market orientation. The ethical aspect is concerned with the genuine acceptability of an activity within society (OECD, 2002). For instance, human trafficking and drug smuggling violate important moral norms, which is why they are forbidden in modern societies. Commonly labelled 'criminal', such wrongdoings are typically approached from a different angle than is the case with intrinsically legitimate conducts (OECD, 2002).

When it comes to productivity, it is important to realize that not all human undertakings result in new value added. Corruption, extortion and tax evasion arising from artificial inflation of costs are typical examples of illicit practices in which only the reallocation of resources occurs. Such misbehaviours are usually (but not always and not all of them) viewed as criminal, rather than informal (Williams & Schneider, 2016).

Finally, activities can be viewed through the prism of market orientation, irrespective of their legal status and productivity. Cleaning own house, neighbour help or volunteering are common examples of non-market activities. On the other hand, transactions involving the payment of a delivered good or service, as well as those based on bartering, are classified as market activities.

To cope with this genuine multidimensionality of human behaviour, different groups of stakeholders typically narrow down the focus only to a specific subset of hidden economic activities they are interested in. National statistical offices are, for instance, concerned with the total value added resulting from the activities of individuals and companies during the observed period (OECD, 2002). Their emphasis is thus strictly on productive activities, regardless of the ethicality and market status. Tax authorities, on the other hand, usually approach the phenomenon from the tax evasion perspective (Brown & Mazur, 2003; IRS, 2012). Accordingly, they are commonly focused on all legitimate market-oriented activities, irrespective of their value added. Productivity is also seldom of the main interest to social scientists, most of whom are eager to explore the socio-psychological characteristics of one's behaviour (Richardson, 2006; Williams *et al.*, 2015b, 2015a). Finally, academics willing to quantify concealed transactions often pursue an opportunist approach by restricting their scope in accordance with the availability of data and the estimation method(s) applied (Andrews *et al.*, 2011; Schneider, 2000).

Given this, it is not surprising to hear that more than 40 different definitions and associated names for various subgroups of unregistered economic activities have been used in the research literature so far (Williams, 2004). Yet, although the majority of terms brought to light during the inception phase of this research field are still in use, a few newer ones gradually overtook the stage[1]. These arose from substantial endeavours by experts and cooperation between various international institutions, such as the International Labour Organisation (ILO), the

[1] The most notable pioneering terms include the 'informal sector' (Hart, 1973), the 'subterranean economy' (Gutmann, 1977), the 'black economy' (Dilnot & Morris, 1981), the 'underground economy' (Tanzi, 1980) and the 'informal economy' (ILO, 2002). For a full list, see Williams & Schneider (2016).

Organization for Economic Co-operation and Development (OECD), the United Nations (UN), the International Monetary Fund (IMF), the European Commission (EC), and the World Bank Group (WB).

A detailed elaboration on the historical advancements in this respect is beyond the scope of this research, so we will instead focus only on the three terms that prevail nowadays. The widest-ranging among them is the 'non-observed economy', which refers to "all productive activities that may not be captured in the basic data sources used for national accounts compilation" (UNECE, 2008, p. 2). That is to say, the non-observed economy connotes all activities which for some reason remained out of the scope of the official statistics (Eurostat, 2021). Besides inherently legal activities that were intentionally kept unreported, the non-observed economy hence also includes criminal activities, do-it-yourself work, various forms of underreporting, transactions not required to be reported, as well as those that remained out of the scope thanks to the deficiencies of the statistical offices (UNECE, 2008).

To ease quantification and aid policy efforts, the non-observed economy is usually divided into seven categories, depending on the exact reason why the activities in question remained unrecorded (Eurostat, 2021). These are as follows: N1 – Producer should have registered (underground producer); N2 – Illegal producer that fails to register; N3 – Producer is not obliged to register; N4 – Registered legal person is not included in statistics; N5 – Registered entrepreneur is not included in the statistics; N6 – Misreporting by the producer and; N7 – Statistical deficiencies in the data.

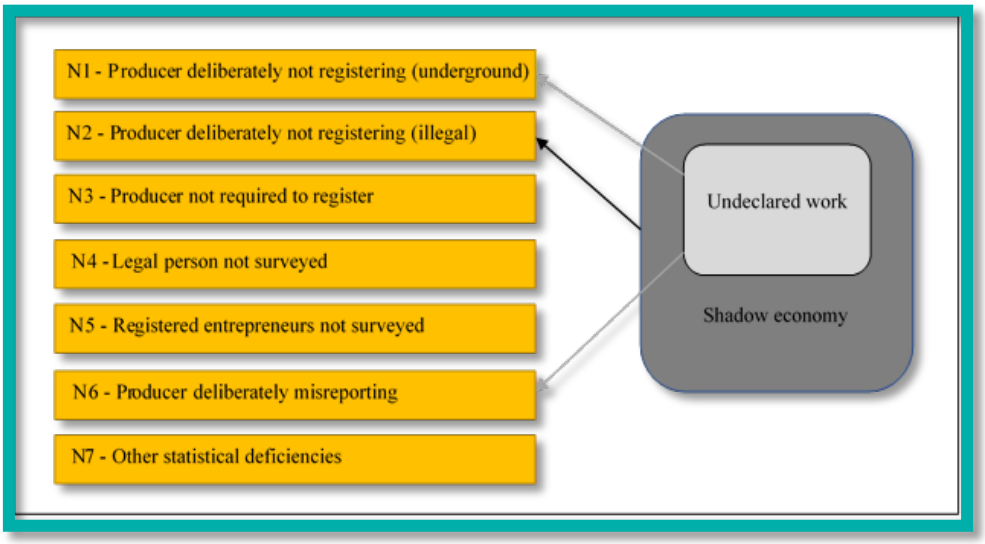
Although we will make references to the non-observed economy throughout this report, our discussion will mostly be centred around a narrower set of activities, which are known under the name 'undeclared work'. Introduced by the European Commission (1998), undeclared work refers to "any paid activities that are lawful as regards their nature but not declared to the public authorities" (European Commission, 1998, p. 4). Accordingly, this term embraces all productive market-oriented activities of individuals and companies that are fundamentally legitimate, but remain deliberately unreported to the authorities for any of the following reasons: to avoid payment of taxes and/or social security contributions; to circumvent certain aspects of the labour legislation (e.g., minimum wage, maximum number of working hours, and safety standards) and/or; to bypass various administrative procedures (European Commission, 1998).

As such, undeclared work does not include do-it-yourself work, volunteering and neighbour help. Criminal activities are also excluded, as are tax evasion schemes not related to productive activities. On the other hand, it includes all emerging forms of fraud stemming from atypical employment relations, such as platform work, on-call work, piece-work arrangements, seasonal work, posting of workers and others. Most importantly, undeclared work also embraces quasi-formal/under-declared-employment, the practice highly prevalent in Europe in which a formally registered employer gives their formally registered employee part of the wage 'under the table'[2] (Franic, 2020; Kayaoglu & Williams, 2017).

To put it simply, undeclared work denotes activities that would entail some payment to the state budget if they were reported. Consequently, the authorities are usually interested in formalisation, rather than in eradication of undeclared work (Williams, 2016).

[2] Since the undeclared part of the payment is often given in an envelope, this illegitimate employment scheme is also known under the name 'envelope wage practices' (Franic & Cichocki, 2021; Williams, 2013).

**Figure 1. Mapping of concepts – non-observed economy, shadow economy, and undeclared work**




***Source***: Authors' own illustration

Figure 1 illustrates the relationship between undeclared work and the non-observed economy. As can be seen, undeclared work corresponds to activities falling inside categories N1 (producer should have registered) and N6 (deliberate misreporting by a producer) of the non-observed economy. Indeed, Eurostat (2014, p. 123) defines N1 as the collection of producers who do "not register to avoid tax and social security obligations". On the other hand, deliberate misreporting (N6) connotes the situation when "gross output is under-reported and/or intermediate consumption is overstated, in order to evade income tax, value added tax (VAT), other taxes, or social security contributions" (Eurostat, 2014, p. 123).

However, the overlap is not perfect, given that undeclared work also includes some activities from the remaining five categories of the non-observed economy. For example, surpluses from the production by households for their own final use (category N3) often end up on the market, thus counting towards undeclared work. Likewise, most moonlighters that fall into the category N4 would be missed by the statistical offices simply because the latter usually have no means (nor mandate) to identify and survey them. Despite these subtleties, it is, however, safe to say that the categories N1 and N6 encompass the bulk of activities this report is focused on.

Another important term that will be used in this report is the 'shadow economy'. For the purpose of our study, the shadow economy will refer to all productive, market-oriented activities that remain hidden from the authorities, regardless of their intrinsic legitimacy (ELA, 2024). In addition to undeclared work, the shadow economy hence also includes activities forbidden by the law (i.e., criminal activities). Given this, the shadow economy corresponds to categories N1, N2 and N6 of the non-observed economy, as illustrated in Figure 1.

It should, however, be noted that a number of different definitions are usually put under the umbrella of the shadow economy in practice. This will be particularly evident in the part of the study elaborating on the measurements of the phenomenon, as most authors from that specific subfield treat the shadow economy and undeclared work as synonyms. To address this peculiarity, we will come back to terminological disunity in the second part of the report. For the time being, however, the shadow economy will be treated as the superset of undeclared work, unless specified differently.

A systematic review on policies for tackling the shadow economy is crucial because it accounts for two critical shortcomings in the current state-of-art: a) a fragmented, discipline-specific 'silos' approach that hinders a holistic understanding of the shadow economy and, consequently, the implementation of effective measures to tackle it, and b) a wide range of overlapping terms associated with the shadow economy that results in varied methodologies and different estimates used to capture its hidden nature.

## 2. A systematic review of policy measures to reduce various components of the shadow economy (with a focus on Estonia, Latvia, Lithuania, Georgia, Moldova, Cyprus, and Malta)

The shadow economy has notable implications for workers, businesses, and governments. By bypassing taxes and social security contributions, it reduces state revenue allocated for public services and social assistance programs. Businesses operating in the shadow economy may gain a competitive edge by lowering costs and offering reduced prices through practices such as dumping. Workers in this sector often face labor rights violations and lack access to social protections, including pensions and health insurance (Horodnic & Williams, 2021). These factors hinder progress toward achieving Sustainable Development Goal (SDG) 8, which promotes "decent work for all," and SDG 10, which seeks to "reduce inequalities," as outlined in the United Nations' 2030 Agenda for Sustainable Development (UN General Assembly, 2015, p. 14).

Tackling undeclared work, a key element of the shadow economy, remains a significant challenge and a priority on the policy agendas of national and international organizations across Europe and beyond (European Commission, 2016; ILO, 2015). In Europe, this is reflected in the establishment of the European Platform Tackling Undeclared Work in 2016, which brings together national authorities such as labor inspectorates and tax and social security agencies, alongside social partners like employer and employee organizations, and observers such as the European Foundation for the Improvement of Living and Working Conditions (Eurofound) and the International Labour Organization (ILO). The platform aims to improve coordination and efficiency in addressing undeclared work (European Parliament, 2016). Similar efforts to formalize the informal economy have been implemented in other regions, such as initiatives by the Regional Cooperation Council (RCC) and the ILO in the Western Balkans under the Employment and Social Affairs Platform (2024).

This systematic review aims to use key terminology commonly associated with the shadow economy to provide a thorough evaluation of the effectiveness of policy measures intended to address it. The focus will be on aspects of the shadow economy targeted for formalization, such as participation in undeclared work, rather than on criminal activities. Such a review is necessary to address the fragmented research and inconsistent terminologies in this area. It will offer evidence on effective policy approaches to tackling the shadow economy and support the development of targeted strategies to promote formalization where appropriate.

The purpose of this systematic review is to collect, evaluate, and synthesise the available evidence on the effectiveness of policy measures aimed at reducing the size of the shadow economy. This review will explore the following key questions:

1. What evidence is available about the policy aimed at reducing the size of the shadow economy?
2. What types of studies and methods are available to evaluate the effectiveness of policies aimed at reducing the size of the shadow economy?
3. What does the available evidence suggest about the direction and magnitude of the effects of various policies in reducing the size of the shadow economy?
4. What evidence gaps exist, and how can future studies address them?

## *2.1. Methodology*

The systematic review has been conducted in more steps, as briefly described below. The full protocol of the study is available upon reasonable request.

Firstly, for assessing the eligibility of the publications, the PICO framework has been used (Schardt *et al.*, 2007), synthesised as follows:

- Type of Population: The review included studies on policy measures targeting the shadow economy in the Baltic states, Cyprus, Georgia, Malta, Moldova, considering multi-country studies only if they focused on at least one of these countries.
- Type of Intervention: The systematic review draws on the holistic policy approach to tackling undeclared work, adopted by the European Platform on undeclared work within the European Labour Authority (European Commission, 2016), and supported by the ILO, as reflected in its Recommendation No. 204 on transitioning to a formal economy and its Future of Work reports (ILO, 2015, 2019), as well as by the OECD's advocacy for comprehensive approach (OECD, 2017). This approach analyses a wide range of policy measures grouped into five key sub-components: enhancing detection capabilities, implementing stronger sanctions, improving the accessibility and benefits of formal economic participation, education and awareness campaigns, and modernizing enforcement authorities to build public trust and cooperation.
- Type of Comparison: Studies with or without comparison groups were included, acknowledging the limited use of experimental designs.
- Type of Outcome: The review will include studies and reliable grey literature (e.g., good practice fiches by the European Labour Authority) that examine the impact of specific policies on the shadow economy. Due to the variety of terms used to describe the shadow economy and its aspects, the outcomes will be derived from combinations of words in columns 2 (Adjective) and 3 (Noun) of Table 2, such as shadow economy, informal economy, undeclared work, underdeclared wages, and others. As such, outcomes such as employment status, degree of formality, declared income, and revenue increases were considered.

- Type of Studies: The review included both quantitative and qualitative studies, as well as quasi-experimental and non-experimental designs, with no restrictions on publication year or status.
- Other Criteria: Keywords were in English, but no language or temporal exclusions were applied.

Relevant papers for the systematic review were identified through comprehensive searches conducted across scientific databases, online libraries, and the websites of key institutions focused on addressing undeclared economic activities. A detailed overview of these sources is provided in the table below.

**Table 1. Main databases that will be consulted for the systematic review**

| Database | Types of papers that will be extracted from the database |
|---|---|
| Web of Science | Scientific articles, book chapters |
| Scopus | Scientific articles, book chapters |
| 3ie Development Evidence Portal | Grey literature documents |
| European Labour Authority`s Virtual Library | Grey literature documents |
| Google Scholar | Scientific articles, book chapters & grey literature documents |

*Source*: own processing

It is important to note that due to the limited number of studies identified during the search phase, we expanded the search to Google, deviating from the original protocol. As the shadow economy encompasses various concepts (as detailed in the introduction section) and measures to address it can involve both direct and indirect policies, a comprehensive list of potential search keywords has been created. We began with an extensive list of potential search keywords that covered various aspects of the shadow economy, including terms for different approaches to tackling the issue, adjectives commonly used in the literature, and synonyms for economic practices, such as "work," "businesses," or "employment."

**Table 2. Refined list of search terms for identifying relevant sources for the systematic reviews**

| Measure | Adjective | Noun | Country |
|---|---|---|---|
| Policy intervention* | shadow | economy | Estonia |
| Tackl* | informal | work* | Latvia |
| Eradicat* | grey | *employment | Lithuania |
| Reduc* | un*declared | entrepreneur* | Georgia |
| Formali* | | wage | Moldova |
| Detection measure* | | salary | Cyprus |
| Workplace inspection* | | | Malta |
| Audit* | | | |
| Risk of detection | | | |
| Penalt* | | | |
| Fine* | | | |
| Non-compliance list* | | | |
| Incentive* | | | |
| Supply-side measure* | | | |
| Demand-side measure* | | | |
| Awareness campaigns | | | |

| |
|---|
| ***Fostering commitment to formal economy*** (this sequence was not combined with the words from column 2 and 3 for the searches, but only with the words from column 4) |

***Source***: own processing

Additionally, we included geographical terms, listing countries of interest. This resulted in over 170,000 possible search combinations, which was impractical for our research scope. To narrow this down, we first applied truncation symbols, such as the '*' symbol, which allowed us to search for multiple variations of terms in a single query (e.g., 'un*declared' retrieves both 'undeclared' and 'under-declared'). Despite this, the initial round still produced over 50,000 combinations. In the second round, we reviewed the list with the research team, eliminating terms that yielded few results. For example, searches like 'non-official economy' produced only 11 results, and 'moonlight economy' returned just 4, none of which were relevant to the countries of interest. This process resulted in a more refined and manageable set of search terms, as shown in Table 2, with approximately 2,500 combinations to be searched across each of the datasets mentioned above. As the searches included numerous keywords, in general, only a small number of studies appeared in the results for each search, and in some instances, there were no results at all[3].

Given the limited number of studies to process per search, the data selection process began immediately after the searches and involved four steps as follows. Firstly, the displayed results for every search were screened by title and abstract and papers that seemed relevant to our research scope were saved. Initially, for this first step, in accordance with the protocol, we planned to use Zotero to save the results, as it can automatically identify duplicates. However, Zotero requires results to be downloaded and imported into the software, and given the extensive number of keyword combinations (exceeding 2,500 per database), this process would have necessitated downloading a large volume of databases. Therefore, to streamline removal of duplicates, we instead relied on the browser's functionality to identify previously opened links, which were marked in a different colour from earlier searches. This approach facilitated the initial screening process and resulted in 187 papers being included in the second step of data selection. Here, the titles and abstracts of the 187 saved papers were re-examined on a different day than when they were initially saved. Through this step, 34 papers were excluded.

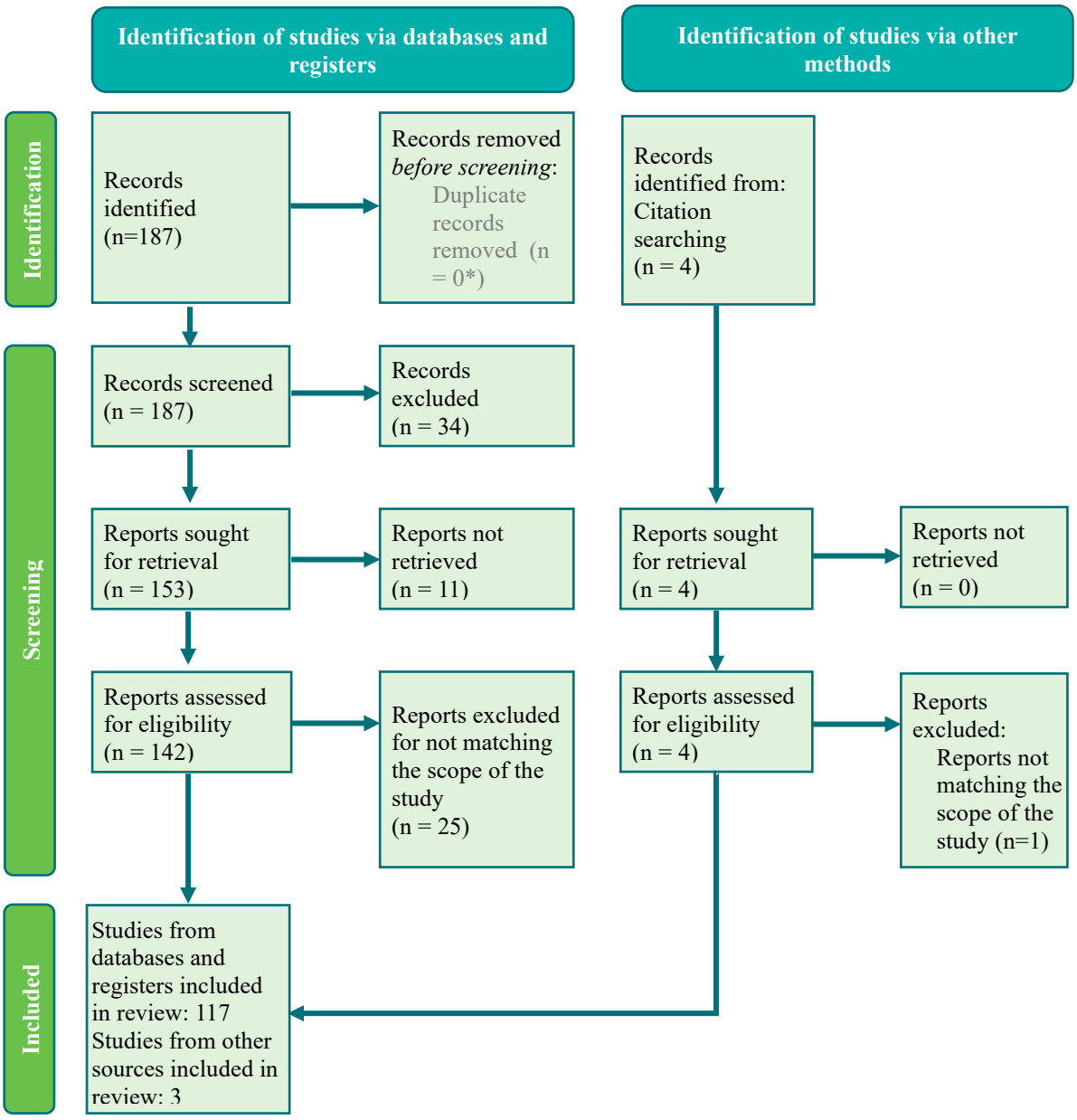
While most of these papers were removed due to an initial misalignment with our research scope[4], others were excluded because they were, for example, older editions of already saved papers or good practice fiches that were already covered within a more comprehensive learning resource paper discussing multiple good practices. As such, 153 papers were progressed to the third step of data selection, which involved seeking the full texts of the papers. At this stage, 11 papers could not be retrieved, leaving 142 papers for the fourth and final step, which implied reading the full texts of the papers and deciding on their inclusion/exclusion. 25 papers were excluded following this step, leading to 117 studies to be included in our systematic review. In addition to the search, citation tracking was performed for the retrieved papers through both

[3] Indeed, some searches, particularly those conducted on Scopus, yielded a large number of results. However, these results were often related to only one or two keywords from our search rather than the full topic of interest. To address this, we carefully examined the first 25 results for each search. If the 25th result was still relevant to our research scope, we proceeded to review the next set of 25 results. If not, we moved on to the next search, which was typically the case.

[4] The decision to exclude some papers initially saved was taken based on the review process carried out by two independent researchers. While these papers initially appeared to align with the research scope, a second review often revealed inconsistencies. Any disagreements between the two researchers was discussed with a third, more experienced researcher.

backward and forward tracking to identify further relevant studies, and the entire process was evaluated by external researchers, one from 3ie and another independent researcher. 4 new papers were identified, retrieved and fully read in this step. 3 of them were included in our review, which comprised a total of 120 papers. A visual representation of the data screening process is displayed below, in Figure 2, illustrating the PRISMA flow diagram.

**Figure 2.** PRISMA Flow Diagram




*Note: *Due to the extensive number of key term combinations (exceeding 2,500 per database), titles and abstracts were screened directly for each combination instead of downloading a large number of databases. To streamline the process of removing duplicates, the same browser was used to identify previously opened links, which were marked in a different color based on earlier searches.* | ***Source***: Authors' own illustration

***

All the selected studies were analyzed to extract bibliographic, methodological, and content-related information, including the study title, authors, publication details, and findings on effective methods to reduce the shadow economy. Given the heterogeneity of the included studies and the variability across reported outcomes, we synthesized the evidence using a narrative analysis.

Before moving to the results, it is important to note that in order to ensure transparent reporting and facilitate better interpretation by other researchers and policymakers, we aimed to evaluate the scientific papers in our systematic review based on their methodological quality. To do so, we used the Mixed Methods Appraisal Tool (MMAT) provided by Hong *et al.* (2018). The tool consists of specific questions tailored to the study design (qualitative, quantitative, or mixed methods). These questions are designed to assess aspects such as the study's relevance, rigour, coherence, and risk of bias. Examples include "Is randomization appropiately performed?" (for quantitative randomized controlled trials) or "Is the interpretation of results sufficiently substantiated by data?" (for qualitative studies). Each type of study is assessed using five questions, to which reviewers respond with "Yes", "No", or "Can't Tell" based on the information reported in the study. However, the tool does not encourage assigning a score to studies based on the number of "Yes" responses, nor does it recommend excluding studies with low methological quality. Instead, it is intended to promote transparency and enable the comparison of study results based on their reliability. In alignment with the tool's emphasis on transparency, we report the results of the methodological quality assessement tool in Appendix A. The review of the methodological quality of the studies in this Appendix was carried out independently by two different researchers.

## *2.2. Overview of the results*

Our systematic review was based on a broader approach, meant to obtain an inclusive corpus of previous research and evidence, using the principles of concentric circles and constellation research.

A robust literature review is more than a summary of existing scholarly research; it is a critical synthesis that situates knowledge within its broader intellectual and practical contexts, especially important in the field of shadow economy. Utilizing frameworks such as concentric circles approach and constellations of authors, journals, ideas, and stakeholders enhances the depth, inclusivity, and coherence of a review, adding interdisciplinary and systemic perspectives and acknowledging hidden influences and underexplored contributions (*Larsen et al.*, 2019; Ohlhorst & Schon, 2015).

The concentric circles approach ensures a literature review focuses while still capturing diversity and multi-dimensionality. This method organizes sources in layers of relevance and proximity to the research question, resulting in three distinct circles:

- Innermost circle: Core sources representing central theories and studies that provide a highly relevant foundation for the review.
- Middle circle: Adjacent studies exploring diverse contexts, populations (countries), and methods, helping to capture a broader perspective and identify country-specific nuances.

- Outer circle: Peripheral studies that, while not directly tied to the analyzed countries or main policies, offer alternative or supplementary viewpoints, enriching the explanatory context.

When applying this method, we adopted a funnel-type approach. All sources identified through keyword searches were initially retained, then exclusion criteria were applied sequentially to form the outer, middle, and innermost circles.

Focusing solely on top-tier journals risks skewing the understanding of phenomena by emphasizing confirmatory and mainstream research. Larsen *et al.* (2019) argue for the inclusion of diverse sources, such as grey literature and lower-tier publications, which often contain critical insights, replications, and challenges to dominant paradigms. This approach ensures that all "voices" relevant to a field are considered. Similar ideas are supported by Heidegren (2023), Maton and Doran (2021), Van Waes *et al.* (2019), Ohlhorst and Schon (2015), Maton (2014).

The constellation approach complements this framework by identifying supplementary connections and patterns across the literature. It considers studies as analogous to stars in a constellation, collectively forming an integrative pattern despite contrasting findings or evolving trends. This method takes a holistic and integrative perspective, allowing studies to be grouped into meaningful clusters. By doing so, it reveals subfields (e.g., country-specific or sectoral analyses) and enhances interdisciplinary insights.

Incorporating various stakeholder's perceptions provides practical insights into how knowledge in the field of undeclared work is applied and evolves. Stakeholders considered in the analysis include workers, employers, government and enforcement bodies (e.g., tax and revenue authorities), trade unions and workers' associations, community organizations and NGOs, academic scholars and researchers, and international organizations (e.g., ILO, OECD, World Bank).

A systemic constellation method enables visualization of the interplay between societal components, offering a nuanced understanding of dynamics influencing research, particularly in policy-making. Inclusive literature reviews like this address gaps caused by "knowledge-blindness" or atomistic thinking (Maton, 2014).

Together, this combined reviewing methodology allowed us to achieve greater depth through the concentric circles approach and greater breadth through the constellations approach. The findings were discussed with all team members (internal peer review) to ensure calibration and clarity. This comprehensive approach facilitated an integrative understanding of the shadow economy ecosystem, offering nuanced insights for policy-making, research, and practice. Adopting this perspective, and considering the scarcity of literature specifically evaluating policy measures in the countries addressed in this review, we chose to organize the findings into three clusters.

**Cluster 1** focuses on papers that **explore the outcomes and implications of specific policy measures and initiatives aimed at addressing the shadow economy**. It includes nine papers, details of which are provided in the table below. Notably, all studies in this cluster **focus exclusively on individual countries included in the review**.

As Appendix B displays, Latvia was the most frequently discussed country in the consulted papers, with four studies covering it. Apart from Georgia, which was analysed in two studies, all other countries discussed in the consulted papers for this cluster were featured in only one study each. Malta and Moldova, two countries of interest for our study, were not analysed separately in any of the papers within this cluster. However, we will provide details about these

countries when presenting the papers from the other two clusters. Regarding the methodology of the studies in this cluster, 8 out of 9 papers conducted empirical research. The study by Kindsfateriene and Lukasevicius (2008), however, was a literature review. Although it did not empirically test the efficiency of any specific policy measures aimed at tackling the shadow economy, it still gathered relevant contributions from the literature within our research scope, such as insights into the outcomes of reduced profit income or taxes. Studies using empirical research mostly opted for quantitative research techniques, with only two studies employing qualitative methods. Schueth (2012) conducted ethnographic research, while Vallistu (2023) opted for interviews. While qualitative studies cannot statistically 'test' the efficiency of policy measures, these two studies were included in the cluster due to their valuable insights (e.g., information on how certain policy measures aimed at tackling shadow economy were perceived by specific social agents). All the other 7 studies opted for quantitative research using secondary data analysis.

**Cluster 2** comprises scientific papers or reports that **explore other dimensions of shadow economy** (i.e., not a certain policy measure/initiative, but aspects such as drivers, characteristics of agents involving in shadow economic activities etc.) which **elaborate on at least one policy implication** based on their findings. A total of 74 papers were included in this cluster. They were mainly focused on **multiple countries out of which at least one from the region covered in this review** (rather than a single country) and provide insights and recommendations for designing policies to address the shadow economy. However, 12 studies do concentrate on specific countries, such as Lanamäki and Tuvikene (2022) on Estonia, Ekici and Besim (2018) on Northen Cyprus[5], or Hutsebaut (2021) on Moldova. Similar to the papers in Cluster 1, most of the studies in this cluster predominantly conducted empirical research, with only 8 papers being theoretical. For the empirical research, most of the papers opted for quantitative research (60). Three studies employed qualitative research, and other three studies used mixed-methods. The quantitative studies mainly used secondary data analysis, with only 4 countries opting for surveys solely. Two reports on Moldova (National Development Strategy Moldova 2030; ILO, 2016) performed both primary and secondary data analysis.Further details about the papers in this cluster are provided in the Appendix C.

**Cluster 3** comprises papers from the grey literature that **examine the outcomes and implications of specific policy measures or initiatives targeting the shadow economy**. These papers are rather descriptive and are based on data provided by institutions such as Labour Inspectorates, Tax Authorities, Social Security Agencies, or other implementing bodies. It contains 37 papers, as follows: 25 good practice fiches, 7 reports, 2 position papers, 1 learning resource paper, 1 policy paper and 1 policy brief. Similar to Cluster 1, **these papers focus exclusively on individual countries included in the review.** An exception is a learning resource papers by Williams (2019), gathering useful insights about preventative approaches to tackle shadow economy presented by multiple countries at a seminar organised by European Platform tackling undeclared work on 16th of May 2019 in Brussels. From this paper, we extracted information on policies to tackle shadow economy and their results in Estonia, Latvia, and Lithuania.The other papers in this country focus solely on one specific country, as follows: 3 on Cyprus, 9 on Estonia, 5 on Georgia, 4 on Latvia, 7 on Lithuania, 5 on Malta and 3 on Moldova. Details about these papers can be found in the Appendix D.

In total the number of papers included is displayed in the PRISMA diagram in Figure 2.

[5] Given the scarcely available evidence, we included one paper from Northern Cyprus

## 2.3. *Policy measures to tackle shadow economy in Estonia, Latvia, Lithuania, Georgia, Moldova, Cyprus, and Malta*

The results of the systematic review follow the holistic policy approach towards the shadow economy, grouping the policy measures into five key categories: enhancing detection capabilities, strengthening sanctions, improving accessibility and benefits of formal economic participation, conducting education and awareness campaigns, and modernizing enforcement authorities to foster public trust and cooperation.

**Key findings:**

**Boosting detection capabilities:**

- In **Cluster 1**, with a focus on **Latvia**, two papers explain that one method of detecting shadow economic activities is to target firms employing many minimum wage workers, as these firms often evade taxes. Meanwhile, in **Georgia**, measures like undercover checks of civil servants and frequent, unannounced tax audits effectively enforced reforms but also led to resentment and fear among citizens and businesses due to harsh penalties for non-compliance.
- In **Cluster 2**, some proposed methods include incentives for reporting non-compliant firms, anonymous whistleblowing programs, reporting hotlines, improved training for tax auditors, and unannounced inspections. For inspections, targeting specific sectors such as agriculture is recommended. While digitalization can aid detection, it also enables tax avoidance through e-commerce. Anyway, some authors argue detection alone is insufficient. Encouraging voluntary compliance and state-citizen trust are considered more effective.
- Papers in **Cluster 3** show that **Cyprus** reduced undeclared work in construction from 25% to 10% (2009–2022) through inspections and a whistleblower hotline. **Estonia's** electronic Employment Register enhanced oversight, adding 21,000 employees in its first year. **Lithuania's** 3200 joint inspections (2019–2021) recovered €620,000 in unpaid taxes, while its 2022 QR code system verifies legal employment. **Latvia's** risk analysis tools recovered €21.9 million (2017–2018). **Malta's** roadside inspections helped identify unregistered workers.

**Implementing more effective sanctions:**

- The only paper included in **Cluster 1** in this section shows that **Georgia's** strict penalties for tax non-compliance were justified, but also appeared unfair, especially after retroactive audits by the post-Rose Revolution reformist government. Even compliant businesses faced penalties due to rigid enforcement and a lack of judicial oversight, fostering fear and perceived injustice despite increased tax revenue.
- In **Cluster 2**, papers emphasise tackling public perceptions of impunity, as people evade taxes when they perceive a low risk of detection. Notably, targeting tax evasion potential facilitators, like accountants, is more effective than penalizing tax evaders. However, while deterrence measures may work in the short term, measures

regime, forcing payments for release, and prosecuting tax officials for minor errors, which increased accountability but created fear within the system.

- In **Cluster 2,** digitalization is seen as key element public institutions could use to improve efficiency, reduce bureaucracy, and integrate informal sectors. Governments should adapt regulations to new digital job sectors, as seen in **Lithuania** and **Latvia's** road transport laws. Stable and simple policies, reduced corruption, and improved communication with citizens are also recommended since they enhance perceived institutional quality, transparency, and public trust.
- **Cluster 3** highlights **Estonia's** digital transparency measures, such as the eesti.ee portal, which allows citizens to see which government authorities access their data. **Latvia's State Labour Inspectorate** shifted from a control to a preventative model, thus boosting formal work relationships. **Lithuania's State Labour Inspectorate** offers consultations via Facebook Messenger, improving accessibility and service quality. Meanwhile, **Moldova's** 2011 action plan to reduce informal employment failed due to lack of leadership and resources, resulting in increased informal work.

such as reducing tax burdens, incentivizing formalization, educating citizens, and promoting civic responsibility are seen as more sustainable solutions.

- **Cluster 3** shows that **Malta's** Employment and Training Corporation conducted numerous inspections between 2007–2009, which led to legal actions against non-compliant individuals. Again, encouraging formal economy participation is considered more effective than harsh punishment, which should rather be gradual.

**Improving the accessibility and benefits associated with engagement in formal economy:**

- Papers in **Cluster 1** focus on tax reductions to encourage formal economy participation. In **Latvia**, lowering VAT on certain goods could motivate informal businesses to formalize, while reduced tax rates in **Lithuania** increased business transparency. However, unintended consequences may arise. In **Latvia**, tying parental benefits to reported income led to increased wage declarations, but only within the qualifying period, indicating possible collusion between employers and employees to inflate earnings and maximize benefits. In **Georgia**, lowered taxes incentivized firm registration but also led to underreporting revenues to stay under tax thresholds. In **Cyprus**, charitable donation tax deductions uncovered tax evasion through reporting adjustments.
- In **Cluster 2**, some key factors for improving access to the formal economy are amnesties for informal workers, simplifying business operations, enhancing social protection, and reducing taxes. Other solutions include R&D tax credits, government support during recessions, and digitalization to reduce bureaucracy.
- In **Cluster 3**, **Estonia** leads in terms of strategies to strengthen formalization through digitalization and e-taxation. Since 2004, online tax declarations increased from 59% to 98% by 2019. AI matches job seekers with employers, while "nudge" letters promote better tax behavior in sectors like construction. **Malta's** National Business Portal simplifies registration, and the Part-Time Register aids job seekers. **Moldova** reduced its tax rates in 2005 to combat informality.

**Conducting education and awareness campaigns:**

- In **Cluster 2**, consulted papers highlight that since less-educated workers are more likely to remain informal, governments should improve education and run campaigns on tax benefits and risks of informality. One example is **Estonia's** 'Unpaid Taxes Will Leave a Mark' campaign.
- **Cluster 3** presents initiatives taken in **Cyprus** (e.g. training social partners), **Georgia** (e.g., instructional videos on Revenue Office website), **Estonia** (e.g. 'Thank you for paying taxes' campaign), **Latvia** (e.g. 'I Spit on It' and 'FraudOff!' campaigns) and **Lithuania** (e.g. sending informational letters about taxes).

**Modernising enforcement authorities to foster public trust and cooperation:**

- In **Cluster 1**, **Georgia** empowered public authorities after the Rose Revolution. The government restructured tax agencies, and increased civil servant pay to curb corruption. Controversial tactics included arresting individuals linked to the old

### *2.3.1. Boosting detection capabilities*

In **Cluster 1**, the papers exploring methods for detecting shadow economy practices (3 out of 9) presented either direct measures (e.g., tax audits or inspections) or indirect approaches for identification. In the first category, Schueth (2012) uses ethnographic research to explain how **Georgia** managed to triple its tax revenue between 2004 and 2007, largely due to the strategies employed by the reformist government that came to power after the 2003 Rose Revolution. Before the revolution, Georgia was perceived as highly corrupt, politically unstable, and lawless, requiring significant reforms (Schueth, 2012). In response, the new government sought to strengthen its control over daily activities. For instance, to reduce public sector corruption, police officers were limited to carrying no more than 5 U.S. dollars while on duty, and they were often subjected to unannounced checks by undercover agents. Additionally, tax officials were assigned to conduct more audits on businesses, which were temporarily closed during their fiscal evaluations. While these actions were seen as somewhat effective in enforcing the new legal and procedural reforms, they also instilled fear and resentment among Georgian citizens, entrepreneurs, and civil servants, as discovered non-compliance was harshly sanctioned (a topic that will be discussed in the *Implementing more effective sanctions* section). Moving to indirect ways of identifying shadow economic activities, in two studies, Gavoille & Zasova (2023a, 2023b) explore minimum wage hikes in **Latvia** and the businesses' response to these. In both studies, the authors focus their research on two minimum wage hikes (one from 2014 and one from 2015). In 2013, the minimum wage in Latvia was EUR 284.57 per month, which was raised to EUR 320 in 2014 and subsequently to EUR 360 in 2015.

Such reforms can be used as a mechanism for detecting tax-evading firms, as these firms generally employ large shares of minimum wage workers. In their first study (2023a), analysing data from 2011–2015 provided by the Latvian State Social Insurance Agency, the authors observe that, prior to the two hikes (e.g., in 2011), there were notable spikes in reported wages at the minimum wage and its half (which could suggest the fact that there were many minimum wage workers who worked part-time). For the wage hikes in 2014 and 2015, the authors note that workers earning the minimum wage before the hike generally continued to do so afterward, with new spikes emerging at the updated minimum wage thresholds. In general, small firms (with less than 30 employees) tend to have more minimum wage employees than large firms (more than 30 employees). Based on these findings, the authors recommend that fiscal authorities specifically target firms employing many minimum wage workers in their tax audits. In addition to being a tool for identifying non-compliant firms, minimum wage reforms have the potential to improve tax compliance and social protection. However, their effects differ across firms. In both studies (2023a, 2023b), Gavoille & Zasova highlight that workers in non-compliant firms and the firms themselves are more likely to survive minimum wage hikes, as these firms may respond by reducing wage misreporting and/or reporting fewer hours worked. Conversely, workers in tax-compliant firms face a higher risk of job loss, as these firms may struggle to absorb the increased costs, potentially resulting in layoffs or closures.

In **Cluster 2**, although 19 papers reported implications for better detecting shadow economic activities, they generally did not focus on specific methods or policy measures for improving detection capabilities of institutions fighting against this phenomenon. Exceptions are a study by Putniņš & Sauka (2015), which suggests that policymakers should consider using **incentives to encourage reporting non-compliant companies** to authorities, a report by United Nations Development Programme (2021), proposing an **anonymous denounce programme** in **Moldova**, and a study by Stankevicius & Leonas (2015), which highlights the need for more **reporting hotlines** and **a system with full information about economic agents** operating on the market. Similary, a report of ILO (2016) focused on **Moldova**, states that all relevant

information for workers and employers should be accessible via a dedicated webpage of the **National Commission on Consultations and Collective Bargaining**. Most other consulted papers discuss rather general aspects that could help in detecting shadow economic activities. For example, Eilat & Zinnes (2002) recommends **better training for public servants conducting tax audits.**

Gasparėnienė *et al.* (2022) reinforce this by suggesting that better-qualified and better-paid specialists conducting labour inspections could help reduce the size of the informal economy in **Lithuania**. They also propose that **unannounced inspections** could be more effective in detecting labour code violations. Similarly, papers focusing on **Moldova** have recommended the same approach (United Nations Development Programme, 2021; ILO, 2016), especially because in this country, The Labour Inspection and State Fiscal Service, two key institutions for detecting and penalising shadow economy, are required to provide firms with **at least five days' notice before conducting inspections**, which reduces the likelihood of uncovering irregularities (ILO, 2016). Moreover, these institutions have reduced authority, requiring to involve the Prosecutor's Office and other judicial bodies for suspected shadow activities. Poor communication between these entities often delays cases, while investigators frequently cite insufficient or low-quality evidence (ILO, 2016). **Digitalisation** was also considered a key factor for better detecting shadow economic activities (Gasparėnienė *et al.*, 2022; Elbahnasawy, 2021), as it could enhance the traceability of economic activities.

However, this could also be a facilitator in tax avoidance strategies, as noted by Argilés-Bosch *et al.* (2020). Through e-commerce, firms no longer need physical presence in the states they sell their products and services. Without a permanent establishment status, they can redirect profits to jurisdictions with lower taxes (Argilés-Bosch *et al.*, 2020). Additionally, some authors emphasize which groups should be prioritized in detection efforts. For instance, Moro-Egido *et al.* (2020) and Schneider (2015) draw attention to **individuals receiving unemployment benefits**, who often engage in the shadow economic activities to receive both a salary and benefits. Instead of reducing unemployment benefits – a solution that may seem intuitive – Schneider (2015) suggests that better monitoring of these individuals is necessary. Simply cutting benefits would not necessarily encourage more people to join the formal workforce and could harm those genuinely facing financial hardship during unemployment (Schneider, 2015). Here, Ohnsorge & Shu (2022) highlight that countries with lower unemployment benefits coverage have a larger share of informal economy. Mara (2021) underscores the **agricultural sector**, which accounts for a significant share of shadow economic activities and, therefore, requires enhanced control and supervision.

Gasparėnienė *et al.* (2022) also suggest that inspections should prioritize the **agricultural** sector, while also considering the **construction, repair service, childcare, housecleaning, transporting, hairdressing and beauty sectors**. Overall, while detection measures play a role in tackling the shadow economy, a view shared by several authors consulted in this cluster is that these measures are sometimes ineffective (Williams, 2020, 2010, 2009), motivating people to find new ways to conceal their activities (Frey & Schneider, 2015), especially since for some people, shadow economy is a survival strategy if they have no income (Loayza & Rigolini, 2011). More efficient solutions are considered those that generally enforce a 'good', compliant behaviour rather than focusing solely on detecting and punishing a 'bad' behaviour (Hutsebaut, 2021; Zitkiene *et al.*, 2016; Loayza & Rigolini, 2011; Williams, 2010, 2009). These solutions emphasize improving the advantages and benefits of participating in the formal economy (Loayza & Rigolini, 2011; Williams, 2010), enhancing citizens' civil responsibility (Frey & Schneider, 2015), or strengthening the relationship between the state and its citizens (Hutsebaut, 2021). These will be discussed in more detail in the following sections.

In **Cluster 3**, more than one third of the papers (14 of them) presented some shadow economy detection policies or strategies. A notable detection measure comes from **Cyprus**, where the Ministry of Labour and Social Insurance has focused on **increased inspections**, particularly in the **construction sector**, since 2009. As a result, the rate of undeclared work in this industry has dropped from 25% in 2009 to 10% in 2022 (ELA, 2024a). Another significant initiative in Cyprus is the **whistle-blower telephone hotline** (no. 7778577), introduced by the Department of Labour Inspection in 2010. Through this hotline, individuals could anonymously report undeclared work, workplace malpractices, or violations of employment contracts. The system is still currently operating, offering anonymity and protection to those who report non-compliance under Cyprus national law. Complaints are used for targeted inspections and to detect undeclared employment. According to ELA (2023a), the initiative has been relatively successful, with 360 complaints recorded in 2022 (the most recent year) and the highest number of complaints (702) in 2018.

In **Estonia**, since 2014, all employers have been obligated to register their employees in the **electronic Employment Register** prior to the commencement of work. The system is supervised by the Estonian Tax and Customs Board and gathers employment information in a one place making it a highly useful source of data for authorities conducting labour inspections. Due to various ways to complete the registration (i.e., online via the E-Channel, through SMS or phone call, or in person at the Estonian Tax and Customs Board office), as well as an awareness campaign on the new requirements and numerous workplace inspections, an additional 21,000 employees were registered in 2014, after the initiative was implemented (ELA, n.d.a). However, countries interested in implementing such measures must have a strong IT infrastructure in place. The Employment Register is part of a broader **collaboration** strategy of the Estonian Tax and Customs Board, which exchanges data with labour inspectorates and other authorities to conduct joint inspections aimed at reducing undeclared and under-declared work (ELA, 2023b).

An emphasis on the importance of **collaboration** between various state agencies for labour inspections is also suggested in the policy paper by Bechmann & Radeke (2014) focusing on **Moldova**. The authors specify which state institutions would need to improve their cooperation, namely **National Insurance House (CNAS)** and **Labour Inspectorate**, since in Moldova, employees often report cases of informal employment or underpayment of social contributions to CNAS. Similarly, a report by the Social Justice Center (2021), focusing on **Georgia**, highlights the need for stronger collaboration between state agencies. An example of such an approach is seen in **Lithuania**, where **Risk Assessment Centre and Joint Operation Centres** were established in 2019 to enhance **cooperation between public institutions** (such as the Police, the Financial Crimes Investigation Service, the State Tax Inspectorate, and the State Labour Inspectorate) in the fight against undeclared work and the shadow economy. Between 2019 and 2021, 3200 joint inspections were carried out, recovering EUR 620,000 in taxes (ELA, 2022c). Inspection decisions are often based on a risk assessment system that uses data mining on company information from various authorities, ranking companies by their risk of non-compliance. The system has significantly increased the chances of discovering undeclared work (ELA, 2023d). A key entity in the collaboration of public institutions against shadow economy in Lithuania is **The Central Coordination Group**, which has been established since 2001 and is a central hub for institutions addressing undeclared work (ELA, 2020b). The system determines the primary tasks and assigns them to the county level. Regional institutions also implement joint actions coordinated at the national level (ELA, 2020b). Besides joint inspections, Lithuania introduced the **Transparent Worker Identification QR Code** in 2022 as part of its efforts to combat the shadow economy. This initiative ensures that individuals on construction sites can be identified by authorities to verify

legal employment, with responsible parties required to submit the codes to institutions overseeing undeclared work. The codes contain information on whether an individual is officially employed, self-employed, or a posted worker in Lithuania and can be easily verified. Since its implementation, the initiative has helped labour inspectors identify undeclared workers, contributing to a decrease in their numbers compared to the previous year (ELA, 2023c).

Adopting the same view as Estonia and Lithuania, in **Latvia**, the **Council for Prevention of the 'Shadow Economy'** (*Ēnu Ekonomikas Padome*) and the '**Action plan of public authorities for combatting 'shadow economy' in 2016-2020**' stipulate a cooperation between various public authorities (such as the Ministry of Economics, the State Labour Inspectorate etc) to supervise, plan, coordinate, and analyse activities aimed at preventing the shadow economy (ELA, n.d.c). A notable strategy for detecting shadow economy activities in Latvia is applied by the State Revenue Service, which uses **risk analysis techniques** with specific criteria and specialized software to identify letterbox companies, combat fraud, and deter undeclared work. While the analysis is complex, involving many indicators (such as the average salary of company's employees, VAT returns of the subcontractors, and the number of complaints received about undeclared work for that company), specialized tools, and skilled staff to interpret the data, it has proven to be helpful in decreasing the number of tax debt schemes in Latvia. In 2017-2018 a number of 73 companies were tax-audited resulting in EUR 21.9 million being recovered by the state (ELA, 2019a).

In **Malta**, the Department for Industrial and Employment Relations closely monitored compliance in the road transport sector through **comprehensive roadside inspections** conducted throughout 2022. Aleatory road-sites inspections were carried out on commercial vehicles to identify violations of employment conditions under national law, undeclared work, and illegal overstays of workers in Malta. Among other outcomes of the inspections, 25 employees were found to be either unregistered or incorrectly registered, 13 individuals were discovered to be living and working in Malta illegally, and 5 employees receiving unemployment benefits were found to be working (ELA, n.d.h). The Employment and Training Corporation was also involved in conducting **inspections** in various other sectors, as part of their efforts to tackle undeclared work (Ministry of Finance, the Economy and Investment, 2010). Between October 2007 and December 2008, they conducted 4119 inspections, which lead to identifying 2175 infringements (most of them in hospitality, cleaning and retailing). Inspections continued in 2009 as well (between January and April). Out of 1251 inspections conducted, 728 additional infringements were identified, with 127 foreign nationals discovered working illegally (Ministry of Finance, the Economy and Investment, 2010). Details about the sanctions applied to those identified as non-compliant will be provided in the next section.

### *2.3.2. Implementing more effective sanctions*

Among the papers included in **Cluster 1**, the only one addressing sanctions for shadow economic activities is the paper of Schueth's (2012), partially reviewed in the previous section. The study highlights the strict sanctions applied to **Georgian** citizens and entrepreneurs found guilty of non-compliance with tax or fiscal transparency regulations. Unannounced inspections were frequently conducted to identify non-compliance, and heavy fines were imposed as penalties. While some fines were considered somehow justified (e.g., such as those for failing to comply with a 2006 law requiring firms to use cash registers and provide receipts to their customers), others were more contentious and viewed as unjust. Before the Rose Revolution, Georgia's fiscal code was subject to frequent unannounced amendments and rather impractical and inconsistent. Consequently, when the reformist government took power and initiated

retroactive tax audits, nearly every enterprise operating before the revolution could be found guilty of tax evasion leading to widespread perceptions of unfairness. Moreover, even businesses trying to comply with all legal and fiscal requirements could be penalized, especially because the new government was strict and intolerant of even minor errors in accounting. Furthermore, tax audits were conducted under the government's sole authority, with no judicial independence or institution to mediate fiscal disputes. As previously mentioned, while these practices significantly increased Georgia's tax revenue, the flip side was that they instilled fear and a perceived injustice among Georgian citizens, entrepreneurs and civil servants.

In **Cluster 2**, the 14 papers fitting this category of measures do not necessarily elaborate on specific sanctions or penalties for shadow economic activities in their policy implication sections. Instead, they provide suggestions on how to design sanctions and approach such policies. For example, it is important for policymakers to **address the public perception of impunity** (Ensor, 2004; Quintano & Mazzocchi, 2013), as people perceiving a low risk of being caught are more likely to evade taxes and engage in shadow economy (Putniņš & Sauka, 2015). In line with this, citing the work of Alstadsæter *et al.* (2019), Masca & Chis (2023) emphasise that it would be more effective to impose sanctions on larger suppliers of tax evasion services (e.g. accountants, financial consultants etc.) rather than increasing penalties for the tax evaders themselves, as the latter approach is, to some extent, less efficient. At the same time, Masca & Chis (2023) highlight the fact that, in general, convincing citizens to comply involves more than just detection and punishment instruments. This is also supported by Frey & Schneider (2015), who stress the fact that deterrence measures (e.g. more frequent controls, higher penalties) are generally effective in the short-term, as people tend to look for ways to make detection more difficult. A similar view is shared by Hutsebaut (2021), Williams (2020, 2010, 2009) and Loayza & Rigolini, 2011, as highlighted above under the *Boosting detection capabilities section*. The solutions proposed by these authors focus more on initiatives aimed at **reducing tax burden** (Frey & Schneider, 2015), **helping those operating in informal economy make the transition to formal economy** (Williams & Horodnic, 2015a, 2015b; Williams, 2010, 2009), providing **incentives or tax benefits** (Jessen & Kluve, 2021; Williams, 2010), **fostering voluntary compliance** (Putniņš & Sauka, 2011), **educating citizens regarding shadow economy** (Williams, 2020), or **raising civic responsibility** (Hutsebaut, 2021; Frey & Schneider, 2015). Such measures are detailed in the following sections.

In **Cluster 3**, there were not so many papers discussing sanction and penalties measures (5 out of 37). However, we will elaborate on the sanctions applied to those identified as non-compliant during the inspections conducted by Employment and Training Corporation of **Malta** between October 2007 and April 2009. After the first round of inspections (October 2007-December 2008), a total of 2032 individuals were **removed from the unemployment register for failing to provide a valid reason for not accepting an employment or training opportunity** offered by the Employment and Training Corporation. Additionally, 1236 cases were prepared for court hearings, while another 400 cases were referred to the police for court processing. Of the court cases heard, around three quarters were decided in favour of the Employment and Training Corporation. After the second round of inspections (January-April 2009), 67 people were removed from the unemployment register after being found working while still registered as unemployed (Ministry of Finance, the Economy and Investment, 2010). Only a few papers in this cluster explicitly discuss sanctioning strategies for addressing the shadow economy, a common perspective, also noted in papers from **Cluster 2.**

However, the papers included in Cluster 3 display that punishing individuals involved in this shadow economy may be less effective than persuading them to join the formal economy. Measures proposed for the latter are **incentives or associated benefits for formal economy**,

such as decent, tax-free and higher minimum wages (ILO, 2023; Social Justice Center, 2021) (with higher minimum non-taxable amounts for certain categories such as single mothers or invalids – United Nations Development Programme, 2008) or low tax regimes for micro and small enterprises similar to those extant in **Georgia** (Social Justice Center, 2021; UN Women, 2018). While they still have a role in combating shadow economy, penalties and sanctions could be included very slowly and should be light enough to encourage formalisation (UN Women, 2018). This view is not universally agreed upon. For example, in a study from 2014, Bechmann & Radeke (2014) argued that in **Moldova**, where the maximum fine for detected shadow economic activities was (at that time) MDL 10,000 (approximately EUR 520) for employers (with no fines for employees), penalties should have been accompanied by the payment of previously unpaid taxes and social insurance contributions. This was also highlighted in a report by ILO (2016). Bechmann & Radeke (2014) argues that additional measures, such as closure of business or imprisonment, could also be considered.

While it is acknowledged that employees sometimes have no choice but to accept undeclared work proposed by their employer, fines for employees could be introduced as well according to the authors. These should be lower than those for employers but are needed as a signal for the fact that shadow economy is not accepted in the society. However, the authors emphasise that policies aiming at tackling shadow economy should not rely solely on sanctions or punitive measures solely. Instead, the approach should adopt a '**carrots and sticks'** model, with both incentives for formal economy (carrots) and sanctions for those not complying (sticks) (Bechmann & Radeke, 2014).

### *2.3.3. Improving the accessibility and benefits associated with engagement in formal economy*

Most papers in **Cluster 1** (7 of them) fall into this category, with the countries studied implementing various measures to encourage activities in the formal economy. However, the most common initiative identified in the reviewed papers was the reduction of VAT. In **Latvia**, Nipers & Pilvere (2017) estimate that reducing VAT for fruits, berries, vegetables and potatoes from 21% to 5% would have multiple advantages. Firstly, it could lower the prices of these items, and potentially increase their consumption. As a result, although the government would receive less VAT revenue in the short run due to the lower rate, the price reduction could benefit consumers, who would then spend their savings on other goods (taxed at 21%), potentially generating additional VAT revenue for the government in the medium term. Secondly, the price difference between legitimate VAT-paying businesses and shadow businesses would decrease, as the advantage that shadow businesses once had due to lower prices would shrink.

This could encourage some businesses to transition from the shadow to the formal economy. However, even if they do not, consumers might find informal businesses less attractive, as the price difference between informal businesses and formal businesses would no longer be as significant. All these factors could decrease the shadow economy in the long run. Although Kindsfateriene & Lukasevicius (2008) do not particularly address VAT, their theoretical study, based on a literature review of the **Lithuanian** tax system, similarly emphasizes that tax reductions, in general, can encourage participation in the formal economy. One key point noted by the authors is that, as expected, higher income levels among citizens lead to increased expenditures, which in turn boost national budget revenues from value-added taxes.

Another important observation is that, in general, higher income tax rates do not guarantee higher tax revenues to the government, as they may incentivize businessmen to conceal their actual income. On the contrary, the authors show that in Lithuania, when the profit tax rate was

reduced, the revenues from this tax not only remained stable but increased more than six-fold from 0.31 billion Litas in 2003 to 1.9 billion Litas in 2006. With lower profit tax rates, businessmen are less motivated to hide or underreport their profits, leading to greater transparency. Moreover, due to the reduced tax rates, they can use the remaining income to invest in their businesses or pay their employees better (officially reported) salaries, which in turn can lead to higher national budget revenues. More developed businesses generate higher profits, and better-paid employees are more likely to spend their income, which subsequently generates more tax revenue for the state. Additionally, a reduced profit tax attracts more foreign investments. All these factors contribute to economic development.

A similar view on the benefits of reduced taxes for the formal economy is shared by Schueth (2012) and Bruhn & Loeprick (2015) in their studies of **Georgia**. Although many policy measures implemented in Georgia after the 2003 Revolution were somewhat controversial, as discussed in the previous sections, Schueth (2012) admits that the country's new fiscal code after the 2003 Revolution aimed to encourage the formal economy by reducing taxes, lowering tax rates, and minimizing exceptions. Bruhn & Loeprick (2015) go into further details and discuss the effects of a tax reform implemented in 2010. Until 2010, the same income tax rate was applied to all enterprises in the Georgian state. The reform focused on micro and small enterprises, stipulating those micro businesses (those with an annual turnover under GEL 30,000 and no employees) would be exempt from income tax, and small businesses (those with an annual turnover between GEL 30,000 and GEL 100,000) would be subject to a tax rate of either 3% or 5%. Using administrative data between years before and 2 years after the reform provided by the Georgian Revenue Service, along with regression discontinuity analysis, the authors find that the reform boosted formal firm creation. The micro-business tax regime increased firm registrations below the GEL 30,000 threshold by 27-41% in the first year. However, the increase in registrations was not sustained in subsequent years, suggesting a one-time response from informal firms registering to take advantage of the new regime. In contrast, the small business tax regime did not show a robust effect on formal firm creation in any year post-reform. Another important finding of the study is that firms just below the GEL 30,000 threshold declared significantly lower revenue compared to firms just above the threshold, in order to stay eligible for the micro-business tax regime. This suggests that some firms intentionally underreported their revenue to remain below the threshold and continue benefiting from the preferential tax regime (the micro-business tax regime). The effect appeared to be short-term, lasting only in the first year following the reform. As for firms just below the GEL 100,000 threshold, before the reform, there was no significant difference in the number of firms at the threshold in 2008 and 2009. However, in 2010, the first year after the reform, there was a significant increase in the number of firms just below the GEL 100,000 threshold, suggesting again that more firms were trying to remain under the threshold to benefit from the lower tax rates. This increase in the number of firms remained significant in 2011, but the effect weakened in 2012, indicating that the underreporting decreased over time. To conclude, the positive effects of the Georgian policy reform must be weighed against the risks of abuse due to differentiated taxpayer treatment (Bruhn & Loeprick, 2015).

Turning to other policy initiatives aimed at enhancing the benefits of the formal economy, Vallistu (2023) explores Estonians' opinions on the **Entrepreneur Account**, a digital solution implemented in **Estonia** to facilitate platform workers' access to social security. The study, based on interviews with policymakers and users of the account, examines perceptions on the effectiveness of this initiative. While it is generally more difficult for atypical workers to have social security coverage, Entrepreneur Account is a type of bank account that automatically taxes income (at a 20% rate or 40% rate for higher earnings). Individuals earning money from selling goods or services can voluntarily open such an account, with contributions

automatically transferred to the Estonian Tax and Customs Board. Through this, they can pay their taxes and thus, access social benefits more easily. Therefore, Entrepreneur Account was designed as a way of improving the accessibility and benefits of participating in the formal economy. Indeed, Entrepreneur Account users interviewed by Vallistu (2023) found this account beneficial for operating 'legally, with a low bureaucracy, and a lighter tax burden'.

However, access to social security coverage was not necessarily the main motivation for holding such an account. A perceived drawback of Entrepreneur Account is that it offers access only to certain benefits: maternity benefits, and pension and health insurance. Entrepreneur Account holders are not covered, for example, against unemployment risks. Moreover, sometimes even the social benefits for which the account provides coverage are hard to access because it is better suited to an employee's financial model than to the realities of entrepreneurship or platform work. To access social protection, platform workers must make regular monthly contributions, with a minimum amount that is sometimes difficult to meet. For example, one of the interviewees mentioned that they receive payments quarterly, which prevents them from accessing health insurance, as it requires monthly payments. Considering all these, Vallistu (2023) suggests that changes in legislation and policies should better incorporate digitalisation and the disruptive changes it brings to the labour market.

Additionally, the current social security system could be made more flexible in terms of conditions to access social benefits. For example, instead of requiring monthly contributions, health insurance could be guaranteed through a minimum contribution made over a longer period. Voluntary social security schemes (i.e., voluntary payments for certain benefits) are also seen as a possible solution. Regarding social security benefits, Jascisens & Zasova (2021) explore the consequences of tying these benefits to declared income in **Latvia**. In general, such measures might induce tax compliance (i.e., citizens are more motivated to declare their income to qualify for certain social security benefits). To assess these effects, the authors focus their study on parental benefits. In the Latvian state, the parental benefit was a monthly lump-sum until 2005. Following a reform in January 2005, the benefit was set at 70% of a parent's gross wage, with a minimum of EUR 80 and a maximum of EUR 558 (the minimum was then raised to EUR 90 and the cap was removed). The period considered to calculate the benefits was 12 months, ending 3 months before the child's birth. The reform led to an increase in declared wages, with a sharp rise of 5.4% to 7.5% during the months of pregnancy that overlapped with the benefit qualification period. However, this increase did not extend beyond the period considered for benefits, suggesting that employees and employers may collaborate to inflate wages for the benefit calculation, with the inflated income likely representing previously unreported earnings. Furthermore, the wage growth during pregnancy was notably higher in small firms (17.4% more than in large firms, those with more than 50 employees), where collusion between employees and employers may be easier to observe. As a result, the increased tax revenue from higher declared wages during pregnancy may be offset by the abuse of social benefits.

For **Cyprus**, Clifford & Mavrokonstantis (2021) examined changes in tax reporting policies and the behaviour of reporters to these in the context of charitable donations. In Cyprus, **charitable contributions are subsidized through tax deductions**. While taxpayers self-report their donations to claim these deductions, documentation is required if the donations exceed a certain amount. The mandatory documentation is uploaded by the reporter but must be obtained from third parties like NGOs or associations as proof that the taxpayer indeed donated money to them. For donations below the threshold, no documentation is required. Until 2003, the maximum amount that could be declared without receipts was based on the individual's salary. People earning more than CYP 10,000 could declare a maximum of CYP 150 in donations, those earning between CYP 7,500 and 10,000 could declare up to CYP 100,

and so on. Through Act No. 823 of 2003, the threshold was standardized to a maximum of CYP 150 for every citizen, regardless of their income. In 2008, the threshold was adjusted again, when Cyprus adopted the Euro (€). It was raised to EUR 300, which is the equivalent of CYP 175. However, the announcement of the changed threshold was made only after the 2008 fiscal year (end of April 2009), by which time all taxpayers had already filed their taxes, and, therefore, no "false" claim according to the new threshold could have been made. Using data from Tax Department of the Republic of Cyprus, the authors explore the tax behaviour responses to all these changes. Examining bunching patterns, the authors find that, between 2003 and 2007, there was a concentration of reported donations at the CYP 150 threshold, with little to no spread around this point. During this period, no excess mass was observed at the CYP 175 threshold. However, starting in 2008, bunching at CYP 175 began to grow, while the bunching at CYP 150 ceased to increase. While indeed, bunching at the CYP 175 intensified in 2009 and 2010 (i.e., after the announcement about the new threshold was made), it is surprising that its spike appeared in 2008 (when taxpayers did not officially know about it). This can suggest some real CYP 175 donations, but also the fact that some taxpayers anticipated an increase in the threshold, because they understood tax incentives over the year.

Based on the authors' estimations, at least 64% of the response to the increased threshold reflects changes in reporting rather than actual behavioural changes. Specifically, the authors note that taxpayers increase their reported donations by £0.70 for every £1 they can claim without providing documentation, with at least £0.45 of this increase attributable to reporting adjustments rather than real donations. While taxpayers seeking the maximum deduction may overstate their donations, it is also possible that individuals donating more than the allowable maximum underreported to avoid the burden of providing receipts. Therefore, the 'reporting adjustment' could reflect both increased over-reporting and decreased under-reporting. However, no signs of a missing mass above the threshold are noticed by the authors. Tax evasion is hence more likely the main source of the reporting responses.

To overcome this issue, the Clifford & Mavrokonstantis (2021) suggest lowering the maximum threshold for which no documentation is required. Indeed, this implies more administrative costs (as the administrative personnel must analyse and validate more uploaded receipts) and could determine those donating above the threshold to lower their donations in order to avoid providing the documentation. However, these costs are not outweighed by the costs associated with the scenario of an increase in the threshold, when tax evasion appears more (because this allows evaders to exploit larger deductions), and those with real donations just above the old threshold can evade with a small amount of money.

In **Cluster 2**, almost half of the papers (35 of them) elaborate on factors that could improve the accessibility and benefits associated with engagement in formal economy. To begin with, although the paper by Ekici and Besim (2018) does not primarily focus on behavioural responses to a specific policy, it highlights important aspects. In 2004, to reduce the prevalence of informal employment, in **Northern Cyprus**[6], in collaboration with the Turkish government, an amnesty allowing informal workers to register without penalties within a year has been implemented. The policy particularly targeted Turkish migrants working informally, and proved to be efficient, as it contributed, amongst other factors, to the decline from 25% to 10% of informal employment. However, the two authors focus their research on the wage gap between the formal and informal workers. They use the policy initiative as an instrumental variable for an exclusion restriction test for exploring the wage differences between formal and informal employment in Northern Cyprus. Indeed, there are significant differences in wages per hour and per month between informal and formal employees, with formal workers earning

6

in general more (both before and after the amnesty was employed), but this does not fall into the scope of our review.

Moving on to papers that discuss broader factors that could contribute to tackling the shadow economy, two main directions emerge, emphasizing that (1) providing formal economy-related benefits to citizens and (2) facilitating or simplifying business operations and administration can encourage participation in the formal sector instead of the informal one. In other words, when citizens find it (1) **beneficial** and/or (2) **easy to comply**, they tend do so.

Regarding the first direction, the literature notes that the **social protection systems** play a significant role in determining the size of shadow economy. For example, Mara (2021) states that a 1% increase in the share of GDP allocated to social protection leads to a 0.40% decrease in the shadow economy. This is because those operating in the shadow economy typically lack access to social protection benefits, such as unemployment benefits, maternity leave, pensions, or health insurance. As a result, employees are incentivized to choose official, declared jobs over shadow economy activities or occupations (Ohnsorge & Shu, 2022; Mara, 2021). However, Koettl & Weber (2012) caution this might not be the case for low-wage workers. While shadow economy participants indeed forgo social protection benefits, formal low-wage workers might find the financial rewards of formalization minimal. Taxes and the loss of benefits (e.g., housing subsidies, unemployment benefits) can significantly reduce their take-home income. To address this, policymakers could consider measures such as reducing labour taxes for minimum-wage workers or offering wage subsidies to make formal employment more attractive (OECD/ILO, 2019; Koettl & Weber, 2012).

Despite some of its drawbacks, it is generally assumed that enhanced social protection can ease the transition from informal to formal economy (Ohnsorge & Shu, 2022). In particular, there is a close connection between **healthcare benefits** and the shadow economy. Taking **Georgia** as an example, Belli *et al.* (2004) note that in 1995, public financing for the healthcare sector was less than 80 cents per capita annually (as the country was going through a transition period after gaining its independence from the Soviet Union in 1991). Thus, public insurance coverage was limited to a basic benefit package, and patients were charged for additional services. This situation paved the way for the creation of an unregulated market for health services. As healthcare workers increasingly relied on both formal and informal payments, they were gradually pressured to ask patients for direct payments to supplement their income, which led to a rise in informal payments in the healthcare sector. This was also highlighted in a study of Stepurko *et al.* (2013), exploring countries were the healthcare system has a relatively low funding (Bulgaria, Hungary, **Lithuania**, Poland, Romania and Ukraine). Similar findings were reported by Horodnic & Williams (2017), Tambor *et al.* (2013) and Ensor (2004). Therefore, when formal economy benefits are minimal or non-existent, people may feel compelled to seek benefits through the informal sector (Belli *et al.*, 2004; Stepurko *et al.*, 2013). One suggested solution is to **increase pre-paid healthcare coverage** through taxes, social insurance, and private insurance (Belli *et al.*, 2004; Ensor, 2004) or to introduce some obligatory charges in the benefit package (Tambor *et al.*, 2013). These could discourage people to make additional informal payments (Tambor *et al.*, 2013).

Another solution could be **eliminating existing duplications and reducing the number of under-utilized facilities** and personnel, as this would likely free up resources that could be used to improve service quality in the remaining facilities (Belli *et al.*, 2004). It is equally important to **inform patients about their rights and access to free healthcare benefits**, ensuring that no supplementary payments are required (Stepurko *et al.*, 2013; Tambor *et al.*, 2013; Belli *et al.*, 2004; Ensor, 2004). Policy makers could also make lists with hospitals performing best in terms of quality standards, hoping that those lower on the lists will strive to

reduce their informal payments (Ensor, 2004). Moreover, Stepurko *et al.* (2015) and Ensor (2004) as well note that **increasing healthcare personnel salaries** could be an effective strategy to address informal payments in this sector, as higher wages would reduce workers' motivation to request such payments. However, Stepurko *et al.* (2015) admit that this is not a universal solution, especially since **Lithuania** implemented it during 2005-2008 and still has a high prevalence of healthcare informal payments. For such cases, the authors recommend a performance-based payment system, where healthcare providers are paid based on the quality and quantity of services they deliver. This kind of system may help improve healthcare services and reduce informal payments by aligning payment with performance, thus encouraging providers to offer sufficient and good-quality service.

Not only could the social protection systems offer benefits that encourage the formalization of the shadow economy, but the **banking and financial sectors** were also found to play a significant role in such efforts. Banks (as well as other institutions such as digital lending platforms or microfinance institutions) can provide financial support to formal firms (e.g. credits) (Barra *et al.*, 2024; Ohnsorge & Shu, 2022; Distinguin *et al.*, 2016; ILO, 2016; Eilat & Zinnes, 2002), which could incentivize firms to transition from shadow to formal activities to access such support. Moreover, increased banking activity is expected to generate higher revenues to the governments (Gilbert & Ilievski, 2016).

Besides benefits offered to employees or businesses already operating in formal economy, it is equally important to provide incentives to those operating in the shadow economy in order to encourage them to do the transition to the formal sector. Offering them **amnesties** (Williams & Horodnic, 2015a, 2015b; Ekici & Besim, 2018; Williams, 2010, 2009), **reducing tax burden** (Gasparėnienė *et al.*, 2022; Chletsos & Sintos, 2021; Hutsebaut, 2021; Mara, 2021; ILO, 2016; Frey & Schneider, 2015), especially for low-wage workers (Koettl & Weber, 2012) or **providing tax incentives or tax benefits** (Jessen & Kluve, 2021; United Nations Development Programme, 2021; Williams, 2010) are also seen as potential solutions.

To elaborate on the last aspect, Pappadá & Zylberberg (2017) analyse tax reforms in 35 countries and develop a measure of VAT compliance in these. They argue that higher taxes increase the cost of declaring incomes, which may lead entrepreneurs to reduce their transparency. Additionally, higher taxes reduce the ability of firms to invest in their development. Specifically, a 10% increase in VAT is associated with a 4% decrease in VAT compliance. Similarly, Ohnsorge & Shu (2022) state that income and value-added tax rates are higher in countries with more shadow activities. In turn, tax cuts are considered effective in reducing informal economy.

Therefore, to make formal economy more attractive, policy makers should consider increased taxes incentives. Another example of incentive for formal economy comes from a report by United Nations Development Programme (2021). Suggesting that **reducing cash payments** could contribute to decreasing shadow economy, the report state that vouchers to cover costs associated with the installation of card payment terminals could be offered to firms deciding to adopt such terminals. Reducing fees for banking transfers is also considered a potential solution in the report. Kouakou & Yeo (2023) also propose a form of incentives to encourage formal economy. They argue that since **research and development (R&D)** drives **innovation**, and innovation policies can help reduce shadow economy, firms investing in R&D could be granted tax reductions, also known as 'R&D tax credit' (already implemented in France, the United Kingdom and the United States).

For firms interested in R&D but lacking financial resources, alternative support, such as direct financial assistance, could be provided (Rojco & Blyznyuk, 2017; ILO, 2016). Companies that create **new jobs** could also be incentivised for their contribution to the formal economy (Rojco

& Blyznyuk, 2017). While the aforementioned benefits are important to offer, it is equally crucial for governments to not only understand **which** benefits are needed, but also **when** they are needed. For instance, Owolabi *et al.*, (2022) observe a countercyclical nature of shadow economy: it tends to grow when the formal economy contracts or faces difficulties, such as during recessions. Therefore, during such periods, governments should prioritize offering support (such as fiscal assistance to businesses) since formal businesses may struggle. This view could, however, be challenged by one of the findings of World Bank (Ohnsorge & Shu, 2022) showing that formal and shadow economy can also go 'in tandem' (i.e., when one grows, so does the other and vice versa). A possible explanation is that shadow economy income may financially support formal-economy demand (Ohnsorge & Shu, 2022).

Regarding the second main direction of the consulted papers elaborating on **policies aiming to encourage formalisation**, many facilities that could be offered to businesses for simplifying business operations and administration come from **digitalisation**. This may encourage businesses to adopt digital tools for formal operations, reduced bureaucracy or simplified tax paying (Nguyen *et al.*, 2022; Ohnsorge & Shu, 2022; Elbahnasawy, 2021). Even if not directly facilitating business operations, **economic complexity** (i.e., a sophisticated, diversified economy, a wide variety of goods and services) (Ha *et al.*, 2021) and **liberalisation**[7] (Eilat & Zinnes, 2002) are also considered influential here, as it could contribute to economic growth, increase the number and diversity of available jobs, and reduce risks for firms introducing new products to the market. All these benefits and facilities could enhance overall **satisfaction** with the system and even **life satisfaction**, which is closely linked to **tax morale**[8] (as people more satisfied with their life usually express a higher tax morale) and, in turn, influences the shadow economy (Ciziceno & Pizzuto, 2022; Ohnsorge & Shu, 2022).

**Cluster 3** also comprises multiple papers (16 in total) discussing ways of facilitating and encouraging compliance. In **Estonia**, **digitalisation** is recognised as a key factor in formalising the economy, helping to facilitate various economic activities, such as streamlined transaction processing and the efficient sharing of tax information between government institutions. In fact, Estonia is considered one of the world's most digitally advanced society and is often cited as an example of success in using technology both directly and indirectly to encourage formalisation (ILO, 2021). The country's digitalisation strategy started in 1994, under the name of 'The Estonian Way to the Information Society' (ILO, 2021). Since then and until today, The Ministry of Economic Affairs and Communications has supported various digital business systems through workshops and funding, aiming to create a '**real-time economy**', with e-bills, e-payments, automated business reporting and an overall digitalised economy.

While the project is still ongoing, it has already developed several prototypes of e-waybills and conducted impact analyses of its initiatives. The overall goal of this initiative is to reduce administrative burdens, improve the traceability of economic activities, and thus enhance the formal economy (ELA, 2024b). While many initiatives to improve digitalisation in general were implemented by now, a notable measure facilitating the transition to formal economy is the introduction of the Estonian Tax and Customs Board's **e-Tax**, which facilitated the online declaration of taxes. This was a successful initiative, and it grew steadily, from 59% in 2004 to 92.4% percent in 2010, and then to 95% percent in 2015. By 2019, around 98 percent of tax declarations were submitted online (ILO, 2021).

[7] While liberalisation is indeed considered a potential measure to reduce the informal economy, a World Bank report (Ohnsorge & Shu, 2022) notes that an unintended consequence of such measure is that might lead to greater informality in the short term if not accompanied by measures aimed at increasing labour flexibility.
[8] *Tax morale* refers to the internal motivation to fulfil tax obligations (Horodnic, 2018).

Another initiative taken by Estonian Tax and Customs Board is that it **collaborates with digital platforms** such as Airbnb to enable voluntary earnings reporting and pre-filling tax returns to boost compliance through a user-friendly approach. With pre-filled tax returns, platform workers only need to validate the form sent by the Tax Authority at tax submission time, adjusting if necessary. Between 2020 and 2021, 97% of returns from taxpayers was filled electronically (ELA, 2021a).

Additionally, in 2020, Estonian Tax and Customs Board launched **a service that rates companies' tax behaviour** and provides information on how to maintain proper tax compliance and address any tax issues, helping to prevent the need for tax audits. To use this e-service, companies can voluntarily submit their tax information. The tool then provides a tax compliance and tax behaviour rating, highlighting any deficiencies, if applicable. The service is currently used by around 7.000 to 10.000 users per month, with 65% of them stating that they would recommend the tool to others (ELA, 2022b; ILO, 2021).

While such initiatives aim to help those already working or running a business, Estonia also implemented strategies targeting those intending to start a business, unemployed, or working in the shadow economy, aiming to bring all these individuals to the formal economy. For example, in 2007, the e-Business Register was launched as an easy process to register a business without the intervention of a notary or lawyer.

In order to help those unemployed, in July 2019, the Estonian government introduced the '**Kratt**' strategy, using AI to match unemployed workers with jobs. The algorithm for profiling job seekers is still being refined. These measures help individuals rejoin the formal labour market more quickly, with AI proving more effective than human staff in making job matches (ILO, 2021). Another notable strategy implemented by the Estonian Tax and Customs Board to encourage labour and tax compliance is the use of **'nudge' letters** in the construction (Williams, 2019) and HORECA (ELA, 2021b) sectors.

In the construction sector, employers whose reported wages were below 70% of the industry were identified and sent notification letters addressing this issue. Between January and June 2018, two types of letters were sent: (1) 'softer' ones, stressing the fact that the company could discuss its situation with the Estonian Tax and Customs Board to better manage tax obligations and (2) 'stricter' ones, highlighting potential penalties for tax-evading companies. The stricter emails were found to be more efficient than the softer ones, but overall, the notification letters led to a 12-13% increase in tax payments over a three-month follow-up period.

Between 2011 and 2012, in the HORECA sector, notification letters were sent to at-risk businesses, offering them an opportunity to update their accounting and tax information without penalty. Similar letters were sent to HORECA workers whose average salaries were significantly lower than the regional average. Follow-up inspections revealed that most targeted companies improved their tax behaviour, increasing employee declarations, wages, and wage levels, although some required further controls. Of the 1,300 companies that received the letters, 800 adjusted their declarations (ELA, 2021b).

A resembling approach was implemented in **Lithuania** (Williams, 2019). Companies that paid wages significantly lower than those of other companies in the same sector and/or region were notified by letter about this issue. In 2015, 40,000 **'warned to choose' letters** were sent, resulting in an additional EUR 68 million paid in wages and EUR 27 million collected in taxes. Another noteworthy initiative in Lithuania is a 2018 amendment to social security legislation, which requires employers (with some exceptions) to pay social insurance contributions based on the minimum wage, even if employees earn less. This 'top-up' ensures employees accumulate a full year's pension and helps reduce under-declared employment, where

employees are often reported as part-time or with under-reported hours despite working full-time. The initiative aims to eliminate these practices and has proven effective, with the rate of identified violations in work-time declarations dropping to 49% in the first nine months of 2018, compared to 70% in 2017 (ELA, 2019b).

In **Malta**, although still in the project-phase, the **National Business Portal** aims to encourage formal economy by providing entrepreneurs with a single platform to complete all necessary procedures for establishing, managing, and growing a business in the country (ELA, 2024c). The e-portal aims to simplify the administrative process for businesses by eliminating the need to provide the same information to multiple government entities, offering a single point of contact through an integrated platform. On the portal, business owners will be able to open and close businesses, pay taxes and many other activities. Such a platform already exists in Malta, but it is limited to posted workers. Created in 2022, **Postedworkersmalta.gov.mt** is a **'one-stop-shop' platform** employers can use to record all the necessary details regarding workers they intend to post in Malta. The platform gathered 200 posted workers notification forms in 2022 (ELA, n.d.i). Not only employers and business owners were targeted through such platforms in Malta. In 2008, the Employment and Training Corporation launched the **Part-Time Register**, allowing individuals seeking part-time work to register and connect with potential employers. As of September 2009, 1,045 individuals had registered for part-time employment (Ministry of Finance, the Economy and Investment, 2010).

Another strategy to encourage formalisation in Malta is the **Service Charter for Companies operating in the Security, Cleaning, and Care Working Sectors** (Malta Employers' Association, 2012). This charter serves as a tool for companies in these sectors to demonstrate their commitment to ethical employment standards, such as ensuring proper overtime payment and refraining from requiring workers to adopt self-employment status if they work exclusively for the company under its direct supervision. Companies that sign the charter and commit to its principles can receive preferential treatment in the awarding of tenders. However, if they fail to comply with the charter's principles, they are given a time frame to rectify the situation. If they still do not comply, they will be removed from the list of signatories (Malta Employers' Association, 2012).

While all the aforementioned initiatives to facilitate the transition from the shadow to the formal economy were indeed effective, the reverse transition (i.e., from the formal to the shadow economy) can also occur if government measures are unfriendly to business owners. The policy brief by Abramishvili & Shalibashvili (2023) highlights some examples of such cases in **Georgia**. Firstly, when the Georgian government **removed small traders from public spaces to promote urban land and property commercialisation**, rising rental prices drove many traders toward informal trade. This shift was an unintended consequence of market-oriented reforms, which exacerbated the social and economic vulnerabilities of these traders. Secondly, the Georgian Dream party's introduction of the Pension Agency, requiring an **additional 2% tax** from both employees and employers to fund pensions, unintentionally encouraged some workers to shift to the informal economy to avoid the tax, despite the initiative's original objective of securing workers' retirement benefits (Abramishvili & Shalibashvili, 2023). However, Georgia has also implemented effective strategies to encourage formal economy, one of which is the entrance into the **Deep and Comprehensive Free Trade Area** in 2016. Due to this, Georgia can export agricultural products in European Union without the tariff to EU markets (Danish Trade Union Development Agency, 2021).

Another initiative of Georgia is the reform of the complex (and often exploitative) private minibus system into a tender-based model. **The Ministry of Regional Development and Infrastructure, the League of Passenger Transport Operators, and the Trade Union of**

**Georgian Motor Transport and Motorway Workers** formed a consultation council. After protests and negotiations, memoranda of cooperation with tender-winning companies led to collective agreements on medical insurance, working hours, paid leave, and safety for workers. As a consequence, the drivers were registered as individual entrepreneurs with commercial contracts (Danish Trade Union Development Agency, 2021). Lastly, another initiative encouraging formal economy is the establishment of **Free Industrial Zones**. Their regulations permit full foreign ownership of companies, aiming to boost export diversification and promote regional development through improved cargo transportation and other related services. Companies in Free Industrial Zones benefit from **corporate tax exemptions, low labour, energy, and cargo costs**, **simplified customs procedures, rapid business setup, and free trade opportunities**. Their goods can enter the domestic market but are taxed at 4% of gross income (Danish Trade Union Development Agency, 2021).

A similar approach of reducing taxes to stimulate formalisation was also implemented in **Moldova**. Reforms in 2005 aimed to reduce the informal economy by shifting the tax burden towards indirect taxation, lowering income tax rates by 1–2 percentage points and employer social fund contributions to 27% of gross wages (ILO, 2007).

### *2.3.4. Conducting education and awareness campaigns*

No paper included in **Cluster 1** examined the impact of such initiatives. However, 26 papers included in **Cluster 2**, provided examples or implications in this sense.The reviewed papers frequently highlight the importance of **tax morale** in addressing the shadow economy. Tax morale can greatly enhance compliance, thereby reducing the shadow economy overall (Ciziceno & Pizzuto, 2022; Kemme, 2020; Marè *et al.*, 2020; Williams, 2020; Williams & Horodnic, 2015a, 2015b; Stankevicius & Leonas, 2015; Torgler & Schneider, 2009).

Among the factors influencing tax morale and shadow economy in general, **education level** plays a key role (Ohnsorge & Shu, 2022; Kemme, 2020, Rodriguez-Justicia & Theilen, 2018), especially because less skilled workers (i.e., people with lower education level) are more likely to remain in the informal economic sector (Ohnsorge & Shu, 2022). Therefore, on one hand, governments should aim to offer **better education** to their citizens (OECD, 2024; Ohnsorge & Shu, 2022; ILO, 2016). On the other hand, policy makers should aim to foster tax morale through their initiatives such as **information campaigns and education programs about the direct and indirect benefits of paying taxes and formal economy in general** (Masca & Chis, 2023; Gasparėnienė *et al.*, 2022; Ohnsorge & Shu, 2022; United Nations Development Programme, 2021; Kemme, 2020; Moro-Egido *et al.*, 2020; OECD, 2019; Rodriguez-Justicia & Theilen, 2018; Williams & Horodnic, 2017, 2015a, 2015b; ILO, 2016; Zitkiene *et al.*, 2016; Williams, 2010, 2009), **or about the negative consequences and risks of shadow economy** (Rojco & Blyznyuk, 2017; National Development Strategy Moldova 2030).

Williams & Horodnic (2015b) provide the example of the 'Unpaid Taxes Will Leave a Mark' campaign in **Estonia**, whose core message emphasized that supporting the state is the responsibility of every citizen. 65% of people surveyed about this campaign stated that they believed it increased awareness of unpaid taxes (Williams & Horodnic, 2015a, 2015b).

Another recommendation for an initiative focused on educating purchasers of undeclared goods and services about the taxes applicable to their purchases, comes from Horodnic *et al.* (2021), who propose the mandatory use of cash registers[9], accompanied by posters informing citizens

[9] While the article specifically refers to health services, this policy recommendation could be extended to other sectors as well.

that they are not required to pay any bills without a printed receipt and can lodge complaints via a specified hyperlink. This recommendation implies the need for a well-developed reporting tool. Furthermore, the state could introduce receipt lotteries to incentivize citizens to request receipts for every purchase (Horodnic *et al.*, 2021).

The studies of Williams (2020) and Williams and Horodnic (2015a) also suggest campaign ideas to improve tax education, such as using banners with messages like 'Your taxes are paying for this' on ambulances, fire engines or schools. While enhancing knowledge about taxes is important, it is equally essential to provide **training and professional development opportunities** to citizens (OECD, 2024; ILO, 2023; OECD, 2023; Gasparėnienė *et al.*, 2022; Rojco & Blyznyuk, 2017; National Development Strategy Moldova 2030). These could help them secure a job more quickly during periods of unemployment, reducing their reliance on social benefits (Gasparėnienė *et al.*, 2022).

In **Cluster 3**, 9 papers presented initiatives aimed at informing and educating citizens in terms of formal economy. It is worth noting that the **Cyprus** Labor Inspectorate has been organizing **annual training sessions** to social partners since 2017 to raise awareness about the issue of undeclared work and to promote the existing legislation and measures designed to address it. The training sessions primarily address trade unions and employers' organization. Positive outcomes of these events include the participation of more than 260 attendees, and the fact that during an internal evaluation, most participants reported that their knowledge about the topic of undeclared work has increased. Moreover, some trainees voluntarily implemented the training within their own organizations. While not solely attributable to the training sessions, a significant reduction in undeclared work in the HORECA sector was observed, dropping from around 40% in 2017 to 9% in 2020 (ELA, 2022a).

A similar approach based on providing training, guidance, and instructions for compliance can be noticed in **Georgia**, where The Revenue Office provides instructional videos on procedures like filing financial declarations, but efforts are needed to increase their accessibility and reach (Abramishvili & Shalibashvili, 2023). Additionally, Georgia established the **National Vocational Education Council**. The council helped develop Vocational and Education Training policies for the private sector by establishing sectoral and supervisory councils at the college level, with active participation from employers' organisations and trade unions (Danish Trade Union Development Agency, 2021). Moreover, job seekers in Georgia can receive support from the State Employment Promotion Agency, which collects information on training programs, internships, and employment opportunities (Social Justice Center, 2021).

In **Estonia**, since 2014, the Labour Inspectorate has an **Agreement of Cooperation** with the Division of Occupational Health and Safety of the Regional State Administrative Agency for Southern Finland, aimed at safeguarding the rights and ensuring equal treatment of Estonian workers posted to work in Southern Finland's labour market (ELA, n.d.b). The institutions collaborate to **raise awareness** among Estonian posted workers about their rights and obligations in Finland, using shared materials and official websites. They also engage in ongoing information exchange, biannual meetings, and even labour inspector exchanges. As a result of the cooperation, Estonian inspectors have received extensive training, particularly regarding posted workers. Estonia has only recently begun receiving posted workers, as it was primarily a sending country in previous years (ELA, n.d.b).

Another initiative in Estonia is that of the Estonian Tax and Customs Board's, which launched the '**Thank you for paying taxes**' awareness raising campaign in 2018 (ELA, 2020a). This was focused on thanking taxpayers for their contributions and highlighting how their payments benefit various sectors (e.g. education, health, social security, pensions etc) at both a societal and personal level. The campaigns' messages were shared via social media, radio, television

and on campaigns' website which also provided additional resources for employees, such as tools to check whether their employer had registered their employment contract. Moreover, stickers with campaigns' messages were placed on ambulances to highlight that the health sector is publicly funded through taxes. The campaign reached a wide audience and received positive feedback across the platforms it was shared on. Key factors in its success included the use of diverse media channels and the incorporation of real-life examples in the messages.

Another campaign example comes from **Latvia**. In 2011, The Latvian Employers' Confederation launched **'I spit on it' (*Man uzspļaut*)** campaign to raise awareness about the negative effects of shadow economy on the society. The campaign used an intriguing approach by displaying the message 'I Spit on it' on a black background across electronic boards in Riga and on TV. This generated curiosity, and the ads later (i.e., after one month) revealed three images — a child, a pregnant woman, and an elderly couple — along with the texts 'Happy childhood?', 'Young families', and 'Well-provided for old age'. The images aimed to highlight how the shadow economy negatively impacts social benefits such as children's futures, maternity leave, and pensions. Along with the messages, the Latvian Employers' Confederation also promoted a **tool for measuring shadow behaviour in daily activities**, offering advice to help people reduce their own involvement in the shadow economy. Although it is difficult to measure the campaign's impact, it started various discussions on popular media channels (ELA, n.d.d). While the 'I Spit on It' campaign ran only in 2011, Latvia also has an ongoing awareness campaign aimed at combating the shadow economy, particularly fraudulent activities. **'#FraudOff!' (*#Atkrapies!)*** is an initiative that began in 2018, focused on helping Latvian citizens identify instances of fraud and encouraging them to stand against and combat it. Five types of messages, promoting behaviours against fraud (e.g. requesting a written employment contract to the employer) were shared on social media (both through regular posts and influencer endorsements) and on the campaign's website. Additionally, a contest was held to encourage participants to nominate an 'excellent boss' in the workplace for a chance to win a hoodie (ELA, n.d.e).

In **Lithuania**, in 2017, the Social Security Authority (SODRA) launched a campaign in which over 130,000 **informational 'cherry' letters** were sent to employees who had not accumulated a full year of pension contributions in the previous year, likely due to involvement in undeclared or under-declared work. More than one-third of those who received the letters reported a higher income following this initiative (Williams, 2019).

### *2.3.5. Modernising enforcement authorities to foster public trust and cooperation*

In **Cluster 1**, only the paper of Schueth's (2012) elaborates on initiatives aimed at empowering public authorities in the context of shadow economy in **Georgia**. The author highlights several effective measures implemented after the 2003 Rose Revolution. First, to sever ties between businesses and tax officials, the government restructured tax and inspection agencies, reassigned officials from larger cities to smaller towns, and minimized direct interactions between officials and businesses. Second, the government improved civil servants' salaries and provided better training, which reduced incentives for bribery and corruption. However, some measures were more controversial. For instance, since corruption was framed as a national betrayal under the reformist government, key officials and businessmen, particularly those linked to the previous regime, were arrested on corruption charges. Detainees were confronted with compromising evidence (*kompromat*) collected during the former president's administration and were offered the option to make substantial payments to the government in exchange for their release. Initially, this tactic was seen as a form of 'social revenge' and proved effective in generating substantial funds, aiding the state's recovery from economic decline.

However, over time, the strategy expanded to target smaller, non-compliant enterprises that had suffered under the previous, impractical tax code. Moreover, public servants and tax officials became targets in the fight against corruption, facing severe sanctions. Tax officials were frequently held accountable – and even dismissed – for any shortfalls in revenue. Many employees within the tax system were prosecuted for corruption, even for minor errors in their calculations (Schueth, 2012).

In **Cluster 2**, a total of 50 papers provided insights into how institutions engaged in combating the shadow economy could be modernised and improve citizens' trust. **Digitalisation** emerges as a crucial factor that could aid governments in combating the shadow economy. Not only does it facilitate formal operations and reduce bureaucracy for businesses, but it can also help public institutions be more efficient in their administrative tasks (Ohnsorge & Shu, 2022; Elbahnasawy, 2021) and enhance coordination between government agencies (Elbahnasawy, 2021). Consequently, investments in information and communication technologies could better integrate the informal economy into the formal sector (Erumban, 2024).

Moreover, digitalisation has introduced new job opportunities globally, many of which do not align well with existing legislative systems that are primarily designed for traditional occupations. Therefore, policymakers should consider the implications of digital technologies and adapt and implement regulations to formalize extra-legal activities (OECD, 2023; Lanamäki & Tuvikene, 2022; Ohnsorge & Shu, 2022).

For example, **Lithuania** tried to do so and amended its Road Transportation Code in 2016 to make it fit the new jobs brought into the sector by ride-sharing platforms. The updated provisions permit passenger transport by both individuals and businesses using taxis or private cars. In return for this facility, transport enterprises must report passenger data to road transport authorities, notify the municipal authority of their services, and declare income to the State Tax Inspectorate (OECD, 2023).

A similar approach was taken by **Latvia** through its Road Transport Law in 2018, mandating that ride-sharing apps exclusively accept electronic payments and require drivers for their registration as legal entities in the Enterprises Register (OECD, 2023). Beyond modernizing the technologies they operate with, public authorities should also strive to modernize and improve their public image. The previous section (related to awareness and education campaigns) highlighted that **tax morale** plays a crucial role in reducing the shadow economy. While education significantly influences tax morale and tax evasion behaviour, **the actions of other social actors** (e.g., the behaviour of fellow citizens) (Bruno, 2019; Torgler, 2012; Putnins & Sauka, 2011; Frey & Torgler, 2007), the **social norms** (Williams & Horodnic, 2017, 2015a; Aliyev, 2014; Azzopardi, 2013; Putniņš & Sauka, 2011), the overall **institutional quality** (Allam *et al.*, 2023; Galdino *et al.*, 2023; Ohnsorge & Shu, 2022; Hutsebaut, 2021; Psychoyios *et al.*, 2021; Bruno, 2019; Yamen *et al.*, 2018; Aliyev, 2014; Buehn *et al.*, 2013; Torgler & Schneider, 2009) and the **tax burden** (Torgler, 2012) are also key factors in shaping tax morale.

Thus, public authorities should focus on enhancing both their actual and perceived **performance**, **quality** and **morality** (OECD, 2023; Gasparėnienė *et al.*, 2022; Ohnsorge & Shu, 2022; Horodnic *et al.*, 2021; Hutsebaut, 2021; Psychoyios *et al.*, 2021; Marè *et al.*, 2020; Williams & Kayaoglu, 2017; Williams & Horodnic, 2015b; Dau & Cuervo-Cazurra, 2014; Torgler, 2012; Eilat & Zinnes, 2002). Therefore, fostering greater **trust** among citizens in both authorities and other citizens (OECD, 2023; Gasparėnienė *et al.*, 2022; Horodnic *et al.*, 2021; Hutsebaut, 2021; Marè *et al.*, 2020; Williams, 2020; Williams & Horodnic, 2015a; Aliyev, 2014; D'Hernoncourt & Méon, 2012; Torgler, 2012; Putniņš & Sauka, 2011) and improving

public institutions' overall **relationships with citizens** (Frey & Schneider, 2015; Torgler, 2012) should be considered.

To achieve these, the literature recommends a large array of actions. For example, enhancing **transparency** regarding public authorities' activities and how taxes are spent (Ciziceno & Pizzuto, 2022; Gasparėnienė *et al.*, 2022; Kuznyetsova *et al.*, 2022; Ohnsorge & Shu, 2022; ILO, 2016; Putniņš & Sauka, 2015; Torgler, 2012; Putniņš & Sauka, 2011; Eilat & Zinnes, 2002), **reducing corruption** (OECD, 2023; Ciziceno & Pizzuto, 2022; Ohnsorge & Shu, 2022; Hutsebaut, 2021; Mara, 2021; Distinguin *et al.*, 2016; ILO, 2016; Aliyev, 2014; Torgler, 2012; Torgler & Schneider, 2009; Eilat & Zinnes, 2002), and improving **procedural justice** to ensure that citizens believe they receive the public goods and services they deserve for the taxes they pay (ILO, 2016; Williams & Horodnic, 2015a; Williams, 2020, 2009) could enforce citizens' **trust** in state institutions.

To improve the overall relationship with the citizens, authorities should adopt a **friendlier** attitude rather than an authoritative, restrictive one towards them (Ciziceno & Pizzuto, 2022; Ohnsorge & Shu, 2022; Williams & Horodnic, 2015a) and tailor **communication to target non-compliant citizens** (rather than broadly publicizing high levels of non-compliance, which could erode trust in others' compliance) (Horodnic *et al.*, 2021; Williams, 2020). Concerning the later, a report by United Nations Development Programme (2021) highlights that it might be more effective to spread positive information about tax compliance to motivate people copy or replicate this behaviour, rather than drawing attention to high levels of non-compliance, as negative behaviours are more 'contagious'.

Beside communication itself, relationships with citizens could also be improved by making **(fiscal and tax) policies[10] more stable** (i.e., introducing fewer frequent changes) (Putniņš & Sauka, 2015, 2011; Engelschalk, 2004) and **simpler** (i.e. less complicated, with low levels of bureaucracy and requiring less time to be filled out) (Gasparėnienė *et al.*, 2022; Nguyen *et al.*, 2022; Ohnsorge & Shu, 2022; Hutsebaut, 2021; OECD, 2019; Rojco & Blyznyuk, 2017; ILO, 2016; Zitkiene *et al.*, 2016; Williams, 2010, 2009; Engelschalk, 2004), and addressing **ambiguous or inefficient laws[11]** (Galdino *et al.*, 2023; Williams & Kayaoglu, 2017; ILO, 2016; Eilat & Zinnes, 2002).

Another important recommendation for authorities designing policies aimed at tackling shadow economy is to include citizens in this process. **Collaboration** with civic organizations will strengthen the relationship between public institutions and citizens, and could also improve information sharing, leading to a better understanding of the current state of markets and the economy (Gasparėnienė *et al.*, 2022). **Cooperation and coordination** are needed not only between the state and citizens, but also between state institutions and even between states, as the fight against the shadow economy is a complex process that takes time (ILO, 2016; Aliyev, 2014) and requires the involvement of various institutions and society as a whole (OECD,

[10] In terms of tax policies, an interesting recommendation is made by Bird & Zolt (2011): *dual income taxation*. Such a system refers to a tax structure that applies separate tax rates or methods of taxation to different sources of income. In general, a progressive tax rate is applied to labour income, ensuring that individuals earning more contribute more, and a lower, flat tax rate is applied to income from capital (e.g. investments, dividents, interests etc.). The authors suggest that this kind of approach might improve transparency and thus, decrease tax evasion. However, the progressive part of taxation must be cautiously interpreted, as it can encourage people to opt for shadow economy when reaching amounts with higher taxations (Trandel & Snow, 1999).

[11] An example of such inefficient law is provided by Williams & Kayaoglu (2017) who note that in **Cyprus**, a written employment contract is not required for 'atypical workers' (e.g. fixed-term, seasonal and part-time workers), and employers are permitted to wait up to one month after hiring someone before providing them with a written contract. Therefore, Cyprus is the country with the highest proportion of employees working without a written contract or terms of employment in the study of the two authors.

2023; Gasparėnienė *et al.*, 2022; Hutsebaut, 2021; United Nations Development Programme, 2021; ILO, 2016; Zitkiene *et al.*, 2016; Eilat & Zinnes, 2002; National Development Strategy Moldova 2030).

Moreover, policies implemented at a **larger scale** tend to have a significantly higher proportion of positive and statistically significant estimates compared to individual programs (Ohnsorge & Shu, 2022; Jessen & Kluve, 2021). Bernabè (2005) highlights that policy makers in **Georgia** should differentiate between small-scale informal activities, which provide employment and livelihoods for half of the Georgian workforce and result in minimal government revenue loss, and larger underground or illegal activities, which create limited employment but represent a significant source of potential tax revenue.

At the same time, policies addressing shadow economy need to be tailored to **country circumstances** (Ohnsorge & Shu, 2022). For example, in countries with shadow economy stemming from poor governance, policies could simplify regulations, enhance tax enforcement, and improve public services to boost tax morale. In underdeveloped economies, efforts may prioritise improving access to finance, education, and social safety nets to encourage formalisation (Ohnsorge & Shu, 2022). While all the aforementioned aspects relate to policies that are relatively feasible for state authorities, there are situations where the power of public institutions is constrained by external factors. One such factor is the International Monetary Fund (IMF), as highlighted by Chletsos and Sintos (2021). The IMF often imposes conditions on countries seeking loans, which can reduce the state's control over key areas such as social protection, wages, working conditions, and payments in general. This weakened control may, in turn, encourage people to participate in the shadow economy. For example, **Moldova's** IMF loan required the government to eliminate import restrictions on meat and dairy products. As a result, businesses in these industries faced increased competition, leading some firms to bribe officials for more favourable treatment (Chletsos and Sintos, 2021). A potential solution for regaining control in such scenarios could be found in the studies by Buehn *et al.* (2013) and Eilat & Zinnes (2002). The authors suggest that government employment decentralization could significantly reduce shadow economy. As civil servants are 'closer' to citizens, shadow economy becomes less attractive.

In **Cluster 3**, 5 papers fitted this category of policies. An example of measure for **enhancing trust** in public authorities comes from a report by the ILO (2021), which highlights how **digitalisation** can improve **transparency** in public institutions' activities. Namely, in **Estonia**, everyone can view which government authority has accessed their data via the **eesti.ee portal**. If they have concerns about the reasons for data access, they can address this with the Data Protection Inspectorate. Estonians' right to privacy is protected by the 1996 Personal Data Protection Act and 2000 Public Information Act. The latter also stipulates that an individual is required to provide their data to a state institution only once. If any other state institution requires the same data, it is prohibited from requesting it again from the individual. This encourages state institutions to establish **communication** channels with one another and to enhance **cooperation**. Additionally, to improve this cooperation, Estonia also provided **X-Road**, a decentralised exchange layer facilitating the secure sharing of data between different government institutions. There are more than 50 databases within this system, and it is approximated that using data exchange saves 844 years of working time per year (ILO, 2021).

An emphasis on **cooperation** was also put in **Georgia**. Here, **Tripartite Institutions** ensure collaboration between the government, employers' organisations, and trade unions for solving labour issues (Danish Trade Union Development Agency, 2021). Beside facilitating cooperation between its public institutions, Georgia also tried to enhance their **justice**. For example, to resolve legal disputes about labour rights, it implemented a system of random and

automatic case assignment to judges across the courts (Danish Trade Union Development Agency, 2021).

Another noteworthy strategy is **Latvia's** recent shift by the State Labour Inspectorate **from a control-based model to a preventative one** (Williams, 2019). Thus, instead of measuring their performance by the number of inspections conducted and cases of undeclared work identified, they began focusing on the number of **legitimised work relationships** and the number of **advice/support consultations** provided to enterprises in sectors with a high prevalence of undeclared work. Before sanctioning non-compliant firms, the Inspectorate opted to offer consultations for compliance. In 76% of the cases where undeclared work was identified, the individuals either received a formal employment contract or were registered with the State Revenue Service (Williams, 2019).

The importance of providing **employment consultations** has also gained attention in **Lithuania**. In 2012, the State Labour Inspectorate introduced consultations via Facebook Messenger to offer more options for employers, employees, and their representatives, improving access to advice on occupational health, safety, and formal work. This ongoing initiative provides automatic responses to various queries. For more complex inquiries, lawyers employed by the State Labour Inspectorate manually respond. The initiative has seen significant interest, with consultations increasing by 46% between 2016 and 2017 (ELA, n.d.f). In addition to Facebook Messenger, the State Labour Inspectorate uses various communication channels to offer consultations to Latvian citizens, such as call centres, seminars, press releases. It is also focused on continuously improving the quality of its consultations and has implemented several methods for evaluating communication. The Inspectorate has introduced frequent and concise **surveys to measure service quality**. The evaluation results are used to assess feedback and refine services to ensure effective communication and consultation. For example, based on feedback from an employer survey, the Inspectorate plans to introduce a quarterly employer newsletter featuring updates on labour law and occupational safety and health issues (ELA, n.d.g).

Lastly, it is equally important to mention policy initiatives that did not work in terms of improving institutional quality and authority in the fight against shadow economy. For example, in **Moldova**, in 2011, the Government introduced an action plan to reduce envelope payments and informal employment, with some activities delayed until 2015 and 2016. However, the plan lacked a strong institutional lead, a dedicated budget, and a clear monitoring framework. As a result, informal employment actually increased in the country (National Confederation of Employers of the Republic of Moldova, 2015).

## *2.4. Conclusions*

Starting with the first research question on the **evidence available regarding policies aimed at reducing the size of the shadow economy, the systematic review revealed that there is limited evidence on this topic.** Out of 120 papers analysed, only nine studies in Cluster 1 directly examined specific policy measures targeting the shadow economy. These studies predominantly relied on secondary data and lacked experimental designs, making it challenging to draw robust conclusions about policy effectiveness. Cluster 2 provided broader insights from 74 papers that explore various dimensions of the shadow economy (i.e., not focusing on specific policy measures or initiatives, but examining aspects such as drivers, characteristics of agents involved in shadow economic activities, etc.), each of which elaborates

on at least one policy implication based on its findings. Cluster 3, consisting of 37 grey literature documents, offered descriptive accounts of policy measures based on institutional data but did not provide rigorous evaluation. Overall, **while some evidence exists, it remains fragmented and insufficient for comprehensive policy assessment**.

In addition, the systematic review revealed a reliance on empirical methods, though with **limited methodological diversity**. In Cluster 1, six studies used quantitative secondary data analysis, one employed ethnographic research, one conducted interview, and one study was a theoretical one. Cluster 2, with 74 studies, mainly utilised quantitative methods (60 studies), alongside three qualitative, three mixed-method, and eight theoretical studies. In Cluster 3, the 37 grey literature papers provided descriptive analyses based on institutional data from enforcement agencies (e.g., labour inspectorates, tax authorities, social security agencies). Experimental designs, such as randomized trials, were absent, highlighting the **need for more rigorous and varied methods to evaluate policies effectively**.

Turning to the third research question regarding the **direction and the magnitude of the effects of various policies in reducing the size of the shadow economy**, the available evidence suggests that various policies targeting the shadow economy have generally yielded positive results, though these effects appear to be limited and context-dependent. For instance, tax reforms and enforcement strategies implemented in countries such as Latvia and Estonia were associated with improved compliance and reductions in undeclared work, as seen in the findings from secondary data analysis in Cluster 1 and Cluster 2. However, the magnitude and sustainability of these effects remain unclear, mainly due to methodological constraints such as the lack of experimental designs or control groups. Additionally, the grey literature in Cluster 3 provided anecdotal evidence of successful initiatives, including digital monitoring, but these accounts were largely descriptive. **While the evidence suggests positive outcomes, it falls short of providing robust estimates regarding the true magnitude or long-term impact of these policies.**

Finally, the review **highlighted significant evidence gaps in evaluating policies targeting the shadow economy.** Among the 120 papers analysed, only nine explicitly assessed the impact of specific measures, with very few employing experimental or primary data collection methods. This gap may be attributed to researchers' limited access to administrative data, which restricts their ability to conduct rigorous evaluations. Future research should prioritize fostering collaborations between researchers and enforcement authorities to improve data sharing and enable field experiments. Additionally, efforts should be made to include underrepresented countries, such as Malta and Moldova, to address geographical disparities. Adopting mixed-methods approaches and innovative evaluation designs will be essential for addressing these gaps and strengthening the evidence base for policy development.

## 3. Main findings and lessons learned from the stakeholder workshops

As part of a systematic review of shadow economy measurement methods and policy measures, three online workshops were held to engage diverse stakeholders. The workshops aimed to explore the root causes of the shadow economy across regions and identify effective policies to facilitate the transition to a formal economy. Participants included academics, policymakers, state institutions, social partners, industry associations, and field experts.

The input gathered through the registration form and workshops highlighted the multifaceted nature of the shadow economy and underscored the need for a holistic approach to address its various underlying drivers. A summary of the findings is presented below, with further details available in Appendix E.

**Key findings:**

- To enhance the **detection** of shadow economy activities, increased inspections (particularly in sectors like construction and agriculture), modernized monitoring tools and stronger inter-institutional cooperation are needed. Participants from the Baltic States highlighted the fact that their countries had already adopted some of these measures, such as worker ID systems in **Lithuania** and e-monitoring in **Estonia** and **Latvia's** construction sectors. In contrast, participants from **Georgia** and **Moldova** acknowledged ongoing challenges in this area. Meanwhile, there is growing concern about regulating the cryptocurrency market and implementing whistleblower schemes in **Malta** and **Cyprus**.
- Workshop participants generally viewed increasing **sanctions** as a potential solution to the shadow economy. However, representatives from **Georgia** and **Moldova** acknowledged weak labour inspectors' power and resource constraints. Meanwhile, fines for illegal work have tripled in **Lithuania**, and 'naming and shaming' lists for non-compliant businesses are used in **Estonia**.
- Workshops highlighted the need to make **participation in the formal economy more accessible and beneficial**. Stakeholders agreed that reducing costs (e.g., through tax cuts), simplifying tax processes (e.g., through digital payments), and rewarding compliance are key to increasing formal engagement.
- Participating stakeholders emphasised the need for public **education on the benefits of the formal economy**. However, in **Moldova**, awareness campaigns were found to be only mildly effective, thus suggesting a need for stronger efforts. Representatives from **Malta** and **Cyprus** highlighted social norms' impact on reporting, stressing the need to shift perceptions toward compliance.
- **Modernizing enforcement authorities** involves increasing transparency, enhancing communication, and building public trust.

Starting with **boosting detection capacity**, the workshops highlight the importance of enhancing monitoring systems, utilizing data-driven tools, and fostering inter-institutional cooperation to address the shadow economy effectively. Across countries, innovative measures have been implemented to detect informal economic activities. In **Latvia** and **Estonia**, proactive strategies such as discrepancy letters, tax risk rating systems, and electronic monitoring tools have improved oversight, particularly in sectors prone to undeclared wages,

like construction. **Lithuania** demonstrates the value of systematic inspections and transparent worker identification systems, supported by inter-institutional collaboration to enhance detection and enforcement.

Meanwhile, **Georgia** and **Moldova** underscore the need for stronger detection frameworks, particularly in sectors like, agriculture, and manufacturing, where undeclared work remains prevalent. Moldova's experience highlights gaps in labour inspection and enforcement capacity. In **Malta** and **Cyprus**, strengthening independent measurement of shadow economy, addressing cash-based transactions, and tackling emerging challenges such as cryptocurrency use have been identified as critical areas for improved detection. Additionally, whistle-blower protection and tailored inspection programs for vulnerable populations further reinforce detection efforts.

Moving to **sanctions**, key lessons emphasize the importance of clear, enforceable penalties and increased enforcement efforts. In **Estonia**, stakeholders in the workshops considered measures such as developing noncompliance lists or "naming and shaming" blacklists, along with penalties, to be essential in discouraging businesses from circumventing tax and labour laws. Similarly, **Latvia** and **Lithuania** highlight the role of strong financial sanctions, exclusion from public procurement, and stricter penalties for undeclared wages and labour law violations. **Lithuania**'s recent legislative changes have tripled fines for illegal work and introduced transparency measures, such as publishing lists of noncompliant employers, reinforcing the deterrent effect of sanctions. In **Georgia** and **Moldova**, weaknesses in labour inspection systems and inadequate resources hinder effective sanctioning, underscoring the need for stronger enforcement mechanisms and improved mandates for inspectors. Meanwhile, in **Malta** and **Cyprus**, the importance of stricter penalties, increased enforcement, and the visibility of actions to deter noncompliance is emphasized.

Continuing with measures aimed at **improving the accessibility and benefits associated with engagement in the formal economy**, stakeholders emphasized several key measures. In **Estonia**, simplifying tax regulations, reducing labour taxes, and offering rewards for compliance were seen as essential for encouraging formal participation. In **Latvia**, there was an emphasis on lowering taxes for small businesses and introducing incentive-based tax systems to make formal engagement more attractive. Stakeholders in **Lithuania** highlighted the importance of simplifying the tax system and enhancing support for tax administration to facilitate legal participation. In **Georgia**, stakeholders suggested implementing incentives for workers and businesses, alongside strengthening the social protection system to encourage formal employment. In **Moldova**, stakeholders proposed simplifying the regulatory framework, offering financial incentives for SMEs to formalize, and promoting the use of digital payments. Stakeholders in **Malta** and **Cyprus** underlined that reforming tax systems to be fairer, improving public services, and involving regulatory bodies in legislation are essential to making formal participation more appealing. As such, across all countries, the general consensus was that reducing the cost of legal participation, simplifying tax processes, and rewarding compliance would promote greater engagement in the formal economy.

Moving to the role of **conducting education and awareness campaigns**, stakeholders across all countries emphasized the importance of educating the public about the benefits of engaging in the formal economy. There was a shared focus on raising awareness of the risks associated with the shadow economy, promoting transparency, and fostering a culture of compliance. In **Moldova**, however, it was noted that public awareness campaigns had shown only limited effectiveness, particularly in specific sectors, indicating the need for more impactful and sustained initiatives. Meanwhile, stakeholders in **Malta** and **Cyprus** pointed out the influence

of social norms on reporting behaviour, underlining the importance of shifting perceptions to make compliance the norm rather than accepting undeclared work.

Finally, the measures aimed at **modernizing enforcement authorities to foster public trust and cooperation** were centred on increasing transparency in public spending, improving communication, and building confidence in government institutions.

In sum, tackling the shadow economy requires a holistic approach that integrates all five types of measures: boosting detection capacity, enforcing clear and effective sanctions, improving the accessibility and benefits of formal economic engagement, conducting impactful education and awareness campaigns, and modernizing enforcement authorities to build public trust. Implementing these interconnected measures in a coordinated and context-specific manner is key to tackling the diverse drivers of the shadow economy and ensuring a sustainable shift to formal economic activity.

# 4. A systematic review of methods for the quantification of the shadow economy

**Key findings:**

- This report critically analyses existing approaches to quantify the shadow economy, discusses their limitations, and offers practical recommendations for obtaining more reliable and consistent insights into the phenomenon. The focus is on the seven countries of interest, namely Estonia, Latvia, Lithuania, Cyprus, Georgia, Malta, and Moldova.
- The systematic review was conducted in three phases: 1) a comprehensive search of scientific databases and other online sources to identify relevant publications; 2) the analysis of trustworthiness and relevance using the AACODS checklist; 3) data synthesis in the form of the narrative analysis**.**
- A total of 139 papers were identified during the search phase, 49 of which passed the quality appraisal.
- A two-digit number of methods have been identified. To simplify the discussion, we categorised them into five groups based on their underlying logic: 1) indirect methods; 2) direct methods; 3) discrepancy methods, 4) model-based methods; and 5) multi-method strategies.
- As the data synthesis revealed, no estimation procedure is able to provide credible figures. However, some methods are less problematic than others.
- Discrepancy methods offer reliable lower-bound estimates, while indirect methods provide a solid upper boundary for the real extent of hidden economic activities.
- Multi-method strategies hold promise for the future, as they apply individual methods to specific subsets of activities, hence maximizing the strengths of each method while minimizing biases.

As demonstrated in the first part of this report, the governments of all observed countries have put the fight against unregistered economic activities high on their agendas. A range of measures tackling noncompliant behaviour has been developed and applied during the last decade, each with own rationales, target population, underlying mechanisms, and intended outcomes. However, little can be said about the effectiveness of any of these policy endeavours without knowing whether the activities they are focused on have diminished. This brings us to the second important question this study seeks to answer, which is how to robustly measure the extent of economic activities that remain concealed from the authorities.

Unfortunately, almost seven decades after the first attempt to quantify the 'hidden' part of the economy, and despite a two-digit number of estimation methods developed so far, there is still no clear answer to this question (Fernandes, 2022; Franic, 2019). On the contrary, every new method has only added to the controversy surrounding this research field and raised some new questions above the heads of policymakers and other secondary users of resulting figures

(Fernandes, 2022; Slemrod and Weber, 2012). Not only is it extremely rare to find a pair of independent studies providing comparable results for the same geographic area and the same period, but seeing the absurd discrepancies (both in terms of magnitude and the trend) is more a rule than an exception (Feige and Urban, 2008).

In line with this, the second part of our study aims to answer the following three questions:

1. Why do the resulting estimates diverge and how to account for the differences between measures?
2. What are the strengths and weaknesses of methods used to measure the shadow economy and akin practices?
3. What are the current best practices in quantifying these phenomena?

To simplify this discussion, we will focus only on the methods recently applied in the seven countries of interest. Besides disregarding the 'obsolete' estimation techniques, the idea is also to fortify the discussion with actual examples.

For this purpose, we first conducted a systematic search of the online repositories and databases and extracted essential data from relevant publications. Before moving to the discussion about the estimation methods, the next section hence gives a brief account of this systematic review (the full protocol of the study is available upon reasonable request). Section 3.2. then gives an overview of the studies that satisfied all inclusion and quality criteria, followed by the critical review and comparative analysis of findings from these studies (section 3.3). Although due attention will be given to the basic mechanics of the estimation techniques, the primary emphasis will be on their strengths and weaknesses. This part of the report concludes with practical recommendations based on this thorough analysis, which are given in section 3.4.

## *4.1. Methodology*

The systemic review was divided into three phases. First we run a comprehensive search on scientific databases and other online libraries to identify relevant publications and/or readily available estimates (see Table 3). To ensure that all essential information is accounted for, the following categories of research outputs were looked upon:

- peer-reviewed and grey academic literature, including books, journal articles, working papers, conference papers, and discussion papers
- reports from studies and other relevant documents produced by national institutions, such as tax administrations, labour inspectorates, and bureaus of statistics
- literature from supranational and international institutions (e.g., the European Commission, European Parliament, European Labour Authority, World Bank, International Monetary Fund, International Labour Organisation, and Organisation for Economic Co-operation and Development)
- any other publicly available sources, including commissioned research outputs, newsletters, bulletins, and dissemination material
- statistical indicators from publicly available surveys and databases

Any paper embracing at least one of the seven economies of interest qualified for the inclusion, provided that figures for the year 2000 and later are presented. Both longitudinal and single-year studies were accepted at this stage.

**Table 3. Main databases and repositories consulted for the systematic review**

| Scientific databases | Specialised academic repositories | Other databases and repositories covering academic and grey literature |
|---|---|---|
| Web of Science | ResearchGate | Google Scholar |
| Scopus | Academic | |
| | Social Science Research Network (SSRN) | |
| | Research Papers in Economics (RePEc) | |

***Source***: own processing

To cover all relevant papers, every search entry was initially envisaged to be in the form: *adjective* + *noun* + *country* + *method*. However, since an all-inclusive list of such combinations would require almost 100,000 unique searches, we applied a range of smart manipulations similar to those described in section 2.1. Most importantly, given that most method names are unique in the sense that no terminological overlap with other techniques, subjects/objects, or phenomena outside this specific area exists, it was enough to pair them with the name of the country so as to obtain an overarching search phrase. As the goal was to cover all known methods, as well as both English and local names for the target countries, this notion limited our search to as few as 156 combinations (see Table 4). However, since the 'uniqueness' feature does not apply to all estimation methods, in some cases it was still necessary to account for the name of the phenomenon (i.e., *adjective* + *noun*)[12]. Given the considerable number of terms used to label unregistered activities, we decided to narrow the scope only to the names that are still in use today.

**Table 4. Refined list of search terms for identifying relevant sources for the systematic review**

| Search term I - country | Search term II – estimation method | Search term III – adjective | Search term IV – noun |
|---|---|---|---|
| Estonia | national account discrepancies | shadow | economy |
| Latvia | labo*r force participation | informal | sector |
| Lithuania | expenditure approach | gr*y | activit* |
| Georgia | labo*r input method | und*eclared | action |
| Moldova | currency demand method | *observed | work* |
| Cyprus | Tanzi method | *official | *employment |
| Malta | transaction method | *reported | business |
| Eesti | electricity consumption method | *recorded | enterpr* |
| Latvijas Republika | energy consumption method | *regulated | wage |
| Lietuva | MIMIC | concealed | salar* |
| Sakartvelo | DGE | undocumented | |
| Moldavia | survey | underground | |
| | audit | hidden | |
| | | irregular | |

[12] Specifically, 'MIMIC', 'DGE', 'survey', and 'audit' were the only search terms for which such extensions were needed.

| | |
|---|---|
| | black |
| | unexposed |
| | unorganised |
| | illicit |
| | illegitimate |
| | non-compliant |

***Source***: own processing

The final list of individual terms used for this purpose is provided in Table 4. For each paper identified during this phase, we also performed both forward and backward citation tracking (Haddaway *et al.*, 2022).

After finalizing the *search phase*, all identified papers underwent additional tests of their trustworthiness and relevance. This was done using the AACODS checklist (Tyndall, 2010), which consists of the following criteria: 1) authority; 2) accuracy; 3) coverage; 4) objectivity; 5) date; and 6) significance.

The criterion of **authority** stipulates that the publication is prepared by renowned experts in this research area who are associated with reputable organisations. The **accuracy** criterion is concerned with the clarity and robustness of the applied methodology. The quality and reliability of raw data used for this purpose also play a vital role in this respect. According to the **coverage** criterion, not only must the source clearly state which population and economic groups the figures refer to, but these have to be aligned with the broader aims of the systematic review.

The **objectivity** criterion is focused on identifying potential bias in different steps of the estimation procedure, as well as in the way the results were presented (especially if such a bias was unstated or unacknowledged). According to the **date** criterion, only studies presenting disaggregated yearly estimates for the previous period had to be taken into account. Finally, the criterion of **significance** deals with the relevance, originality, representativeness, and reproducibility of the study. A detailed explanation of how these criteria were directly applied in our case is given in the protocol[13].

After extracting bibliographic, methodological, and content-related information from the studies that survived these two phases, we moved to data synthesis. Since the main goal of the conducted systematic review was to provide a critical evaluation of the available estimation methods, this third and last phase of the study took the form of a narrative analysis. In situations where multiple studies using an identical method for the same country existed, the following precedence criteria were employed for the data synthesis:

- results published, referenced, or in any other way acknowledged by reputable international and supranational institutions (e.g., the European Commission, European Parliament, European Labour Authority, World Bank, International Monetary Fund, International Labour Organisation, and Organisation for Economic Co-operation and Development) were given the utmost priority
- results published, referenced, or in any other way acknowledged by national authorities (including tax administrations and bureaus of statistics) were given preference over the results published in stand-alone academic articles and grey literature

[13] To reduce the risk of bias, the search and quality appraisal of studies were conducted independently by two groups of researchers involved in this part of the project. The results were then compared and any discrepancies were discussed and resolved.

- stand-alone academic studies had priority over non-peer-reviewed publications that do not fall into any of the previous two categories

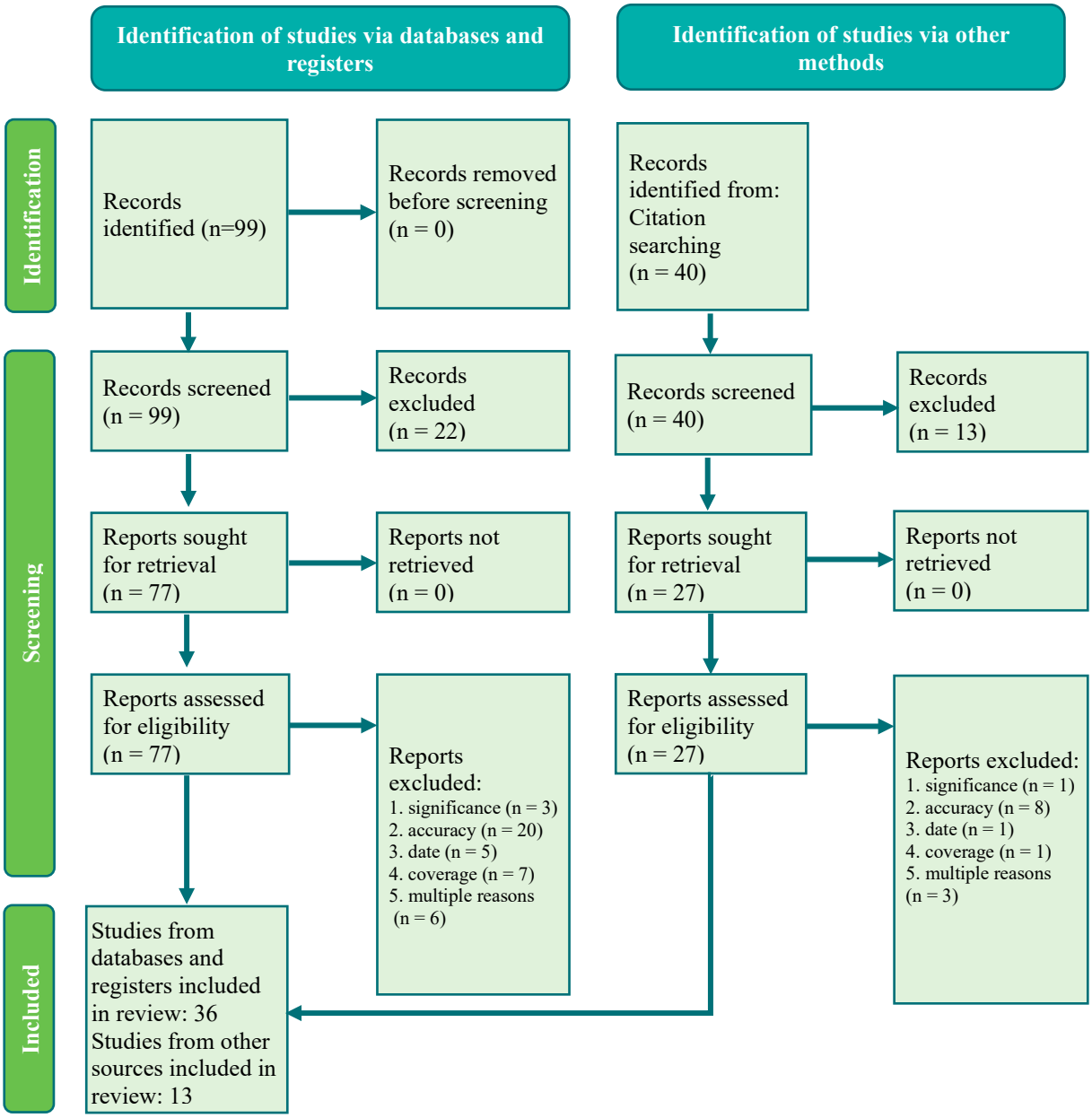
Whenever any doubts and/or ties in this selection process occurred, the final decision was made based on the results of the risk-of-bias assessment. The adjusted version of the ECOBIAS checklist (Adarkwah et al., 2016) was used for this specific purpose[14].

## *4.2. Overview of the results*

During the *search phase*, we detected a total of 139 papers complying with all baseline inclusion criteria (see PRISMA diagram in Figure 3). However, only 49 survived the *quality appraisal*, while the remaining 90 were discarded at that stage of the study. The most selective criterion was the significance, which eliminated 39 papers. Further 28 studies failed in the area of accuracy, 8 did not satisfy at least one of the coverage conditions, while 6 did not pass the date criterion. Finally, 9 publications had more than one deficiency.

[14] In its original form, the ECOBIAS checklist assumes descriptive explanation of strategies applied to deal with certain biases. However, this was of little use in our case given that any bias directly and irretrievably affected the final estimates. For that reason, we replaced the descriptive approach with the numerical one. Specifically, the studies were graded from 0 to 10 on each of the original 22 questions, whereby lower values indicate greater bias (accordingly, 10 means that a particular bias in not present). The detailed evaluation can be found in Appendix H.

**Figure 3.** PRISMA Flow Diagram




***Source***: own processing

Speaking about the exact reasons for rejection, it turned out that 35 papers were part of the continuing studies. This means that some newer publications provided the very same figures together with new estimates referring to later periods. Another frequent issue was the re-publishment of the same results in different forms, which was detected in 7 cases. Whenever such duplicates were encountered, the 'prestige' criterion was used to decide which version to retain/discard. Specifically, precedence over remaining publications was given to peer-reviewed academic articles and books issued by renowned publishers. Also, documents produced by national authorities, EU bodies, and relevant international institutions were given priority over other research outputs, working papers, and akin grey literature.

The situation in which authors presented someone else's estimates rather than their own was also frequently encountered, with a total of 12 papers suffering from this issue. Likewise, the

absence of country-level figures was detected in 7 cases. This mostly assumed the publication of figures only on a sectoral level or regional level, but there were also situations in which the estimates referred to certain population groups. We also came across a few studies in which either the averaging of figures over multiple years (5 papers) or aggregation across several countries (one paper) was done. In 4 cases, the authors outlined the estimation methodology but for some reason did not provide exact figures, while in 9 situations the papers were eliminated due to methodological issues. This latter mostly had to do with the use of unverified methods (i.e., a novel estimation technique was advertised), although in several cases the insufficient description of the procedures applied was actually the main reason for rejection. We also encountered one study that did not adhere to the date criterion due to presenting only a forecast for future periods. As already mentioned, the remaining 9 studies suffered from multiple issues.

Turning to the papers that satisfied all quality appraisal criteria, a detailed list of theirs can be found in Appendix H. A brief descriptive overview, given in Table 5, reveals that peer-reviewed studies and documents issued by international institutions dominate over other publication types. Specifically, a total of 18 papers belong to each of these two categories. The remaining estimates were published either by national authorities (5) or as working papers on the websites of universities, policy institutes, and other reputable academic institutions (8).

It is also interesting to note that two-thirds of publications covered more than one country (Table 5). Studies encompassing all EU member states dominate in this respect, although there was also a considerable number of studies that provided estimates for 100+ countries around the world.

**Table 5. Overview of the identified publications by different criteria**

| | | Number of studies |
|---|---|---|
| Publisher | Academic journals and books | 18 |
| | International institutions | 18 |
| | National authorities and institutions (bureaus of statistics, tax administrations, national banks, etc.) | 5 |
| | Other (universities, policy institutes, etc.) | 8 |
| Geographic coverage | Multi-country | 33 |
| | Single-country | 16 |
| Time coverage | Time series | 32 |
| | One year | 17 |
| Estimated phenomenon | Shadow economy | 23 |
| | Non-observed economy | 7 |
| | Undeclared work | 5 |
| | Informal economy | 3 |
| | Underground economy | 1 |
| | Informal employment | 3 |
| | Income underreporting | 5 |
| | Tax gap | 2 |

***Source***: own processing

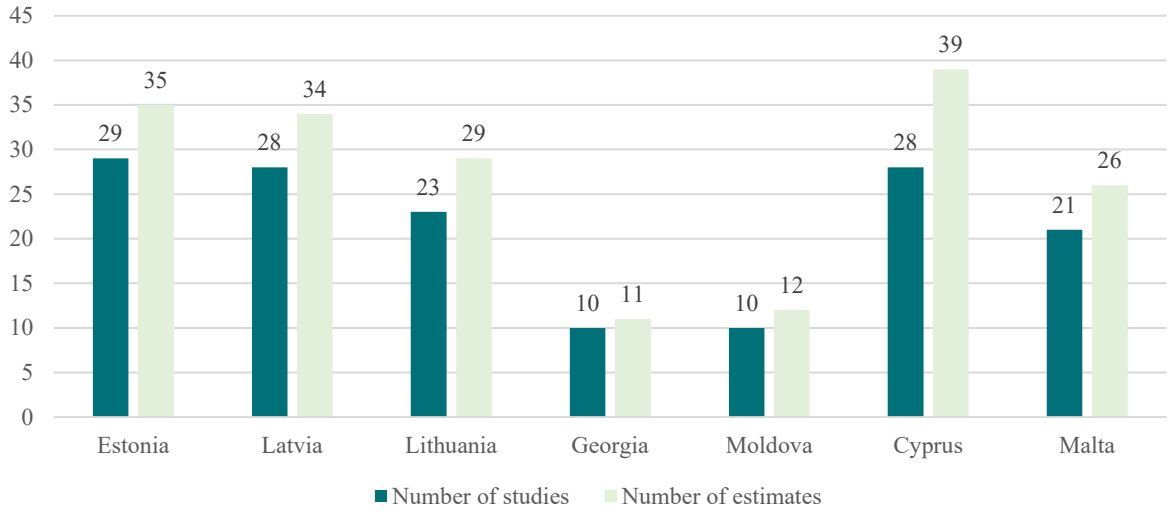
When it comes to time coverage, Table 5 further reveals that longitudinal studies are far more common than those showing results for one year only. Explicitly, we identified solely 17 publications with a single estimate per country. As will be clarified later, representative country-level surveys and comprehensive evaluations of the national accounts represent the

majority of such studies. Despite being most reliable, such studies are extremely costly, both in terms of time and financial resources needed, which explains why they are seldom applied (Elgin and Oztunali, 2012; Franic, 2019).

Before moving to a detailed discussion of this issue, it is, however, important to have a look at some other key aspects of the identified studies. One of them is certainly the distribution according to the exact phenomenon estimated (see Table 5). Interestingly, only 8 different names appear on the final list, which suggests that many terms popular at a certain point in history gradually disappeared from usage. More importantly, this speaks in favour of our decision to limit the number of search phrases. In any case, the term most frequently encountered in this systematic review was the 'shadow economy', with a total of 23 papers providing estimates of this particular phenomenon[15]. The remaining studies dealt with 'non-observed economy' (7 publications), 'undeclared work' (5), 'income underreporting' (5), 'informal economy' (3), 'informal employment' (3), 'tax gap' (2), and 'underground economy' (1). As already discussed earlier, each of these terms denotes a different set of activities, which is the most important (but certainly not the only) cause of the divergence between available estimates.

When it comes to the dispersion of the identified papers across the seven countries of interest, Figure 4 reveals there is a substantial difference between EU member states and the remaining two countries in this respect. Specifically, only 10 studies encompassing Georgia and Moldova were identified, whereby most of them are either single-country studies or global studies. On the other hand, the majority of estimates on the Baltic and two Mediterranean countries came from EU-wide studies, although national researchers and state institutions also did a good job in this respect.

**Figure 4.** Overview of the results by country




***Source***: own processing

Since a non-negligible number of authors employed a multi-method approach, the exact number of estimates surpasses the number of publications covering a particular country. For instance, Cyprus was included in 28 studies, but the total number of available estimates

[15] Nevertheless, in many cases this term referred to a set of activities different from what is typically assumed under the shadow economy. More about this will be said later in text.

accounts for 39 (see Figure 4). Likewise, Estonia was evaluated by 29 studies, but we were able to extract 35 different estimates (either single-year or longitudinal). The accompanying numbers account for 28 and 34 in the case of Latvia, 23 and 29 for Lithuania, and 21 and 26 for Malta. This would say that a total of 186 estimates were extracted from the 49 papers that survived quality appraisal.

The last thing to discuss is the distribution of the studies according to the estimation method(s) used. However, we postpone this task to the next section, given that the popularity of each method is closely related to its technical complexity, underlying assumptions, and accessibility of data.

## *4.3. Critical review of estimation methods and comparative analysis of findings from the systematic review*

Ever since the earliest endeavours to provide meaningful estimates of the unofficial part of the economy (see for instance Cagan, 1958), skepticism, criticism, and open fights between researchers have been a trademark of this field (Breusch, 2016; Feige, 1986, 2016; Schneider, 2016; Tanzi, 1983, 1999). As a result, dozens of methods have been developed to date (European Commission, 2009; Schneider and Buehn, 2016). Even though the majority of them strove to address the limitations of the techniques existing by that point, not a single one has managed to obtain universal acclaim so far (Fernandes, 2022; Franic, 2019). Each with its own strengths and weaknesses, most of the methods introduced over time are still in use today. The ultimate result is a staggering heterogeneity of available estimates, which often makes it impossible to make a solid conclusion about the prevalence of unregistered economic activities in a certain geographic area (Dell'Anno and Davidescu, 2019; Franic, 2019; Slemrod and Weber, 2012).

These differences are largely attributable to two interwoven features of the pertaining studies, namely WHAT is measured and HOW it is measured (Postea and Achim, 2022). The WHAT has to do with the terminological divergence discussed earlier in this report. With a dozen different names and accompanying definitions currently used to denote the activities that remain concealed from the authorities, one should not be surprised to hear that most methods measure only a specific subset of such activities (European Commission, 2009; Fernandes, 2022). Unfortunately, for more than a few of the available methods, it is not clear what is actually measured.

This brings us to the HOW part of the puzzle, which not only exerts more influence on the final estimates but also commonly imposes the answer to the WHAT question. It relates to the simplifications and assumptions underpinning each method. Since every estimation strategy is pretty much unique in this respect, the following sections provide a succinct description of the methods identified in the systematic review. To make things easier to follow, the presentation will reflect the historical development of this field. That is to say, we start with the pioneering techniques (the so-called indirect methods), which are easiest to understand. After discussing the direct methods, the focus will shift to data-mining procedures, which represent the bridge between these two universes. The elaboration finishes with model-based methods, the most complicated and currently most popular quantification techniques. Whenever possible and relevant, the discussion will be fortified with the results extracted during the systematic review, in accordance with the above-discussed selection criteria.

### *4.3.1. Indirect methods*

The bulk of methods used today are grounded on the idea that unregistered activities cannot remain fully hidden, as they at least must leave some trace in the official statistics (Contini, 1981; Feige, 1979; Gutmann, 1977). Unlike some contemporary approaches, which benefit from the latest developments in the field of econometrics, the first attempts to quantify such activities operationalized this idea in the simplest possible form. Specifically, the pioneers of this field hypothesized that there exists a single macroeconomic indicator whose dynamics fully reflects that of the observed phenomenon (Schneider and Buehn, 2017). Following either the assumption of constancy of this macroeconomic indicator over time or its proportionality to the official GDP, every deviation from the presumed trajectory was attributed to the rise/decline of unobserved activities (Gaspareniene and Remeikiene, 2016; Postea and Achim, 2022). Although there do exist some subtle methodological dissimilarities, the choice of the macroeconomic indicator is what makes the key difference between these *indirect methods*.

For instance, the **currency demand approach** stipulates that any increase/decrease in the prevalence of unregistered activities is echoed through an equivalent change in demand for cash (Cagan, 1958; Gutmann, 1977). This particular method thus relies upon the following two key assumptions: 1) illicit payments are done strictly in cash; 2) in the absence of the shadow economy, the demand for money would perfectly reflect the volume of legitimate economic activities (Lazar *et al.*, 2008).

The **transaction approach**, on the other hand, postulates a constant relation between the volume of monetary transactions and the actual level of economic activity within the analysed population (Feige, 1989). Any deflection from this hypothetical ratio is thus ascribed to the changes within the shadow economy (Adair, 2020).

As its name suggests, the **electricity consumption method** follows a similar reasoning for the usage of electric energy. Accordingly, any surge/decline in the official figures on electricity consumption within a certain population over and above the levels projected by a simple model (e.g., relative to the change of official GDP) is attributable to the growth/decay of unregistered activities (Kaufmann and Kaliberda, 1996).

Finally, the **labour force participation method** assumes a constant activity rate among the population of interest. As is the case with other indirect methods, any change in the ratio of people working or actively searching for a job relative to the number of inactive individuals is deemed to be the result of the movement of workers from the formal to the informal part of the economy and vice versa (Contini, 1981; Gaspareniene and Remeikiene, 2016).

Attempts to address at least some of the obvious shortcomings led to a range of modifications of these methods over time, most of which are now recognised as distinct procedures. For instance, Tanzi (1980) improved the currency demand approach by replacing a simple mathematical expression with an econometric model. As a result, this enhanced methodology to approximate the dynamics of unregistered activities with the demand for currency is often referred to as the **Tanzi method** (Tan *et al.*, 2017). Likewise, the turn of the millennium has seen two attempts to overcome the limitations of the electricity consumption method. The first novelty assumed the extension of the model so that it accounts for all sources of energy (Kyle *et al.*, 2001). This less restrictive methodology is known under the name **energy consumption method** (Achim *et al.*, 2024). Another modification was introduced by Lacko (1998), who argued that the change in consumption of electricity by households is a much better indicator of illegitimate activities than consumption at the level of the entire economy. This narrower approach was later named after the author, which gave rise to the **Lacko method** (Postea and Achim, 2022; Schneider and Buehn, 2017).

Despite their attractiveness, reflected mainly through straightforwardness and low implementation cost, most of the indirect methods lost their popularity over time (Gaspareniene and Remeikiene, 2016). One part of the explanation for this lies in implausible and overly simplistic assumptions, which were the key cause of criticism even in the early years following the introduction of these methods (Tanzi, 1983; Thomas, 1999). However, the majority of them have failed the test of time for another, even more important reason. Specifically, the tremendous technical, economic, and social changes over the last few decades have brought to light innovative means of payment, greater energy efficiency, the constant emergence of novel forms of work, and the intertwining of the formal and informal spheres (Achim *et al.*, 2024; Adair, 2020; Giles, 1999). Even if these rather naïve estimation techniques were able to provide meaningful figures some 30-50 years ago, their credibility today is hence highly questionable.

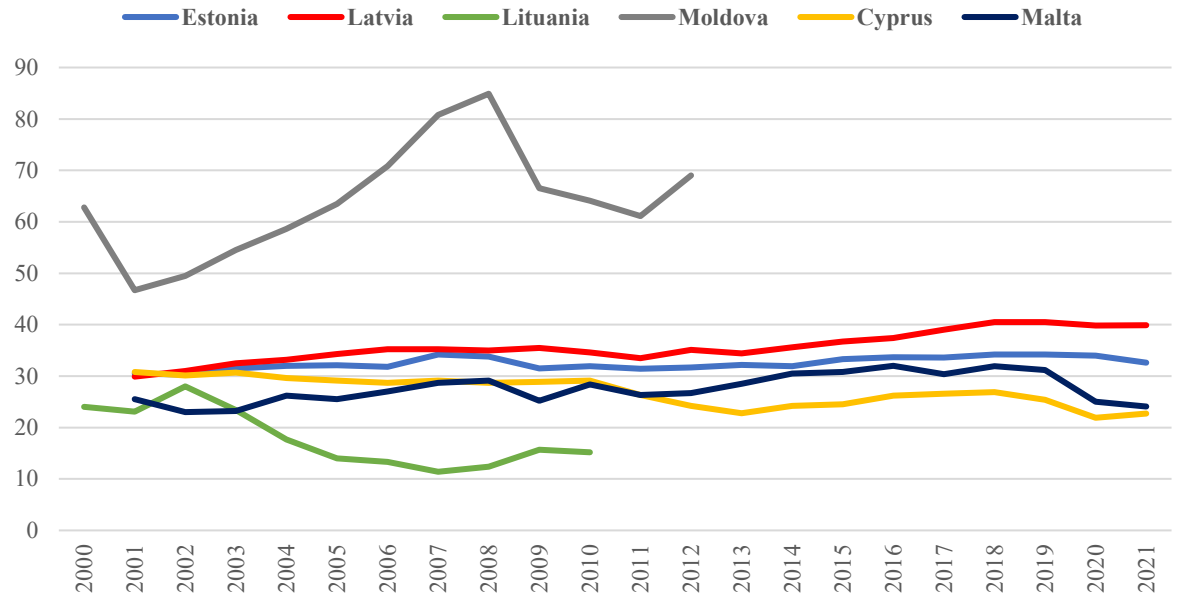
This brings us to the key issue with the indirect methods, which is the lack of clarity about what they actually measure. For instance, there is no doubt that the demand for cash is under the influence of many other factors (such as severe inflation and akin economic shocks) that have nothing to do with the shadow economy. Likewise, electric energy is essential for many activities, regardless of their inherent legitimacy, economic value, and market status (Kirchgässner, 2017; Postea and Achim, 2022).

Consequently, the indirect methods are believed to **overestimate the real extent of the shadow economy** (Adair, 2020; Giles, 1999; Kirchgässner, 2017; Schneider and Buehn, 2017). However, a note of caution is necessary here, as there also exists a range of inherently legitimate activities that do not require the exploitation of natural resources and/or do not entail monetary transactions. Finally, people can be involved both in formal and informal employment, sometimes even within the same job, which completely blurs the line between the formal and informal realms (Franic, 2020; Williams and Horodnic, 2015a). This implies that these methods can actually capture only a portion of the shadow economy.

Despite gradually leaving the scene, indirect methods are still in use. As a matter of fact, almost a third of the identified studies used one of the indirect methods to quantify the hidden economic activities in the target countries. To be more precise, 14 out of 49 publications provided estimates based on at least one of the indirect methods. The exact number of extracted figures is somewhat larger given that a few of these studies utilized more than one method. The currency demand approach (including Tanzi's variation) and various versions of the energy consumption method dominate in this respect, with each approach being applied in 6 studies. On the other hand, only one application of the transaction approach and labour force participation was found.

Nevertheless, given the limitations of indirect methods, one should not be surprised to hear that none of these studies was published, acknowledged, or in any way endorsed by a reputable international institution. To give us at least some clue about the upper boundary of the shadow economy in the analysed countries, Figure 5 presents the results of two studies based on indirect methods. The study by Achim *et al.* (2024), who make use of the energy consumption method, provided estimates of the shadow economy for 26 EU countries (with Lithuania being the only one excluded) during the period 2001-2021. Besides rather high estimated values, the specificity of this study is the grouping of the countries within a narrow interval and the absence of clear trends (see Figure 5).

**Figure 5.** Estimates of the shadow economy using indirect methods (% of GDP)




***Note:*** *Figures for Estonia, Latvia, Cyprus, and Malta were obtained using the energy consumption method, while those for Lithuania and Moldova are based on Tanzi's method.* | ***Sources***: Achim *et al.* (2024),Tan *et al.* (2017)

Figures for Lithuania and Moldova, based on Tanzi's method applied by Tan *et al.* (2017), show much greater variation and clear trends[16]. Besides belonging to opposite extremes in this respect, which is not uncommon for indirect methods (Adair, 2020), another peculiarity of these two studies is the definitional vagueness. Although both teams of scholars estimated the shadow economy, neither went to great lengths to clearly explain which activities were included and which were excluded. Tan *et al.* (2017, p. 146) simply defined the shadow economy as "cash transactions that are typically taking place outside the control of the government authorities". On the other hand, Achim *et al.* (2024) used the term 'shadow economy' to designate all productive activities missed by the official statistics. This would say that their resulting figures essentially quantify the non-observed economy.

### *4.3.2. Direct methods*

With the explosion of informality in Central and East Europe following the collapse of socialist regimes, and the associated greater involvement of international and supranational institutions in tackling unregistered economic activities, the pursuit of credible estimation methods revived during the 1990s (Adair, 2020). The outcome was a shift towards direct insights into the matter, either through population surveys or large-scale audit campaigns by the tax administration.

The latter approach assumes detailed inspections of the preselected group of taxpayers to determine the discrepancy between paid taxes and their actual tax liabilities (Brown and Mazur, 2003; Gaspareniene and Remeikiene, 2016; IRS, 2012). Once the process is over and all accidental mistakes in the tax forms are accounted for, the unexplained differences are assigned to intentional tax evasion (Gaspareniene and Remeikiene, 2016; IRS, 2012). Accounting for the limited representativity of the chosen sample, the resulting figures are then projected to the whole population of taxpayers to get a rough estimate of the overall

[16] No indirect estimates for Georgia were found.

noncompliance. Due to extreme financial and time requirements, this particular strategy has, however, been seldom used in practice. In fact, our systematic review did not expose any study of this type in the analysed countries.

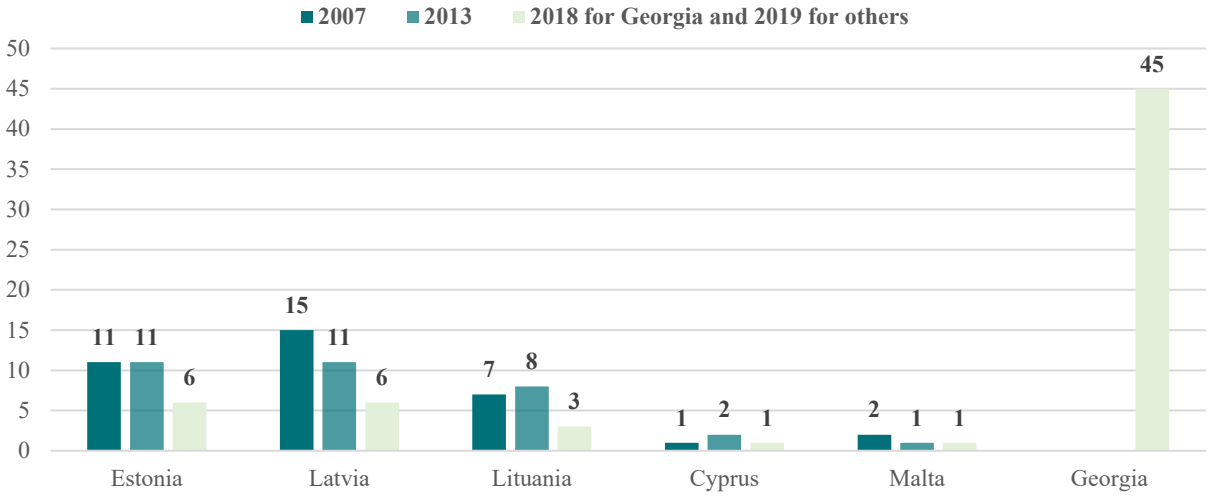
The opposite is true for questionnaire surveys, as they have become the most abundant sources of information on informal practices in Europe (Arezzo *et al.*, 2024; Williams *et al.*, 2015b; Williams and Horodnic, 2015a). This is not surprising given that surveys can provide a micro-level insight into activities, experiences, and standpoints of a group of entities chosen from the observed population. Besides offering the opportunity to target specific stakeholders (workers, companies, social subgroups of interest, etc.), questionnaire surveys are also suitable for assessing the prevalence of any predetermined subset of activities (Gaspareniene and Remeikiene, 2016; Postea and Achim, 2022). Unlike indirect methods, for which it is usually not clear what is being measured, this form of direct inquiry hence enables one to focus on any part of the non-observed economy (e.g., undeclared work, criminal activities, do-it-yourself work, etc.) Most importantly, if the sample is representative, the survey results can be straightforwardly generalised to the whole population (Lazar *et al.*, 2008).

The most comprehensive application of this specific approach is the Special Eurobarometer on undeclared work in the European Union[17] (European Commission, 2007, 2014, 2020). Conducted on behalf of the European Commission, this EU-wide survey originally took place in 2007. In each member state, approximately 1,000 individuals were chosen using stratified random sampling. Although interviewees were visited at home addresses, the anonymity of their answers was guaranteed. Among other things, people were asked if they conducted any undeclared work during the previous 12 months and/or purchased any goods or services using informal means of payment. The survey was repeated in 2013 and again in 2019, not only to check whether the policy measures introduced in the meanwhile gave desirable results but also to gather information on emerging forms of undeclared work.

Besides these three waves of the Eurobarometer survey, our systematic review revealed two additional examples (both from Georgia) of direct inquiries into undeclared practices from the labour supply side. The first of them was commissioned by the UN Women and conducted in 2018 on a representative sample of 1,438 Georgian citizens (UN Women, 2018). The second inquiry, run as part of the quarterly administered labour force survey (involving 6,400 participants), took place during the period 2017-2023 (Geostat, 2024). Unlike the Eurobarometer survey, which provides information on the prevalence of undeclared work within the **whole population**, in these two cases, the resulting figures refer to the share of undeclared employment in **total employment**. This subtle difference points out that reasons for diverging estimates sometimes go beyond the afore-discussed issues of WHAT is being measured and HOW it is being measured. In this particular case, the unit of measurement is what makes the key difference.

[17] The survey uses the definition of undeclared work identical to the one introduced earlier in this report (see European Commission, 2020).

**Figure 6.** Survey-based estimates of undeclared work/employment (% of corresponding population/workforce)




**Note:** Figure for Georgia denotes the percentage of employment, while for the remaining countries, the numbers refer to the percentage of the total population. | **Sources**: European Commission (2007, 2014, 2020); UN Women (2018)

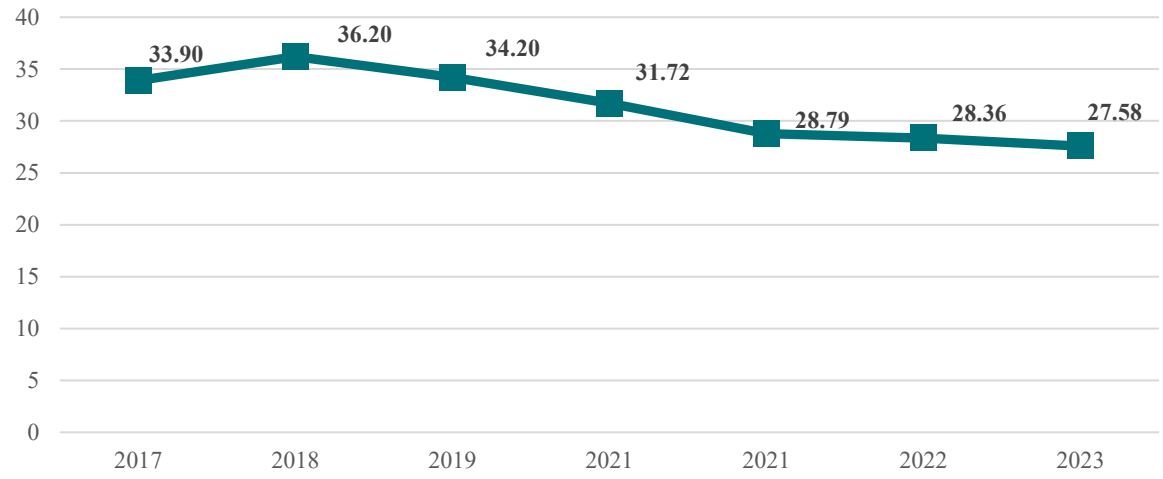
Figure 6 compares the results from the three waves of the Eurobarometer Survey and the UN Women Survey. Although expressed on a different scale, the figure for Georgia undoubtedly points out that unregistered economic activities are more prevalent there than in the observed EU member states. However, even a moderately informed reader would most likely find the estimates for the latter suspiciously low (at least for some countries). The truth is that they would probably be right, which brings us to the most important issue with direct inquiries. Due to the delicateness of the discussed matter and the accompanying doubts about the real intention of the survey, respondents have a clear motivation to give false answers or simply refuse to respond to certain sensitive questions (Achim *et al.*, 2024; Adair, 2020; Gaspareniene and Remeikiene, 2016). For that reason, the results presented in Figure 2.3. for the five EU member states should be seen only as the **lower boundary of the real prevalence of undeclared work** in the population (Adair, 2020).

In addition to high implementation costs, there is yet another reason why questionnaire surveys are seldom utilized for this purpose. Since it is rarely possible to repeat the survey on an identical group of people, in most cases the difference between the results of two successive waves only partially reflects the real change in the behaviour of individuals. To a greater extent, this difference is actually attributable to sampling (Elgin and Oztunali, 2012; Schneider and Buehn, 2016). Consequently, the questionnaire surveys are not overly helpful in monitoring the dynamics of the observed phenomenon over time (Achim *et al.*, 2024).

The labour force survey by Geostat (2024) is one of the rare examples in which this issue was at least partially addressed. The survey is being conducted quarterly, whereby every respondent participates in two consecutive rounds. After this, they are omitted for two quarters and then returned to sample for two more quarters[18]. Even though the sample changes all the time, there is always substantial overlap from round to round, which alleviates the effect of sampling on the final results.

[18] https://www.geostat.ge/media/63694/Employment-and-Unemployment.PDF

**Figure 7.** Informal employment as % total employment in Georgia




*Sources:* Geostat (2024)

According to the resulting estimates, which are presented in Figure 7, informal employment[19] in Georgia has been in steady decline since 2018. The latest estimates for 2023 reveal that the real employment rate is underestimated by 27.58%. Another interesting thing to note is a substantial difference between the Geostat's estimate for 2018 (36.2%) and the corresponding figure provided by UN Women (45%). While a part of the explanation certainly resides in methodological peculiarities (e.g., Geostat excluded agricultural production), the size of the sample is probably a more important factor here.

Since the lack of willingness to disclose information on such wrongdoings is particularly low in the case of company owners and representatives, direct inquiries in the form of a questionnaire survey are in practice restricted to individual taxpayers. There are, however, some interesting attempts to obtain the information from business in an indirect manner. The most notable among them is certainly the **Shadow Economy Index** by Sauka and Putniņš, which covers the Baltic states and Moldova (Putniņš *et al.*, 2019; Sauka and Putniņš, 2024). Cleverly wrapped in a broader survey of satisfaction with the government so as to reduce the rejection rates, this annually repeated study encompasses approximately 500 randomly sampled entrepreneurs per country.

Instead of querying about their own activities, the interviewees are asked to reason about the prevalence of illegitimate activities by other firms in their sector (Putniņš and Sauka, 2015). Specifically, they are asked to estimate the incidence of the following three practices among their competitors: underreporting of business income, underreporting of employees, and underreporting of worker remuneration.

After completion of the survey, the three figures obtained from each interviewee are transformed into a single estimate through a set of mathematical equations. The resulting figure represents the estimated share of underreporting for a single company. These estimates are then projected to the entire economy using the total sum of wage payments by the firm relative to the country's GDP as a weight (Putniņš *et al.*, 2019). This transformation is, however, possible only under the assumption that, despite being asked about the competitors, the interviewees are

[19] Informal employment is here a synonym for undeclared employment.

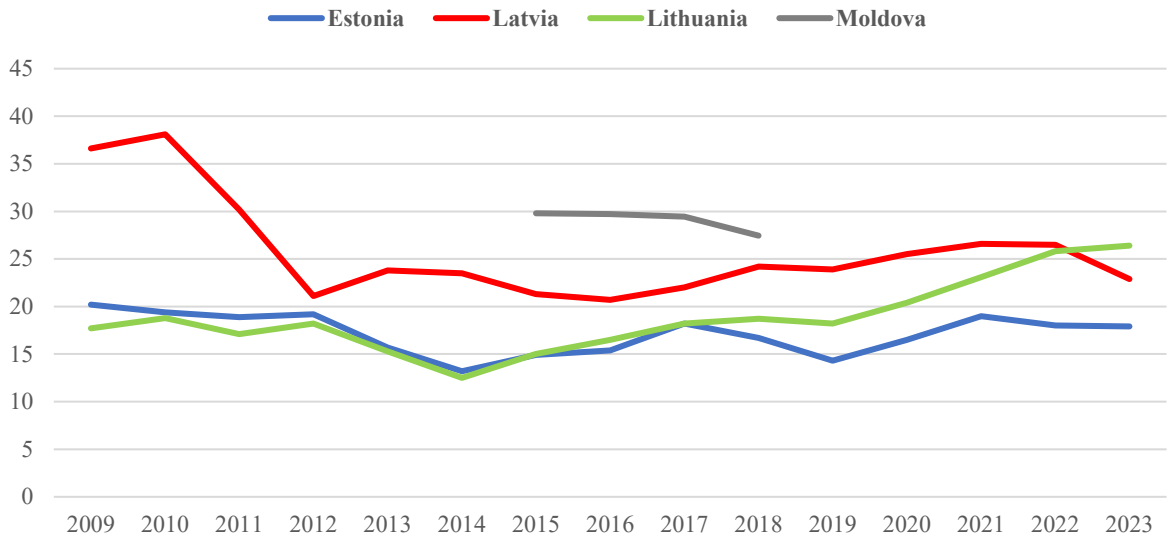
actually talking about own company. In other words, the numbers provided by survey participants are treated as the confessions of their own misreporting.

Before moving forward, it should be stressed that the term 'shadow economy' here refers to "all legal production of goods and services produced by registered firms that is deliberately concealed from public authorities" (Putniņš *et al.*, 2019, p. 90). Since criminal activities are excluded, the final estimates actually speak about the prevalence of undeclared work, not about the shadow economy, in the sense of the definitions used in our report.

Although the authors reason that the resulting figures likely underestimate the real size of undeclared work (Putniņš and Sauka, 2015), the truth is that it is not clear in which direction the bias goes. On the one hand, there is no doubt that this estimation method severely overestimates noncompliance by companies. Indeed, numerous studies from different disciplines of social science have shown that people tend to overinflate the wrongdoings of their peers in order to justify own behaviour and/or downplay the seriousness of their misconduct (see for instance Barkan *et al.*, 2012; Huang *et al.*, 2022). In nothing else, the survey participants whose companies fully complied with legislation most certainly did not report the absence of any cheating on the part of their competitors.

This overestimation is somewhat buffered by the fact that the survey captures only one part of undeclared work. Specifically, these figures refer only to undeclared activities inside registered companies. Transactions of unregistered firms, informal self-employment, and afternoon moonlighting are just some aspects of undeclared work this method fails to account for.

**Figure 8.** Shadow Economy Index for the Baltic countries and Moldova, % of GDP




***Sources:*** Davidescu *et al.* (2022); Putnins *et al.* (2019); Sauka and Putniņš (2024)

Given this, it comes as no surprise to hear that the values of the Shadow Economy Index for the Baltic countries (2009-2023) and Moldova (2015-2018) are for most countries noticeably lower than the values produced by indirect methods[20] (see Figure 8). Lithuania seems to be the

[20] As other direct estimates, this approach also suffers from high between-year variations attributable to sampling. To mitigate the issue, the authors employed a smoothing technique based on a weighted moving average (Putniņš and Sauka, 2015).

only exception, but not much can be said about this given that 2009 and 2010 are the only overlapping years of the corresponding time series.

To sum up, there is no clear conclusion when it comes to the credibility of the Shadow Economy Index. However, if it indeed overestimates the magnitude of noncompliance, it certainly does a better job than the indirect methods.

### *4.3.3. Discrepancy methods*

There is also a group of methods sitting halfway between direct and indirect approaches. As they take the best from each universe, such methods are usually considered the least problematic, although none of them is free of deficiencies (Postea and Achim, 2022).

These are essentially various data-mining techniques searching for inconsistencies between two or more sources of information on the same matter. A number of different variations of this approach have been developed so far, but they can be roughly divided into two groups depending on the angle from which unregistered activities are viewed. The larger of the two are **demand-based methods**, which contrast information about the income of economic agents with their reported money outflows (OECD, 2002; Postea and Achim, 2022). The **supply-based methods,** on the other hand, look for discrepancies between different datasets on labour market.

The so-called **expenditure methods** represent the largest subfamily of demand-based techniques. They are grounded on the hypothesis that the key national surveys conducted by statistical offices or other relevant national authorities (e.g., household budget surveys and household expenditure surveys) represent fully reliable sources of information on the consumption of individuals and households[21] (Adair, 2020). This follows from the belief that the survey participants do not have any reason to hide their expenses. At the same time, available figures on revenues (e.g., from structural business statistics, tax reports, or any other relevant source) are expected to be incomplete owing to the unreported income from informal transactions. After the generalization of the former source, which requires various adjustments and additional assumptions, the two datasets are harmonized and then compared so as to assess the discrepancies between revenues and expenditures on the macro level (Andreou *et al.*, 2020; Kukk *et al.*, 2020). Once all other sources of discrepancies are accounted for (e.g., long-term savings and the velocity of money), the resulting surplus of expenditure over income is attributed to the under-the-table earnings.

The choice of data sources to contrast, as well as of generalization and harmonization techniques, and finally, a sheer number of required assumptions, led to the development of several other subfamilies of demand-based methods (Adair, 2020). Despite sharing many weaknesses with the direct estimation techniques (see for instance, Adair, 2020), the demand-based methods proved to be highly powerful, especially when combined with other techniques (OECD, 2002). Given this, it comes as no surprise to hear that at least one of these methods was employed in 8 out of 49 studies identified in the systematic review. Since these include some of the most comprehensive and trustworthy endeavours to quantify hidden economic activities, we will come back to the demand-based methods later in this report (see Appendix F).

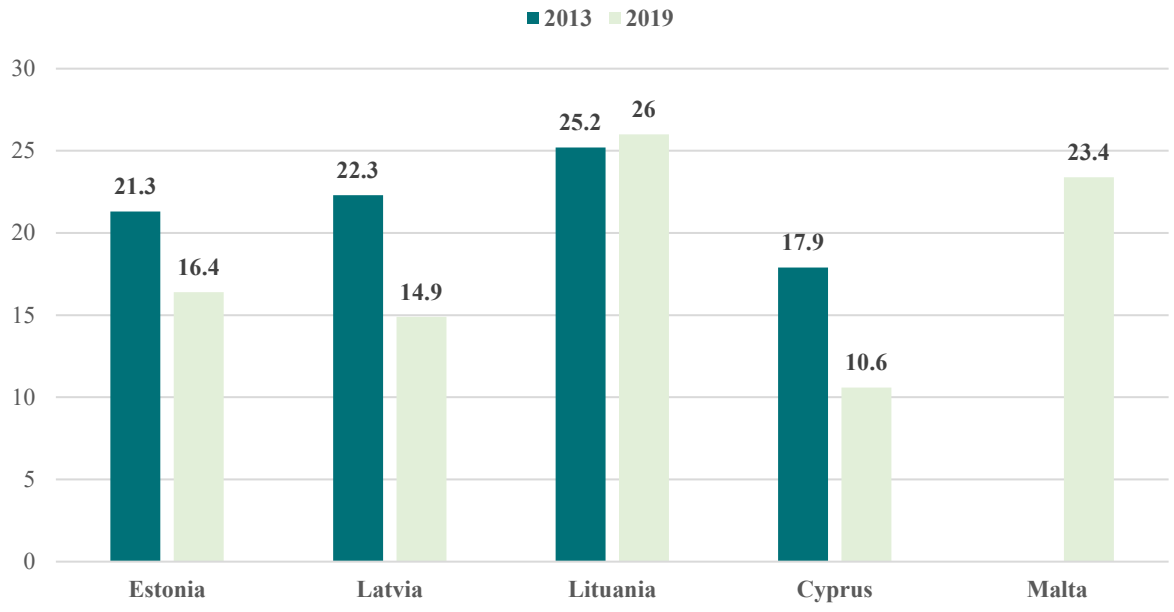
We also identified two studies based on the **labour input method (LIM),** the most popular among the supply-based estimation strategies. This particular approach finds its origin in the

[21] Instead of survey results, some methods from this family rely on final income figures from the system of national accounts (Ginevičius *et al*., 2020).

idea of labour force survey representing the source of flawless information on labour inputs in a certain country (European Commission, 2017). This comes from the belief that the survey participants have no motivation to hide their employment, given that the survey does not dig into the exact nature of their work efforts (for instance, the existence of a valid employment contract is not a matter of question). Akin to the demand-based approach, the goal is hence to compare the results of the labour force survey (after projecting them to the whole population) with data from the structural business statistics. The latter represents the figures reported by employers, who are expected to hide information about workers employed on an informal basis (OECD, 2002; Pedersen, 2003). Once other sources of discrepancies between two sets of data are eliminated, the resulting differences are ascribed to undeclared employment (Istat, 2008). The resulting figures on undeclared labour inputs are then straightforwardly converted into the value added by undeclared work under the (not overly credible) assumption that no difference in productivity exists between the formal and informal spheres of the economy.

There is no doubt that the lower risk of getting a faulty response from survey respondents makes this semi-direct estimation method more reliable than the direct questionnaire surveys. Owing to substantial flexibility, LIM also allows further reduction of bias through the incorporation of information from other available data sources (Istat, 2016). Finally, just like other data-mining techniques, this method is greedy in its nature: the more data it has, the better estimates will be (Franic *et al.*, 2023).

**Figure 9. Estimates of undeclared work in Latvia, Lithuania, Cyprus, and Malta based on the labour input method, % of GVA**




***Sources:*** Williams *et al.* (2017); Franic *et al.* (2023)

Yet, labour input method is by no means free of deficiencies. Besides large implementation costs, an additional problem is the fact that this method can only speak about un(der)declared employment. This means it fails to grasp other illicit activities by companies, as well as various atypical practices and work arrangements that do not connote employment relations (e.g., seasonal work, on-call work, moonlighting, and other forms of occasional work).

Given this, any output of the labour input method should be treated only as a **lower boundary for the real magnitude of undeclared work** (Adair, 2020; Giles, 1999). Still, this boundary is better than the one provided by the questionnaire surveys. Figure 9 shows the results of the two LIM studies offering data on the countries of interest. Although published by different institutions (the European Commission and European Labour Authority, respectively), the results of these studies are directly comparable due to identical methodology[22]. From the presented figures, we can conclude that in 2019 undeclared work accounted for at least 16.4% of official gross value added (GVA) in Estonia, 14.9% of GVA in Latvia, 26% of GVA in Lithuania, 10.6% of GVA in Cyprus, and 23.4% of GVA in Malta.

### *4.3.4. Model-based methods*

Following methodological advances in the field of econometrics and enhanced interest of statisticians in this topic, recent years have witnessed the domination of model-based estimation techniques. The rise of their popularity is also attributable to several key advantages these methods have over other estimation approaches (Kirchgässner, 2017). First and foremost, model-based methods entail low implementation costs, which makes them more appealing than direct and discrepancy techniques (Franic, 2019). The supremacy over indirect methods resides in a reduced (although not eliminated) need for oversimplifications and implausible assumptions. Additionally, these sophisticated procedures offer substantial flexibility in terms of the model architecture and input data, which was not the case with most previously described methods (Schneider and Buehn, 2017). Nevertheless, this does not mean they are error-free. On the contrary, the combination of bendiness, complexity, and technical limitations of the underlying statistical methodologies makes these methods by far the most controversial of all (Feige, 2016; Feige and Urban, 2008; Postea and Achim, 2022).

Without question, **MIMIC** is currently the most popular method for quantifying unregistered activities (Kirchgässner, 2017; Postea and Achim, 2022). It suffices to say that 13 out of 49 studies identified in the systematic review used some version of this particular method. The full name, which is 'Multiple indicators and multiple causes', says pretty much everything about the operational part of this estimation technique. Akin to indirect methods, it exploits the idea that no economic activity can remain fully hidden (Schneider and Buehn, 2017). Accordingly, MIMIC aims to extract information about unreported activities by scrutinizing known macroeconomic indicators. However, unlike indirect methods, here the quest is not limited to one indicator (Postea and Achim, 2022). In addition to this, MIMIC also makes use of the knowledge the academic and expert community accumulated over the years on the drivers of noncompliant behaviour (Schneider and Asllani, 2022). This is done by extending the 'consequence' part with the 'causal part' of the story.

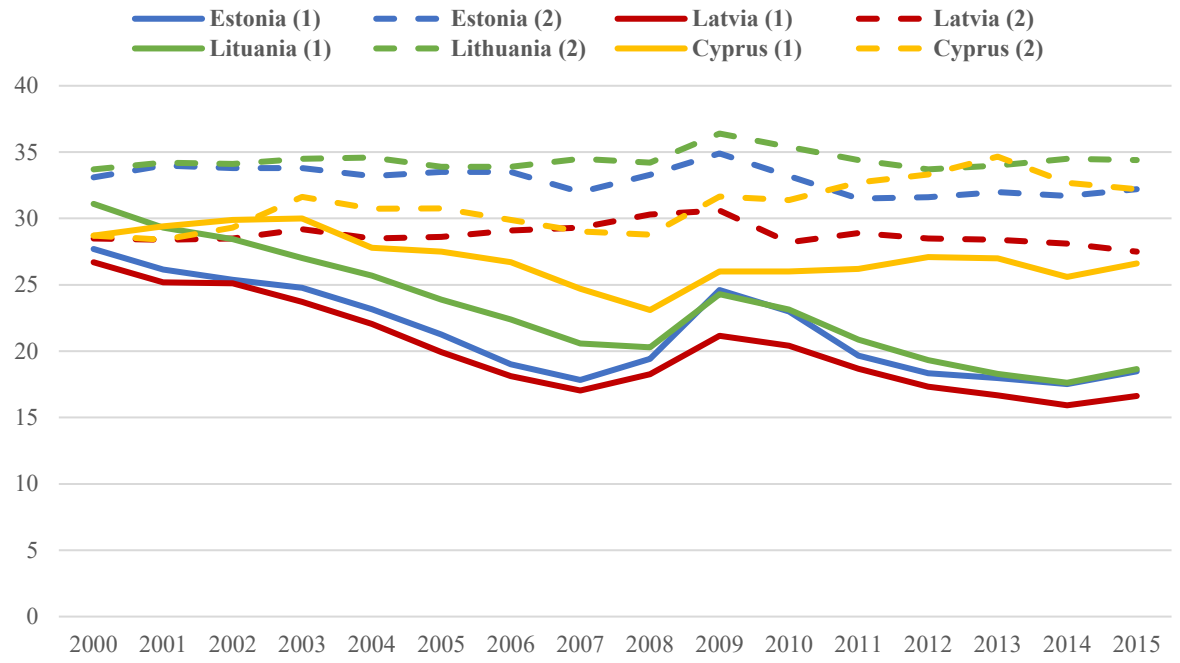
In other words, unregistered activities are conceptualized as a latent variable, i.e., the variable that is not directly measurable, but can be indirectly assessed from the set of predefined causes and indicators. The two sets of measurable variables, together with the latent factor of interest (which represents a bridge between them), define a set of structural equations (Breusch, 2016). The technical details of the tedious procedure to quantify the latent variable are beyond the scope of this report, but the core idea is to detect anomalies in the trajectories among and between the two contrasted sets of variables (i.e., causes and indicators). Sophisticated

[22] In both studies, the subject of estimation is undeclared work, whose definition corresponds to the one used in this report (European Commission, 2017). However, the resulting figures represent % of gross value added (not % of GDP), which complicates the comparison with other studies.

calculations based on factor analysis represent the fundamentals of this extraction mechanism (Timus and Ceban, 2020).

Unfortunately, the theoretical supremacy of MIMIC over indirect methods is neutralized by some important technical limitations. Above all, the practical applications of this method require severe reductions in the lists of causal and indicator variables (Slemrod and Weber, 2012; Timus and Ceban, 2020). So, in spite of the two-digit list of known drivers of informality, MIMIC models cannot stand more than 4-5 of them due to oversaturation issues. The situation with indicators is not any different.

**Figure 10. Two different estimates of undeclared work in Estonia, Latvia, Lithuania, and Cyprus based on the MIMIC method, % of GDP**




***Sources:*** (1) Medina and Schneider (2021); (2) Kelmanson *et al.* (2021)

This brings us to the core issue with this estimation method. Explicitly, some studies showed that even the smallest changes in the set of input variables can have a tremendous impact on the final results (Breusch, 2016; Feige and Urban, 2008). Indeed, the evidence gathered during our systematic review endorses this notion. For instance, Figure 10 compares the results of two studies which, besides being published by the same institution (the World Bank), also have overlaps in the authorship[23]. Without any doubt, the difference between the sets of causal variables used in the modelling is responsible for the bulk of the discrepancy between the two resulting series[24]. Different starting years and different sets of countries encompassed might

[23] Despite using different terminology, both studies estimate the same set of activities, namely "legal and productive economic activities deliberately hidden from official authorities that, if recorded, would contribute to GDP (excluding illegal or criminal activities and do-it-yourself, charitable, or household activities)" (Kelmanson *et al.*, 2021, p. 72). Reflecting the definitions adopted in this report, this would say that both essentially provide estimates of undeclared work.

[24] In Medina and Schneider (2021) the causal variables were trade openness, GDP per capita, unemployment rate, size of government, fiscal freedom, rule of law, control of corruption, and government stability. Kelmanson *et al.* (2021), on the other hand, used productivity (GDP per worker), tax revenues, trade volume and agriculture value added.

have also somewhat influenced the final results, but not much can be said about this due to the scarcity of methodological information inherent in these two studies. Whatever the case might be, a closer look at the resulting estimates reveals some worrying differences, not only in terms of the magnitude but also with respect to the trend of the evaluated phenomenon (see Figure 10).

If nothing else, the necessity to select a small number of causal variables in a situation when there are even no clear criteria on which to base such a decision adds a substantial dose of subjectivity to the process. Often masked by intentional ambiguity in methodological accounts, this subjectivity has been in focus of severe disputes between researchers, therefore contributing to the controversies surrounding this field since the earliest days (Breusch, 2016).

Another, even more problematic, source of bias inherent in this estimation strategy is cleverly wrapped into the terms 'calibration' and 'benchmarking' (Adair, 2020; Almenar *et al.*, 2020). Hidden behind these catchy names is the fact that MIMIC is only able to speak about the dynamics of the analysed phenomenon over time, while being able to say virtually nothing about its exact size (Almenar *et al.*, 2020; Breusch, 2016). In other words, MIMIC provides solely information about the relative change (i.e., in %) of the scrutinized activities on a year-to-year basis. Calibration therefore designates the transformation (i.e., unwrapping) of these relative changes into absolute values (Kelmanson *et al.*, 2021; Schneider and Asllani, 2022). This, in turn, requires information about the exact estimate for the starting year (the so-called 'benchmark' value), which must be taken from other studies. Yet, the decision about the study(ies) used for this purpose is fully under the control of the authors (Kirchgässner, 2017; Postea and Achim, 2022). The benchmark values typically come from indirect methods (e.g., currency demand), which would say that MIMIC not only inherits the key weaknesses of the indirect methods but actually further amplifies them (Adair, 2020; Kirchgässner, 2017).

This exposes the utmost limitation of MIMIC, which boils down to the question of WHAT is actually measured. Given that MIMIC only 'unwraps' the figures coming from indirect methods, there has been a consensus that the resulting estimates at best represent **the upper limit for the real magnitude of the shadow economy** (Adair, 2020; Breusch, 2016).

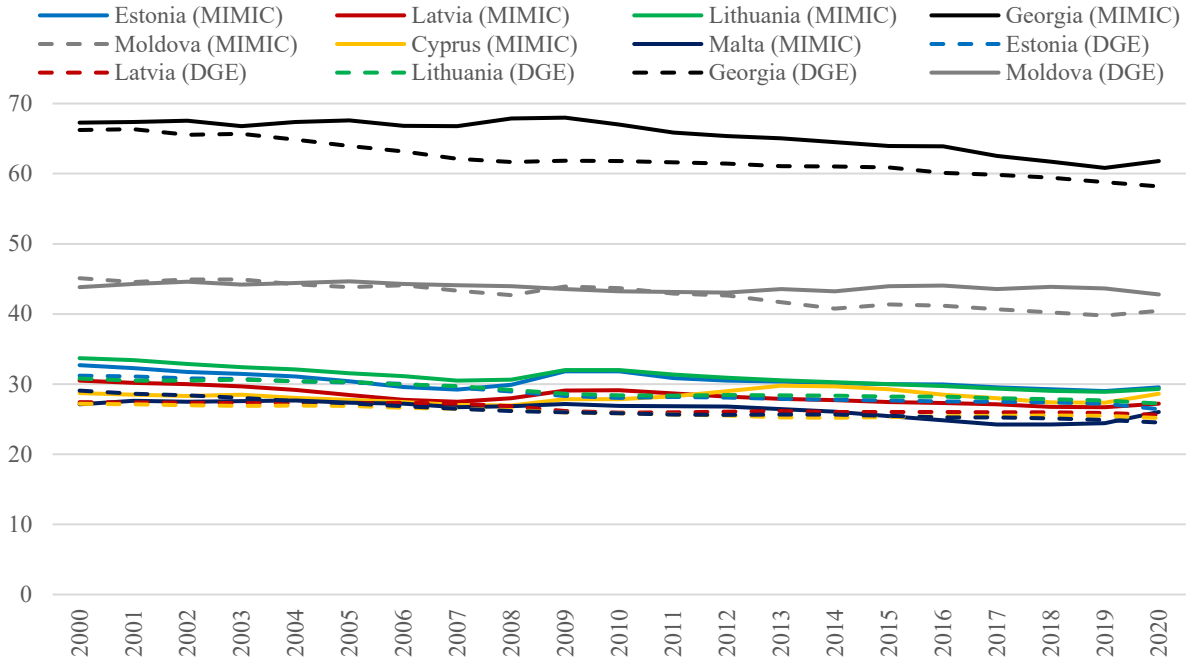
Another model-based estimation strategy that has been getting attention lately is the **Dynamic General Equilibrium (DGE)**. This microeconomic approach is grounded on the assumption that individuals/households strive to maximize their utility given a set of constraints (Elgin *et al.*, 2021). However, just like most other microeconomic models, the DGE procedure cannot go beyond simple utility functions and a small number of basic constraints. Among other things, it is typically hypothesized that all income is spent during the reference period (Elgin and Oztunali, 2012). Also, it is assumed that labour is the only input in the shadow economy. Most importantly, the official and shadow economy are treated as two fully separate (i.e., non-overlapping) realms.

The ultimate goal of these simplifications is to obtain a linear programming task whose solution can be obtained in a straightforward way. However, the outcome of this procedure is again the relative change in the magnitude of the shadow economy on a year-to-year basis (Elgin *et al.*, 2021; Elgin and Oztunali, 2012). To obtain results in tangible units (e.g., % of GDP), some sort of calibration is needed here as well. Yet, besides taking external estimates for the starting point, DGE calibration also requires a number of additional assumptions about the size of certain exogenous coefficients.

Unfortunately, the combination of model over-simplifications, calibration, and flexibility in setting these exogenous parameters severely undermines the credibility of this estimation approach. The calibration appears to be particularly problematic in this respect. It suffices to

say that the authors of both DGE studies (one of which lays down the foundations for the World Bank's Informal Economy Database) identified in the systematic review were quite open about the main reasons for choosing MIMIC-based values for benchmarking. As they admitted, the main goal was to make their estimates as close as possible to those from highly cited MIMIC studies (Elgin and Oztunali, 2012).

**Figure 11. The comparison of MIMIC and DGE estimates of the informal economy in the Baltic countries, Georgia, Moldova, Cyprus and Malta, % of GDP**




*Sources:* World Bank (2024)

However, this did not manage to mask the other obvious limitation of this method, which is the internal dependency of the DGE on cross-country data. To illustrate this, Figure 11 compares DGE and MIMIC estimates of the informal economy provided in the World Bank's Informal Economy Database[25]. Besides significant misalignment of figures for the same country, also evident are substantial commonalities in the size, and (especially) the trends among countries for each of these two methods. For instance, the MIMIC estimates for Estonia and Lithuania are quite close, just as are the corresponding DGE estimates. At the same time, the two models yield highly dissimilar estimates for each of these two countries.

## *4.4. Where do we stand at the moment?*

In his overview of the state of affairs at the end of the millennium, Dixon (1999, p. 335) concluded that the figures obtained by any of the methods available at that time were "no better than guestimates". As he argued, every publication of new estimates hence represented nothing

[25] Informal economy is here defined as "market-based and legal production of goods and services that is hidden from public authorities for monetary, regulatory, or institutional reasons". Given this, both studies again essentially quantified undeclared work.

more than interesting news (Dixon, 1999). Although the following quarter of the century did see some new attempts to master this task, our systematic review has shown that Dixon's words are still highly relevant.

As elaborated in the previous sections, the available estimation methods can be divided into those that underestimate and those that overestimate the magnitude of the monitored phenomenon (Achim *et al.*, 2024). However, some are less problematic than others. As a rule of thumb, one can safely assume that the real extent of **undeclared work** lies **somewhere between the figures suggested by the discrepancy methods and those indicated by the indirect methods** (Achim *et al.*, 2024).

Despite their apparent deficiencies, model-based estimation approaches seem to be winning the battle of methods (Kirchgässner, 2017; Postea and Achim, 2022). This is not surprising nor worrying per se given that they (in theory) remove most of the irrational assumptions inherent in indirect strategies. On the other hand, much lower financial and time cost gives them a substantial advantage over the direct estimation methods (Fernandes, 2022; Postea and Achim, 2022). However, despite their solid theoretical grounds, model-based methods fail in practice for a number of reasons.

The key problems are related to the calibration procedure, given that the scholars commonly try to turn this apparent weakness of their methods into own advantage (Breusch, 2016). As we saw, the authors of the DGE-based studies were pretty much open about the reasons why they chose MIMIC results for the benchmark. The same cannot be said about any of the 13 MIMIC studies identified in our systematic review. Precisely this lack of transparency lies behind the accusations about cherry-picking external values so as to make some countries look worse than others and vice versa (Kirchgässner, 2017; Postea and Achim, 2022). Indeed, while most scholars would agree that Georgia and Moldova stand worse than the EU member states in this respect, it is questionable whether the difference is as tremendous as suggested by MIMIC (see Figure 11).

This is not where the story ends. Just as DGE-based studies tend to rely on MIMIC estimates, MIMIC-based studies usually use the results from indirect methods. Since indirect methods suffer from extremely low credibility, DGE and MIMIC are no better in this respect (Adair, 2020). However, this artificially created chained reliance makes the results of these methods highly comparable, which increases their integrity in the eyes of uninformed users (Thomas, 1999). At the same time, their methodological complexity, coupled with the outflow of many disappointed experts from this field, has silenced the critics of these highly controversial estimation approaches. As a result, some respectable institutions, such as the World Bank, the European Parliament, and the International Monetary Fund have recently included model-based estimates in their official publications and databases.

The good news is that remaining international and supranational institutions not only refrain from using model-based methods but also advocate against their usage (Eurostat, 2014a; OECD, 2002). As a matter of fact, some of them even developed their own comprehensive estimation methodologies. The most notable example is Eurostat's tabular approach, grounded on a set of clear rules and recommendations to national authorities aiming to ensure the exhaustiveness of the national accounts (Eurostat, 2014a, 2021). By clearly acknowledging the apparent notion that there is no one-size-fits-all approach, other institutions have recently also called for switching to multi-method strategies (see Fernandes, 2022). The underlying rationale is to take the best from some of the techniques presented in this report so as to minimize the estimation error (OECD, 2002; UNECE, 2008). Since there have been some recent noteworthy developments in this area, especially in Europe, in Appendix F we provide more details on these multi-method approaches.

# 5. Conclusions, lessons learned, and policy recommendations

In conclusion, this report presents two systematic reviews: one examining policy measures to tackle the shadow economy and another exploring measurement methods. Additionally, three online workshops were held to engage stakeholders, enhance understanding of the underlying causes of the shadow economy in each region or country, and identify the most promising policy measures to encourage the transition to a formal economy. The target audience for these workshops included representatives from academia, policymakers, state institutions, social partner organizations, professional and industry associations, and other field experts. A summary of the findings from these workshops is available in Appendix E.

These systematic reviews reinforced that the shadow economy is a multifaceted concept, and there is 'no one-size-fits-all' approach, both in terms of measurement method and policy measures for tackling it.

On the one hand, the review of methods shows that while there have been improvements in measuring the shadow economy, challenges remain in accurately estimating its size. The available methods still show significant variability, with some underestimating and others overestimating the real scale of the shadow economy. As such, recognizing that no single method is sufficient, there is growing support for multi-method strategies that combine different approaches to minimize estimation errors and provide a more reliable understanding of the shadow economy.

On the other hand, the review of policy measures reveals a significant lack of policy evaluation studies. The few attempts of evaluation rely on secondary data and lack experimental design, which limits the ability to assess cause-and-effect relationships between specific measures and their outcomes. While grey literature based on data provided by enforcement authorities offers insights into how the shadow economy could be tackled, these examples of measures and their outcomes remain largely descriptive, making again difficult to establish a direct cause-and-effect link. The limited availability of data to researchers may explain the lack of policy evaluation studies. Measuring the phenomenon reliably is inherently challenging, and researchers often face significant barriers in accessing the administrative data needed to evaluate the impact of specific measures. Addressing this substantial gap in the literature could involve fostering stronger collaboration between researchers and enforcement authorities. Such partnerships would not only improve data access but also open opportunities for field experiments and pilot initiatives, providing valuable insights for future policy development.

Despite these limitations, the systematic reviews, along with the information provided by the stakeholders during the workshops, confirm that a holistic approach is essential for more effectively tackling the shadow economy. As such, addressing the shadow economy requires not only strengthening enforcement capacity but also improving the benefits of engaging in the formal economy, raising awareness about the advantages of operating formally, and implementing measures aimed at enhancing trust. This includes fostering trust among peers, encouraging citizens to comply with the system and trust one another in following formal practices. Additionally, it involves building trust in government, ensuring individuals believe they are treated fairly and justly, that authorities adopt a transparent and non-punitive approach, and that the public services they receive are a fair return for the taxes they pay.

Nevertheless, to identify the optimal “policy mix” for a specific country, it is essential to first diagnose the shadow economy. This involves not only accurate estimates of its size but also an understanding of the key drivers of the shadow economy, the population groups involved, as well as the legislative framework and social protection system. Such a diagnosis is critical, as

inadequate social protection or a flawed legislative framework (e.g., the inability to register certain types of work, such as gig work) can create significant barriers to labor formalization. Based on this assessment, and through promoting social dialogue and tripartite consensus, the necessary measures for tackling participation in shadow economy can be identified and selected. As such, policy measures must be tailored to each specific context. For instance, the workshops highlighted the importance of addressing the low trust in the social security system and the weak enforcement capacity, particularly in Moldova and Georgia, which adopt a more liberal approach. In the Baltic countries, additional measures such as blacklisting non-compliant companies and excluding them from public procurement, along with the need to simplify the tax system and enhance transparency in public spending, were emphasized. In Malta and Cyprus, the role of social norms and the effectiveness of hotlines for improving enforcement were also highlighted.

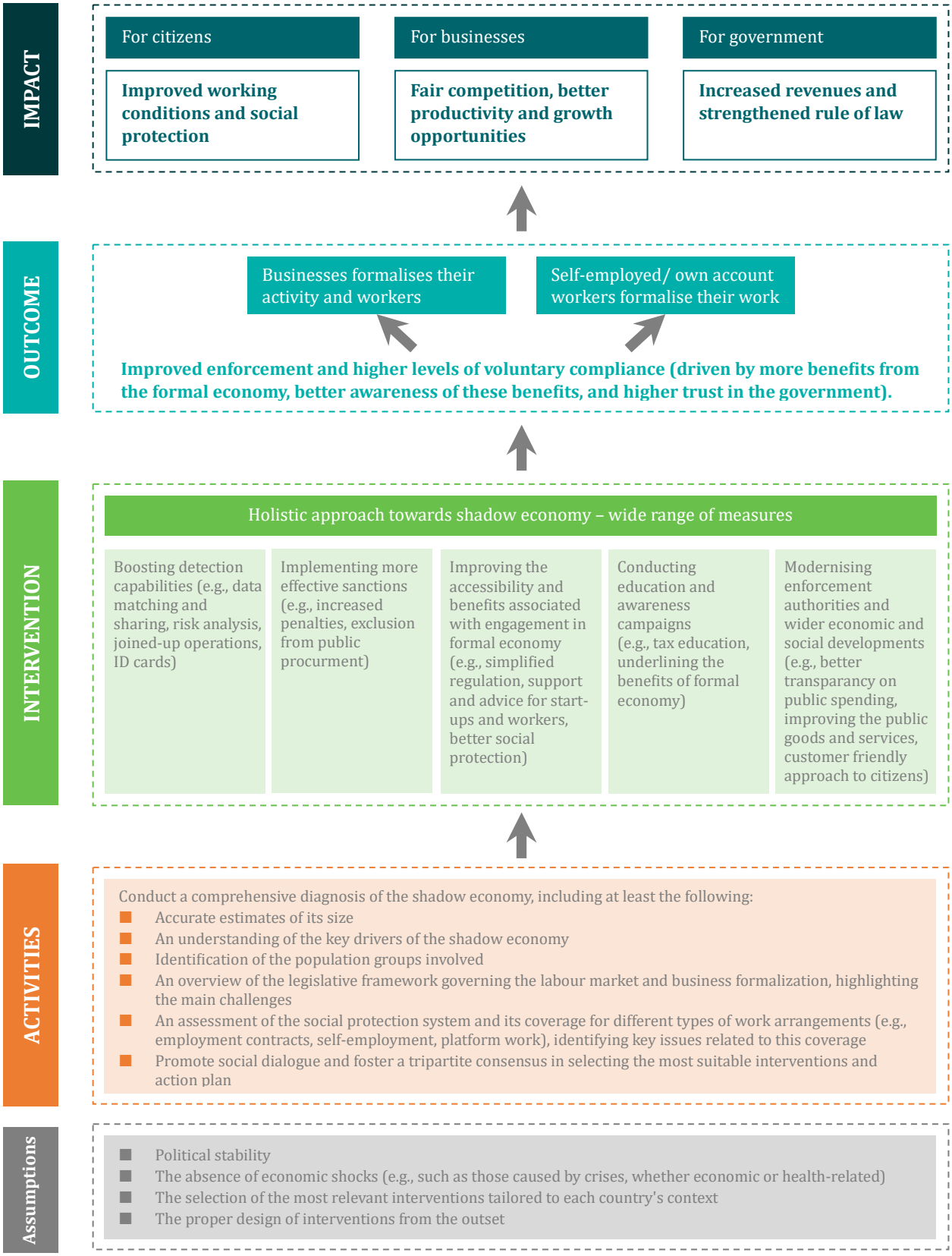
Once the optimal mix of policies is selected and implemented, it will result in improved enforcement and higher levels of voluntary compliance, driven by more benefits from the formal economy, better awareness of these benefits, and higher trust in the government. This, in turn, will motivate own account workers and businesses to formalize their operations by registering both their activities and employees. As a result, workers will gain access to appropriate social protections, ensuring they are fully covered within the formal economy.

In the long term, addressing the shadow economy will lead to improved working conditions and enhanced social protection for workers, fairer competition in the business environment, and the potential for business growth and increased productivity. For governments, it will result in higher revenues and better oversight of labor market legality and, more broadly, the overall economy.

It is important to note that this sequence – from activities to interventions, outcomes, and long-term impacts – rests on a series of assumptions: political stability, the absence of economic shocks (such as those caused by crises, whether economic or health-related), the selection of the most relevant interventions tailored to each country's context, and the proper design of interventions from the outset.

As such, our theory of change, which is not exhaustive and rather underline the general issues in tackling shadow economy, is grapichally displayed in Figure 12.

**Figure 12.** Theory of change




***Source***: Authors' own illustration

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# *Appendix A*

**Table A1.** Mixed Methods Appraisal Tool (MMAT) for studies included in Cluster 1

| No. | Study | Category of study for which questions were used to asses the methodological quality | No. of "Yes" responses (maximum 5) | Question(s) receiving a "No" or "Can't tell" response (if it is the case) |
|---|---|---|---|---|
| 1 | Clifford & Mavrokonstantis, 2021 | Quantitative descriptive | 5 | - |
| 2 | Vallistu, 2023 | Qualitative | 5 | - |
| 3 | Schueth, 2012 | Qualitative | 5 | - |
| 4 | Bruhn & Loeprick, 2016 | Quantitative descriptive | 5 | - |
| 5 | Gavoille & Zasova, 2023a | Quantitative descriptive | 5 | - |
| 6 | Gavoille & Zasova, 2023b | Quantitative descriptive | 5 | - |
| 7 | Jascisens & Zasova, 2021 | Quantitative descriptive | 5 | - |
| 8 | Nipers & Pilvere, 2017 | Quantitative descriptive | 5 | - |
| 9 | Kindsfateriene & Lukasevicius, 2008 | Qualitative | 4 | Is there coherence between qualitative data sources, collection, analysis and interpretation? (Can't tell) |

***Source:*** own processing.

*Note: This tool is specifically tailored to scientific papers. Consequently, the 37 papers from the grey literature included in our study could not be analysed here. Moreover, out of the 83 scientific papers, only 9 directly examined policy measures aimed at tackling shadow economy and their efficiency (these 9 papers are the ones included in Cluster 1 described in Section 2.2). The remaining 74 papers (included in Cluster 2) rather provided general recommendations on important factors to consider in tackling shadow economy. For the papers in Cluster 1 a more elaborate description was provided when reporting the results, as these papers explored specific policies. Therefore, it was essential to include a list displaying the methodological quality of these papers. However, a quality assessment for the papers in Cluster 2 was not included here, as they did not fully align with the scope of our research. These papers explore other issues but discuss at least one policy measure related to the shadow economy. Still, their primary focus is not on evaluating these policies but on providing policy implications based on their findings.*

## *Appendix B*

**Table B1.** Details about papers included in Cluster 1

| No. | Paper | Type of paper | Country/ Area discussed | Type of research | Research methods/ techniques | Category of policy measure/ initiative | Details about the analysed policy measure/ initiative |
|---|---|---|---|---|---|---|---|
| 1 | Clifford & Mavrokonstantis 2021 | Journal article | Cyprus | Empirical (quantitative) | Secondary data analysis | Improving the accessibility and benefits associated with engagement in formal economy | Tax deductions for charitable donations |
| 2 | Vallistu, 2023 | Journal article | Estonia | Empirical (qualitative) | Interviews | Improving the accessibility and benefits associated with engagement in formal economy | Entrepreneurial account (a type of bank account that allows income to be automatically taxed) |
| 3 | Schueth, 2012 | Journal article | Georgia | Empirical (qualitative) | Ethnographic research | Boosting detection capabilities + Implementing more effective sanctions + Improving the accessibility and benefits associated with engagement in formal economy + Modernising enforcement authorities | Multiple measures and policy changes employed after the 2003 "Rose Revolution" |
| 4 | Bruhn & Loeprick, 2016 | Journal article | Georgia | Empirical (quantitative) | Secondary data analysis | Improving the accessibility and benefits associated with engagement in formal economy | No income taxation for micro businesses and very low-income taxation for small businesses, respectively |
| 5 | Gavoille & Zasova, 2023a | Journal article | Latvia | Empirical (quantitative) | Secondary data analysis | Boosting detection capabilities | Minimum wage policy (hikes of minimum wage) |
| 6 | Gavoille & Zasova, 2023b | Journal article | Latvia | Empirical (quantitative) | Secondary data analysis | Boosting detection capabilities | Minimum wage policy (hikes of minimum wage) |
| 7 | Jascisens & Zasova, 2021 | Research paper | Latvia | Empirical (quantitative) | Secondary data analysis | Improving the accessibility and benefits associated with | Parental benefits depending on the declared wage |

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| | | | | | | engagement in formal economy | |
| 8 | Nipers & Pilvere, 2017 | Conference paper | Latvia | Empirical (quantitative) | Secondary data analysis | Improving the accessibility and benefits associated with engagement in formal economy | Reduced VAT for fruits, berries, vegetables and potatoes |
| 9 | Kindsfateriene & Lukasevicius, 2008 | Journal article | Lithuania | Theoretical | Literature review | Improving the accessibility and benefits associated with engagement in formal economy | Reduced income/profit taxes |

***Source***: own processing

## *Appendix C*

**Table C1.** List of papers included in Cluster 2

| No. | Paper | Type of paper | Country/Area discussed | Type of research | Research methods/ techniques |
|---|---|---|---|---|---|
| 1 | Ekici & Besim, 2018 | Journal article | Northern Cyprus | Empirical (quantitative) | Secondary data analysis |
| 2 | Lanamäki & Tuvikene, 2022 | Journal article | Estonia | Empirical (qualitative) | Frame analysis |
| 3 | Aliyev, 2014 | Journal article | Georgia | Empirical (mixed methods) | Secondary data analysis + interviews |
| 4 | Belli *et al.*, 2004 | Journal article | Georgia | Empirical (qualitative) | In-depth interviews |
| 5 | Bernabè, 2005 | Doctoral thesis | Georgia | Empirical (quantitative) | Secondary data analysis |
| 6 | Gasparėnienė *et al.*, 2022 | Book | Lithuania | Empirical (quantitative) | Survey |
| 7 | Azzopardi, 2013 | Journal article | Malta | Empirical (qualitative) | Semi-structured interviews |
| 8 | Hutsebaut (2021) | Journal article | Moldova | Theoretical | - |
| 9 | ILO, 2016 | Report | Moldova | Empirical (quantitative) | Secondary and primary data analysis |
| 10 | ILO, 2023 | Report | Moldova | Empirical (quantitative) | Secondary data analysis |
| 11 | National Development Strategy Moldova 2030 (2018) | Report | Moldova | Empirical (quantitative) | Secondary and primary data analysis |
| 12 | United Nations Development Programme, 2021 | Report | Moldova | Empirical (mixed methods) | Survey + interviews + focus group |
| 13 | Barra *et al.*, 2024 | Journal article | 42 countries (Cyprus, Georgia & Lithuania included) | Empirical (quantitative) | Secondary data analysis |
| 14 | Erumban, 2024 | Journal article | 118 countries (all countries in our review included) | Empirical (quantitative) | Secondary data analysis |
| 15 | OECD, 2024 | Report | Different number of countries analysed in each chapter (Georgia included in Chapter 2) | Empirical (quantitative) | Secondary data analysis |
| 16 | Allam *et al.*, 2023 | Journal article | All EU countries (2004–2018) | Empirical (quantitative) | Secondary data analysis |
| 17 | Galdino *et al.*, 2023 | Journal article | 73 countries (OECD countries included) | Empirical (quantitative) | Secondary data analysis |

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|---|---|---|---|---|---|
| 18 | Kouakou & Yeo, 2023 | Research paper | 138 countries (all countries in our study included) | Empirical (quantitative) | Secondary data analysis |
| 19 | Masca & Chis, 2023 | Journal article | All EU countries (2005–2017) | Empirical (quantitative) | Secondary data analysis |
| 20 | OECD, 2023 | Report | Different number of countries analysed in each chapter (Cyprus, Estonia, Latvia, Lithuania & Malta included) | Empirical (quantitative) | Secondary data analysis |
| 21 | Ciziceno & Pizzuto, 2022 | Journal article | 96 countries (Cyprus, Estonia, Georgia, Latvia, Lithuania & Moldova included) | Empirical (quantitative) | Secondary data analysis |
| 22 | Kuznyetsova *et al.*, 2022 | Journal article | 88 countries (Estonia & Lithuania included) | Empirical (quantitative) | Secondary data analysis |
| 23 | Nguyen *et al.*, 2022 | Journal article | 30 countries (Cyprus, Estonia, Latvia, Lithuania, Malta & Moldova included) | Empirical (quantitative) | Secondary data analysis |
| 24 | Ohnsorge & Shu, 2022 | Book | Depends on the consulted chapter. The main chapter of interest for our study, Chapter 6, explores 121 countries | Empirical (quantitative) | Secondary data analysis |
| 25 | Owolabi *et al.*, 2022 | Journal article | 123 countries (Cyprus, Estonia, Latvia, Lithuania, Malta & Moldova included) | Empirical (quantitative) | Secondary data analysis |
| 26 | Chletsos & Sintos, 2021 | Journal article | 141 countries (Cyprus, Estonia, Georgia, Latvia, Lithuania & Moldova included) | Empirical (quantitative) | Secondary data analysis |
| 27 | Elbahnasawy, 2021 | Journal article | 146 countries (all countries in our review included) | Empirical (quantitative) | Secondary data analysis |
| 28 | Ha *et al.*, 2021 | Journal article | 115 countries (Estonia, Georgia, Latvia, Lithuania & Malta included) | Empirical (quantitative) | Secondary data analysis |
| 29 | Horodnic *et al.*, 2021 | Journal article | 4 countries (Cyprus and Malta included) | Empirical (quantitative) | Secondary data analysis |
| 30 | Jessen & Kluve, 2021 | Journal article | 38 empirical studies regarding 15 countries (Georgia included) | Empirical (quantitative) | Secondary data analysis |
| 31 | Mara, 2021 | Journal article | All EU countries (before Brexit) | Empirical (quantitative) | Secondary data analysis |
| 32 | Psychoyios *et al.*, 2021 | Journal article | 19 countries (Estonia & Latvia included) | Empirical (quantitative) | Secondary data analysis |
| 33 | Argilés-Bosch *et al.*, 2020 | Journal article | 22 countries (Cyprus, Latvia & Lithuania included) | Empirical (quantitative) | Secondary data analysis |
| 34 | Kemme *et al.*, 2020 | Journal article | 138 source countries (Cyprus, Estonia, Georgia, Latvia, Lithuania & Malta included) & 21 OECD host countries (Estonia included) | Empirical (quantitative) | Secondary data analysis |
| 35 | Marè *et al.*, 2020 | Journal article | 92 countries (Estonia, Georgia, Latvia, Lithuania, Malta & Moldova included | Empirical (quantitative) | Secondary data analysis |

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| 36 | Moro-Egido & Solano-García, 2020 | Journal article | 26 countries (Estonia & Latvia included) | Empirical (quantitative) | Secondary data analysis |
| 37 | Williams, 2020 | Journal article | 6 countries (Estonia, Latvia & Lithuania included) | Empirical (quantitative) | Secondary data analysis |
| 38 | Bruno, 2019 | Journal article | Various countries used as examples (theoretical paper) | Theoretical | - |
| 39 | OECD, 2019 | Report | Different number of countries analysed in each chapter (Estonia, Latvia, Lithuania & Moldova included) | Empirical (quantitative) | Secondary data analysis |
| 40 | Rodriguez-Justicia & Theilen, 2018 | Journal article | 29 countries (Cyprus, Estonia, Latvia & Lithuania included) | Empirical (quantitative) | Secondary data analysis |
| 41 | Yamen *et al.*, 2018 | Journal article | 27 countries (Cyprus, Estonia, Latvia, Lithuania & Malta included) | Empirical (quantitative) | Secondary data analysis |
| 42 | Rojco & Blyznyuk, 2017 | Journal article | Moldova & Ukraine | Empirical (quantitative) | Secondary data analysis |
| 43 | Pappadá & Zylberberg, 2017 | Journal article | The study of interest for our systematic review: 35 countries (Cyprus, Estonia & Malta included). The other study is focused on Greece only | Empirical (quantitative) | Secondary data analysis |
| 44 | Williams & Horodnic, 2017 | Journal article | All 28 EU countries (in 2013) | Empirical (quantitative) | Secondary data analysis |
| 45 | Williams & Kayaoglu, 2017 | Journal article | All 28 EU countries (in 2013) | Empirical (quantitative) | Secondary data analysis |
| 46 | Distinguin *et al.*, 2016 | Journal article | 86 countries (Estonia, Latvia, Lithuania & Moldova included) | Empirical (quantitative) | Secondary data analysis |
| 47 | Gilbert & Ilievski, 2016 | Journal article | 126 countries (all countries in our study included) | Empirical (quantitative) | Secondary data analysis |
| 48 | Zitkiene *et al.*, 2016 | Journal article | Various countries used as examples (theoretical paper) | Theoretical | - |
| 49 | Frey & Schneider, 2015 | Journal article | 52 countries (Estonia, Georgia, Latvia & Lithuania included) | Empirical (quantitative) | Secondary data analysis |
| 50 | Schneider, 2015 | Journal article | Multiple countries used for various estimations (Moldova included) | Empirical (quantitative) | Secondary data analysis |
| 51 | Stepurko *et al.*, 2015 | Journal article | 3 countries (Lithuania included) | Empirical (quantitative) | Secondary data analysis |
| 52 | Putniņš & Sauka, 2015 | Journal article | Estonia, Latvia & Lithuania | Empirical (quantitative) | Survey |
| 53 | Stankevicius & Leonas, 2015 | Conference paper | No specific country (theoretical paper) | Theoretical | - |

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| 54 | Williams & Horodnic, 2015a | Journal article | 4 countries (Estonia, Latvia & Lithuania included) | Empirical (quantitative) | Secondary data analysis |
| 55 | Williams & Horodnic, 2015b | Journal article | Estonia, Latvia & Lithuania | Empirical (quantitative) | Secondary data analysis |
| 56 | Quintano & Mazzocchi, 2013 | Journal article | 33 countries (Cyprus, Estonia, Latvia, Lithuania & Malta included) | Empirical (quantitative) | Secondary data analysis |
| 57 | Stepurko *et al.*, 2013 | Journal article | 6 countries (Lithuania included) | Empirical (quantitative) | Survey |
| 58 | Tambor *et al.*, 2013 | Journal article | 35 countries (Cyprus, Estonia, Latvia, Lithuania & Malta included) | Empirical (quantitative + qualitative) | Quantitative secondary data analysis + qualitative description of selected country experiences |
| 59 | D'Hernoncourt & Méon, 2012 | Journal article | 63 countries (Estonia, Latvia, Lithuania & Moldova included) | Empirical (quantitative) | Secondary data analysis |
| 60 | Loayza & Rigolini, 2011 | Journal article | 54 countries (Cyprus & Malta included) | Empirical (quantitative) | Secondary data analysis |
| 61 | Putniņš & Sauka, 2011 | Journal article | Estonia, Latvia & Lithuania | Empirical (quantitative) | Survey |
| 62 | Williams, 2010 | Journal article | 5 countries (Cyprus included) | Empirical (quantitative) | Secondary data analysis |
| 63 | Williams, 2009 | Journal article | 4 countries (Estonia, Latvia & Lithuania included) | Empirical (quantitative) | Secondary data analysis |
| 64 | Torgler & Schneider, 2009 | Journal article | 55 countries (Georgia, Latvia & Moldova included) | Empirical (quantitative) | Secondary data analysis |
| 65 | Dau & Cuervo-Cazurra, 2014 | Journal article | 51 countries (Latvia included) | Empirical (quantitative) | Secondary data analysis |
| 66 | Buehn *et al.*, 2013 | Journal article | 145 countries (Estonia, Georgia, Latvia, Lithuania, Moldova) | Empirical (quantitative) | Secondary data analysis |
| 67 | Koettl & Weber, 2012 | Book chapter | 6 countries (Estonia & Latvia included) | Empirical (quantitative) | Secondary data analysis |
| 68 | Torgler, 2012 | Journal article | 10 countries (Estonia, Latvia & Lithuania included) | Empirical (quantitative) | Secondary data analysis |
| 69 | Bird & Zolt, 2011 | Journal article | Various countries used as examples (theoretical paper) | Theoretical | - |
| 70 | Frey & Torgler, 2007 | Journal article | 30 countries (Estonia, Latvia, Lithuania & Malta included) | Empirical (quantitative) | Secondary data analysis |
| 71 | Engelschalk, 2004 | Journal article | 4 countries (Georgia included) | Theoretical | - |
| 72 | Ensor, 2004 | Journal article | Various countries used as examples (theoretical paper) | Theoretical | - |

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| 73 | Eilat & Zinnes, 2002 | Journal article | 25 countries (Estonia, Latvia, Lithuania & Moldova included) | Empirical (quantitative) | Secondary data analysis |
| 74 | Trandel & Snow, 1999 | Journal article | No specific country (theoretical paper) | Theoretical | - |

***Source:*** own processing

## *Appendix D*

**Table D1.** List of papers included in Cluster 3

| No. | Paper | Type of paper | Country/Area discussed | Category of policy measure/initiative | Details about the policy measure/initiative |
|---|---|---|---|---|---|
| 1 | ELA, 2024a | Good practice fiche | Cyprus | Boosting detection capabilities | More frequent inspections in the construction sector |
| 2 | ELA, 2023a | Good practice fiche | Cyprus | Boosting detection capabilities | Whistle-blower telephone hotline for reporting undeclared work, workplace malpractices, or violations of employment contracts |
| 3 | ELA, 2022a | Good practice fiche | Cyprus | Conducting education and awareness campaigns | Training sessions to raise awareness about the issue of undeclared work and to promote the existing legislation and measures designed to address it |
| 4 | ELA, 2023b | Good practice fiche | Estonia | Boosting detection capabilities | Open-source information, cooperation, and information exchange within the public sector to address under-declared work |
| 5 | ELA, n.d.a | Good practice fiche | Estonia | Boosting detection capabilities | Using data from Employment Register for labour inspections |
| 6 | ELA, 2021a | Good practice fiche | Estonia | Improving the accessibility and benefits associated with engagement in formal economy | Pre-filling tax returns to boost compliance through a user-friendly approach |
| 7 | ELA, 2021b | Good practice fiche | Estonia | Improving the accessibility and benefits associated with engagement in formal economy | Sending notifications letters to at-risk businesses and employees in the HORECA sector |
| 8 | ILO, 2021 | Report | Estonia | Improving the accessibility and benefits associated with engagement in formal economy | Various measures implemented in Estonia for e-formalisation |
| 9 | ELA, 2022b | Good practice fiche | Estonia | Improving the accessibility and benefits associated with engagement in formal economy | Offering tax behaviour ratings to firms and provide them with information on how to maintain proper tax compliance and address any tax issues |

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| 10 | ELA, 2024b | Good practice fiche | Estonia | Improving the accessibility and benefits associated with engagement in formal economy | Automated reporting, easing administrative tasks for businesses |
| 11 | ELA, n.d.b | Good practice fiche | Estonia | Conducting education and awareness campaigns | Agreement on Cooperation between Estonia and Finland on Estonian posted workers in Finland |
| 12 | ELA, 2020a | Good practice fiche | Estonia | Conducting education and awareness campaigns | "Thank you for paying taxes" awareness raising campaign |
| 13 | Social Justice Center, 2021 | Report | Georgia | Boosting detection capabilities + Implementing more effective sanctions + Improving the accessibility and benefits associated with engagement in formal economy + Conducting education and awareness campaigns | Various measures implemented in Georgia for economic formalisation |
| 14 | Un Women, 2018 | Report | Georgia | Implementing more effective sanctions + Improving the accessibility and benefits | Various measures for reducing women economic inactivity or shadow economy activities |
| 15 | United Nations Development Programme, 2008 | Report | Georgia | Implementing more effective sanctions + Improving the accessibility and benefits | Various policy measures for reducing shadow economy |
| 16 | Abramishvili & Shalibashvili, 2023 | Policy brief | Georgia | Improving the accessibility and benefits associated with engagement in formal economy + Conducting education and awareness campaigns | Various measures for economic formalisation |
| 17 | Danish Trade Union Development Agency, 2021 | Report | Georgia | Improving the accessibility and benefits associated with engagement in formal economy + Conducting education and awareness campaigns + Modernising enforcement authorities (to enhance public trust in their institutions) | Various measures for economic development and the achievement of Decent Work Agenda's targets and Sustainable Development Goals |

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| 18 | ELA, 2019a | Good practice fiche | Latvia | Boosting detection capabilities | Risk analysis to detect letterbox companies |
| 19 | ELA, n.d.c | Good practice fiche | Latvia | Boosting detection capabilities | Cooperation and information exchange between various public sector institutions to prevent shadow economy |
| 20 | ELA, n.d.d | Good practice fiche | Latvia | Conducting education and awareness campaigns | "I spit on it" awareness campaign |
| 21 | ELA, n.d.e | Good practice fiche | Latvia | Conducting education and awareness campaigns | #FraudOff! awareness campaign |
| 22 | ELA, 2020b | Good practice fiche | Lithuania | Boosting detection capabilities | Cooperation and information exchange between various public sector institutions to prevent shadow economy |
| 23 | ELA, 2022c | Good practice fiche | Lithuania | Boosting detection capabilities | Cooperation and information exchange between various public sector institutions to prevent shadow economy |
| 24 | ELA, 2023c | Good practice fiche | Lithuania | Boosting detection capabilities | Transparent Worker ID QR Code for workers in the construction sector |
| 25 | ELA, 2023d | Good practice fiche | Lithuania | Boosting detection capabilities | Using data mining to identify under-declared employment |
| 26 | ELA, 2019b | Good practice fiche | Lithuania | Improving the accessibility and benefits associated with engagement in formal economy | Top-up social insurance contributions for employee wages below the minimum wage |
| 27 | ELA, n.d.f | Good practice fiche | Lithuania | Modernising enforcement authorities (to enhance public trust in their institutions) | Consultation with the State Labour Inspectorate via Facebook Messenger |
| 28 | ELA, n.d.g | Good practice fiche | Lithuania | Modernising enforcement authorities (to enhance public trust in their institutions) | Constant evaluation of the quality of consultations provided by the State Labour Inspectorate |
| 29 | ELA, n.d.h | Good practice fiche | Malta | Boosting detection capabilities | Inspections carried out in the road transport sector |
| 30 | Ministry of Finance, the Economy and Investment (2010) | Report | Malta | Boosting detection capabilities + Implementing more effective sanctions + Improving the accessibility and benefits associated | Various measures implemented to promote employment among women and elderly, and to tackle undeclared work |

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| | | | | with engagement in formal economy | |
| 31 | ELA, 2024c | Good practice fiche | Malta | Improving the accessibility and benefits associated with engagement in formal economy | Implementing a single platform where entrepreneurs can complete all necessary procedures for establishing, managing, and growing a business in Malta |
| 32 | Malta Employers' Association, 2012 | Position paper | Malta | Improving the accessibility and benefits associated with engagement in formal economy | Service Charter for Companies operating in the Security, Cleaning, and Care Working Sectors |
| 33 | ELA, n.d.i | Good practice fiche | Malta | Improving the accessibility and benefits associated with engagement in formal economy | Implementing a 'one-stop-shop' platform employers can use to record all the necessary details regarding workers they intend to post in Malta |
| 34 | Bechmann & Radeke, 2014 | Policy paper | Moldova | Boosting detection capabilities + Implementing more effective sanctions + Improving the accessibility and benefits associated with engagement in formal economy | Various measures for economic formalisation |
| 35 | ILO, 2007 | Report | Moldova | Improving the accessibility and benefits associated with engagement in formal economy | Reducing tax burden for both employers and employees |
| 36 | National Confederation of Employers of the Republic of Moldova, 2015 | Position Paper | Moldova | Modernising enforcement authorities (to enhance public trust in their institutions) | Various measures for economic formalisation of undeclared work and informal employment |
| 37 | Williams, 2019 | Learning resource paper | Estonia | Improving the accessibility and benefits associated with engagement in formal economy | Sending 'nudge' letters to employers reporting very low wages the construction sector |
| | | | Latvia | Modernising enforcement authorities (to enhance public trust in their institutions) | Shifting from a 'control' approach to a 'preventative' approach in the modus operandi of State Labour Inspectorate |
| | | | Lithuania | Improving the accessibility and benefits associated | Sending 'nudge' letters to employers reporting very low wages |

| | | |
|---|---|---|
| | with engagement in formal economy | |
| | Conducting education and awareness campaigns | Sending informational letters to employees about the importance of pensions |

***Source:*** own processing

## *Appendix E*

### Learning resources from the online workshops

#### Introduction

As part of a comprehensive systematic review of shadow economy measurement methods and policy measures in Europe, particularly focusing on the Baltic states, Georgia, Moldova, Cyprus, and Malta, three online workshops were organized to engage a diverse array of stakeholders. The goal was to deepen our understanding of the underlying causes of the shadow economy in each region/country and to identify the most promising policy measures to promote the transition to a formal economy. Target audience included representatives from academia, policymakers, various state institutions, social partner organizations, professional and industry associations, as well as other field experts.

The following online workshops were successfully organized as part of the project:

1. **November 12, 2024:** this workshop focused on engaging stakeholders from the Baltic countries, specifically Estonia, Latvia, Lithuania;
2. **November 18, 2024:** this session brought together stakeholders from Georgia and Moldova;
3. **November 21, 2024:** the final workshop engaged stakeholders from Cyprus and Malta.

The three workshops adhered to a consistent **agenda** designed to foster meaningful dialogue and collaborative problem-solving regarding the shadow economy. Each session included the following components:

| | |
|---|---|
| 5 min | Welcome and opening of the workshop |
| 45 min | Presentation of initial findings from the systematic review on the shadow economy, with a particular emphasis on policy initiatives in the Baltic countries and measurement methods |
| 55 min | Interactive sessions: Effective solutions<br>• What are the biggest obstacles to formalizing undeclared economies, and how can they be addressed?<br>• Is there any sector or any occupation where undeclared work is more prevalent? What is the explanation for this?<br>• What about the types of undeclared work more common? (e.g., unregistered employment, envelope wages, bogus self-employment)<br>• What approaches or initiatives might be more effective in reducing shadow economy in your region?<br>• What would incentivise declaration of income?<br>• What are some pioneering initiatives for reducing shadow economy in your region? |
| 10 min | Q&A session |
| 5 min | Closing remarks & next steps |

**Key speakers:** Dr. Ioana Horodnic (Alexandru Ioan Cuza University of Iași, Romania) and Dr. Josip Franic (Institute of Public Finance, Croatia) presented initial findings from the systematic review on the shadow economy, with a particular emphasis on policy initiatives in covered countries and measurement methods.

Upon the registration participants were invited to provide their input on the following questions:

> **Q1: What do you believe is the main reason people and companies engage in the shadow economy in your country?**
>
> **Q2: Based on your experience, what policy measure do you think could effectively reduce the shadow economy in your country?**

The inputs on policy measures provided by national stakeholders upon the registration and during the workshops, will be organized among the following sub-components, namely:

1. **Boosting detection capabilities, encompassing the development of data mining, matching, and sharing.**
2. **Implementing more effective sanctions.**
3. **Improving the accessibility and benefits associated with engagement in formal economy.**
4. **Conducting education and awareness campaigns.**
5. **Modernizing enforcement authorities (to enhance public trust in their institutions).**

## THE INPUTS PROVIDED BY NATIONAL STAKEHOLDERS UPON THE REGISTRATION

### 1. Boosting detection capabilities, encompassing the development of data mining, matching, and sharing

**Estonia**

- Strengthening enforcement mechanisms: ensure that there are robust systems in place to monitor compliance with tax and regulatory frameworks.
- Reducing cash transactions: implement measures to promote cashless transactions, making it easier for authorities to track financial activities and reducing anonymity in financial dealings.

**Latvia**

- Improved monitoring mechanisms: enhance the ability of authorities to oversee the economic activities of individuals and businesses, particularly focusing on medium and large enterprises that may be operating with undeclared wages.
- Inspections in state institutions: the State Audit Office should carry out inspections to ensure compliance not only in private sector but also in state institutions.

**Lithuania**

- Active measures for taxpayer control: implement systematic controls on taxpayer activities to ensure compliance and reduce the potential for tax evasion.
- Criminal investigation and strict penalties: as a last resort, employ criminal investigations and impose strict penalties against those found guilty of evading taxes or engaging in the shadow economy.

**Georgia**

- Regulating accounting: establish and enforce clear accounting regulations that make it harder for businesses to operate informally.
- Strengthening law enforcement: implement effective enforcement mechanisms to ensure compliance with tax and labour laws.

**Malta**

- Increased independence of regulatory bodies: strengthening the financial and administrative independence of regulatory and enforcement bodies can enhance their ability to operate effectively and fairly.

**Cyprus**

- More enforcement and penalties: Strengthen the enforcement of existing laws and regulations to ensure compliance within the economy.

### 2. Implementing more effective sanctions

**Estonia**

- Developing noncompliance lists: create blacklists or shaming lists for businesses that repeatedly fail to comply with tax or labour laws. This could serve as a deterrent for companies contemplating engaging in the shadow economy.
- Penalties for non-compliance: although there is also a suggestion to reward compliance, ensuring that there are significant penalties for those who do not comply can act as a balancing measure.

**Latvia**

- Exclusion from public procurement: establish grounds for the exclusion of companies engaged in unfair practices from tendering for public contracts. This creates a direct consequence for businesses operating in the shadow economy.
- Controlling undeclared wages: focus on penalties for noncompliance, especially regarding the payment of "envelope wages," which may involve monitoring and punishment for those who violate labour regulations.

**Lithuania**

- Inevitability of responsibility: emphasize the consequences of tax evasion as a means to deter individuals and businesses from participating in the shadow economy. This involves promoting the understanding that evasion will lead to liabilities and legal consequences.

**Georgia**

- Legalization of income: create frameworks that encourage businesses and individuals to declare and legalize their income, possibly accompanied by a framework that addresses past non-compliance to encourage the transition to formal operations.

**Moldova**

- Stimulation and control measures: develop mechanisms that stimulate formalization while simultaneously enforcing laws and regulations against non-compliant businesses and individuals.
- Revising tax and customs policies: ensure that tax and customs policies are clear and enforceable, with penalties that reflect the seriousness of infractions in order to deter shadow economy activities.

**Malta**

- Greater input into legislation: allowing regulatory bodies greater involvement in the transposition of legislation can lead to more relevant and enforceable laws.

**Cyprus**

- Implementation of stricter penalties: establish stricter penalties for businesses and individuals that engage in shadow economic activities.

### 3. Improving the accessibility and benefits associated with engagement in the formal economy

**Estonia**

- Simplifying tax regulations: making tax systems clearer and easier to navigate, reducing the burden of compliance and encouraging businesses and individuals to operate legally.
- Reducing labour taxes: lowering the costs associated with legal employment may encourage both employers and employees to operate within the formal economy.
- Implementing reward systems for compliance: developing tax breaks or recognitions for businesses that comply with laws and contribute to the economy, promoting a culture of legality and compliance.

**Latvia**

- Lower taxes for small businesses: implement policies that reduce the tax burden on small businesses, making it more viable for them to operate legally.
- Incentive-based tax compliance system: develop a system that rewards consistent taxpayers with benefits, such as property tax relief at certain income thresholds, to encourage formal engagement.
- Harmonizing tax policies: streamlining and harmonizing tax policies to be more fair and easier to navigate can reduce the incentive to evade taxes.

**Lithuania**

- Clearer tax system: simplify the tax system by reducing the number of exemptions and making it more understandable. A transparent and straightforward tax structure can reduce frustrations that lead individuals and businesses to evade taxes.

**Georgia**

- Incentives for workers and enterprises: implement incentive programs aimed at both workers and businesses to encourage formal employment and legal business operations. This includes benefits for compliance and support for transitioning into the formal economy.
- Decrease taxes and cut bureaucracy: simplifying the tax system by lowering taxes and reducing bureaucratic hurdles can make it easier for businesses to comply and provide a stronger incentive for them to operate legally.
- Development of a strong social protection system: establish a robust social security and assistance framework that provides adequate protection for individuals, thus mitigating the risks associated with informal employment and encouraging more people to engage in the formal economy.

**Moldova**

- Simplifying the regulatory and tax system: streamline the tax code by reducing the number of tax rates and complexities, making compliance more accessible for small businesses and individuals.
- Incentives for formalization: introduce financial support and incentives for businesses to register officially, including easy access to microfinance and reduced costs for compliance to bring more small and medium-sized enterprises (SMEs) into the formal sector.
- Promoting digital payments: encourage the use of card payments and other digital transactions by introducing reward programs for consumers, thus reducing reliance on cash and making transactions easier to track.

**Malta**

- Greater input into legislation: allowing regulatory bodies greater involvement in the transposition of legislation can lead to more relevant and enforceable laws.

**Cyprus**

- Fair taxation system: reform the tax system to make it fairer and more appealing for individuals and businesses.
- Enhanced provision of public services: improve the quality and accessibility of public services so that citizens see the tangible benefits of contributing to the tax system.

### 4. Conducting education and awareness campaigns

**Estonia**

- Informing about benefits of legal operations: education initiatives that highlight the fair use of taxes and the benefits of being engaged in the formal economy, such as access to social services and better infrastructure.

**Latvia**

- Education about the shadow economy: initiatives to inform society about the risks of operating in the shadow economy, emphasizing the long-term benefits of formal economic participation.
- Shifting mindsets: promote a culture that values transparency and fairness over noncompliance. Encouraging citizens to reflect on the benefits of contributing to the formal economy can reshape future attitudes.

**Lithuania**

- Education across all age groups: Implement educational programs that cover tax obligations, responsibilities, and the importance of compliance, tailoring these initiatives to all demographics.
- Increase awareness of tax system: Focus on enhancing public understanding of the tax system and the benefits of formal economic engagement, countering the belief that tax avoidance is acceptable or "cool".

**Georgia**

- Educating about economic benefits: campaigns that highlight the advantages of participating in the formal economy.

**Moldova**

- Public awareness campaigns: develop campaigns to educate both workers and employers about the benefits of participating in the formal economy, such as access to healthcare, pensions, and legal protections. This includes national media campaigns, workshops for small businesses, and resources that highlight the advantages of formal employment.
- Promoting civic responsibility: shift public perceptions regarding the importance of taxes in funding public goods and services, fostering a culture of civic responsibility and compliance.

### 5. Modernising enforcement authorities to foster public trust and cooperation

**Estonia**

- Building trust in government institutions: campaigns aimed at increasing public confidence in how tax money is spent may lead to greater willingness to comply. Encouraging transparency about public spending can help citizens see the value of their taxes.

**Latvia**

- Greater transparency in public spending: by showing how tax revenues are utilized, the government can build public trust, which may encourage voluntary compliance.

**Lithuania**

- Transparency in tax use: promote transparency regarding how taxes are utilized by the government. Showing citizens that their contributions are leading to tangible benefits can foster a sense of responsibility and trust in the system.

## THE INPUTS PROVIDED BY NATIONAL STAKEHOLDERS DURING THE WORKSHOPS

### Workshop 1: Estonia, Latvia, Lithuania

| | |
|---|---|
| **Date and Time** | November 12, 2024, 14:00-16:00 EET |
| **Location** | Online platform (Zoom) |
| **Country** | Estonia, Latvia, Lithuania |
| **Participants** | 29 participants (including policy makers, supervisory authorities, social partners, industry associations, academia and project team members)<br>***Estonia:*** *Estonian Tax & Customs Board, Labour Inspectorate, Estonian Trade Union Confederation*<br>***Latvia:*** *Ministry of Finance, Procurement Monitoring Bureau, Free trade Union Confederation, Latvian Construction Association, University of Latvia, University of Life Sciences and Technologies, Collegio Carlo Alberti*<br>***Lithuania:*** *Ministry of Social Security and Labour, State Tax Inspectorate (including regional Tax Inspectorates), Boarder Guard Service* |

### 1. Boosting detection capabilities, encompassing the development of data mining, matching, and sharing

**Latvia**

- The Tax Revenue Service is sending letters to individuals whose declared income does not align with the balances in their bank accounts, requiring them to explain discrepancies. Implementation of a rating system to provide a "green light" to businesses deemed low risk for shadow economy participation. This includes a comprehensive methodology evaluating businesses across six categories, allowing compliant businesses to benefit from faster permits and advantages in public procurement.
- The development of a tax risk rating system utilizing a risk coupling methodology that incorporates various critical risk factors to determine business compliance.
- An electronic working time accounting system implemented in the construction sector for enhanced oversight of employee registration and working hours.

**Estonia**

- Estonian tax authorities have proactively sent letters to companies highlighting discrepancies between their wage levels and the average levels within their sectors.

**Lithuania**

- Establishment of an inter-institutional cooperation centre in February 2024 to optimize operations and expedite the detection of violations related to illegal work, undeclared

work, forced labour, and employment of minors. This centre involves six key institutions, promoting collaboration and information sharing.

- Increased number of inspections, with 1,000 more inspections conducted in the first half of the year compared to the previous year, specifically aimed at undeclared work.
- The requirement for a transparent worker identification code has been expanded in the construction sector, tracking every individual performing construction work in Lithuania to improve monitoring and detection.

### 2. Implementing more effective sanctions

**Latvia**

- Introduction of the Shadow Economy Reduction Plan for 2024-2027, which includes stricter measures and oversight of income declarations, where discrepancies lead to required explanations.
- The lack of attention towards understanding the motivations behind workers' participation in the shadow economy addresses the need for effective sanctions against those avoiding tax obligations.
- Public procurement measures include exclusion criteria for suppliers with unresolved tax issues, effectively disqualifying them from contracts.
- The requirement for buyers to verify the tax status of candidates before entering contracts, alongside the rejection of abnormally low tenders which may indicate shadow economy participation.

**Lithuania**

- Legislative changes introduced in 2024 that have tripled fines for illegal work, ranging from 3 to 12 times the minimum monthly salary.
- Increased fines for undeclared work and other labour law violations to strengthen deterrents against participation in the shadow economy.
- The emphasis on adopting a multifaceted approach that includes implementing higher fines and enhancing enforcement efforts reflects the intention to ensure effective sanctions against violators.
- The Labour Inspectorate has begun publishing a list of employers found in violation of labour laws on its website, thereby enhancing transparency and aiding in tackling efforts.

### 3. Improving the accessibility and benefits associated with engagement in formal economy

**Latvia**

- Discussion of the perceived costs associated with legal participation in the economy, emphasizing the importance of making it cheaper to operate legally than in the shadow economy.

- Addressing barriers such as access to capital and growth opportunities for companies, which are essential for improving legal participation.
- The Ministry's initiatives aimed at encouraging businesses to operate legally by providing them with benefits for maintaining compliance with tax obligations.
- The combination of the electronic working time system with efforts to raise the minimum wage in the construction sector to better reflect industry standards, thus creating a more appealing legal employment option.

**Lithuania**

- Highlighting the need for bolstered support for tax administration, ensuring adequate public financing to operate effectively, which is important for creating an environment that can facilitate legal compliance.
- Fostering cooperation between Baltic countries and among national institutions to improve the overall framework that supports businesses in engaging with the formal economy.

### 4. Conducting education and awareness campaigns

**Latvia**

- Development of educational initiatives aimed at informing young people about the risks and long-term costs of accepting cash payments without proper documentation.
- Communication of the negative consequences associated with engaging in shadow economic transactions, including the loss of significant benefits (e.g., maternity leave, sick leave) and the risks of unregulated service providers.
- Proactive measures to highlight the potential dangers involved in purchasing undeclared goods and services, particularly regarding issues in health and safety, especially in beauty services and informal healthcare.
- Emphasis on the shared risks and responsibilities among participants in the shadow economy to foster a more conscientious approach to economic participation.

**Lithuania**

- Launching information campaigns that highlight the benefits of declared work, aimed at educating the public on the advantages of participating in the formal economy.
- The call for a multifaceted approach, which includes enhancing enforcement efforts and increasing detection rates, indicates an awareness of the need to educate both businesses and the workforce about the importance of compliance and the negative ramifications of working in the shadow economy.

### 5. Modernising enforcement authorities (to enhance public trust in their institutions)

**Latvia**

- Information regarding this rating system is made readily available on the homepage of the State Revenue Service, ensuring transparency.

## Workshop 2: Georgia, Moldova

| | |
|---|---|
| **Date and Time** | November 18, 2024, 11:00-13:00 EET |
| **Location** | Online platform (Zoom) |
| **Country** | Georgia, Moldova |
| **Participants** | 24 participants (including policy makers, supervisory authorities, social partners, industry associations, academia and project team members)<br>***Moldova:*** *Ministry of Economic Development and Digitalisation, Labour Inspection, State Tax Service, National Confederation of Employers, Academy of Economic Studies, Foreign Investors Association.*<br>***Georgia:*** *Ministry of Health, Labour Inspection Office, Tbilisi State University, ILO, EU Delegation.* |

### 1. Boosting detection capabilities, encompassing the development of data mining, matching, and sharing

**Georgia**

- Understanding undeclared work in foreign trade: the necessity of comprehending the nuances of undeclared work within the realm of foreign trade, given the openness of Georgia's economy and its significant exports and foreign trade contribution to GDP.
- Sectors most impacted by undeclared work: identifying the sectors most affected by undeclared work, including construction, agriculture, and manufacturing, which highlights areas where enhanced detection capabilities could be beneficial.

**Moldova**

- Gap in identifying formal business activities: there remains a significant gap in identifying formal business activities, indicating a need for improved detection capabilities.
- Limited practices for compliance enforcement: currently, there are limited practices in place to enforce compliance, with the fiscal authority occasionally conducting conformity checks. The need for more proactive measures to identify and address informal activities reflects a gap in detection capabilities.
- Regarding labour inspection, the current system is quite limited, primarily focusing on the verification of labour contracts. The approach taken by labour inspectors tends to be liberal, and the system as a whole is under-resourced regarding the number of inspectors and the mandate they hold

### 2. Implementing more effective sanctions

**Georgia**

- Labour inspection system: noting that Georgia's labour inspection system is underdeveloped, lacking sufficient inspectors and a robust mandate. The mention of an

ineffective sanctioning system suggests a need for improved sanctions to enforce compliance and deter undeclared work.

**Moldova**

- Weakness in the sanctioning system: the overall weakness in the sanctioning system, including the limited focus of labour inspections and inadequate resources for inspectors, suggests that more effective sanctions could enhance compliance and deter undeclared work.

### 3. Improving the accessibility and benefits associated with engagement in formal economy

**Georgia**

- Social security concerns: many citizens refrain from participating in the government pension system due to a lack of trust and past negative experiences. Current pension provisions are minimal and do not reflect individual contributions, creating disincentives for engagement in the formal economy.
- Uncertainty regarding tax benefits: many Georgians remain uncertain about the tangible benefits they will receive in exchange for paying taxes, indicating a need to improve perceptions of the formal economy's accessibility and benefits.

### 4. Conducting education and awareness campaigns

**Georgia**

- Complexity of developing awareness campaign messages: the challenges of creating effective messages for public awareness campaigns, emphasizing that the issue is not merely one of awareness but fundamentally about economic development and trust in systems.
- Absence of organized awareness campaigns: despite legislation being in place, there have been no organized awareness campaigns in Georgia, highlighting a gap that needs to be addressed.
- Need for further research: the scarcity of studies exploring the factors behind the distrust in social security and undeclared work indicates a need for more educational efforts and understanding in order to inform potential campaigns.

**Moldova**

- Short-lived effectiveness of public awareness campaigns: public awareness campaigns targeting the construction and HORECA sectors have shown only short-lived effectiveness, suggesting a need for better-designed educational initiatives.
- Administrative pressure on businesses: while this could also relate to detection, the context of it being a drive towards informal work points towards the importance of raising awareness and educating businesses on the benefits of participating in the formal economy.

## **Workshop 3:** Cyprus, Malta

| | |
|---|---|
| **Date and Time** | November 21, 2024, 11:00-13:00 EET |
| **Location** | Online platform (Zoom) |
| **Country** | Cyprus, Malta |
| **Participants** | 10 participants, e.g., academia, government officials, supervisory authority and project team members.<br>***Cyprus:*** *Cyprus Labour Inspectorate, Eastern Mediterranean University.*<br>***Malta:*** *British High Commission Malta, Central Bank of Malta.* |

### 1. Boosting detection capabilities, encompassing the development of data mining, matching, and sharing

- Improved measurement and independent reporting: establishing reliable measures of the shadow economy by independent institutions and creating an index to track changes over time.
- Impact of cryptocurrencies on the shadow economy: the need for better measurement methods to capture activities related to cryptocurrencies and new payment forms due to existing methodologies being insufficient.
- Addressing cash-based transactions: strengthening the banking infrastructure and encouraging the adoption of electronic payment methods to reduce reliance on cash transactions, facilitating transparency.
- Whistleblower protection and incentives: the importance of protecting whistleblowers and providing incentives to encourage reporting of tax evasion and illicit activities, especially in small societies.
- Challenges with specific populations: tailoring outreach and inspection programs for vulnerable groups (e.g., asylum seekers, illegal immigrants) working in undeclared jobs, particularly in sectors like construction.

### 2. Implementing more effective sanctions

- Increased enforcement and visibility of actions: emphasizing the need for greater enforcement of laws governing undeclared work and publicizing enforcement actions to deter non-compliance.
- Collaboration among multiple authorities: encouraging cooperation between various oversight agencies to enhance investigations and hold individuals accountable for misconduct.

### 3. Conducting education and awareness campaigns

- Social norms and reporting behaviour: highlighting the influence of social norms on individuals' willingness to report undeclared work and the importance of changing perceptions around compliance.

- Policy implications and awareness campaigns: Emphasizing how framing public messages about undeclared work can influence behaviour; campaigns should promote compliance as the norm rather than normalizing undeclared work.

# *Appendix F*

## Estimations Toolkit

### (i.e., suggestions for the stakeholders interested in producing their own estimates)

Although some of the estimation methods offering a single 'magic number' still enjoy a considerable reputation among academics and smaller expert groups, there has been an increasing understanding that the pursuit of a one-size-fits-all approach most likely leads to a dead-end street (Fernandes, 2022; Thomas, 1999). Accordingly, the national authorities of the developed countries have been gradually shifting towards estimation strategies that rely on the synergy of multiple methods.

The first moves in this direction can be traced back to the late 1990s, which was the time when several post-socialist countries applied for membership in the European Union (Eurostat, 2021b; UNECE, 2008). Since the contributions to and entitlements from the joint EU budget depend on the member states' level of development, one of the key tasks in front of these candidate countries was to provide an exhaustive account of their GDPs. However, this proved to be extremely challenging due to the flourishing of informal practices after the collapse of socialism (Dell'Anno, 2024; Eurostat, 2021b). In addition to the versatility of final figures obtained by single-method strategies, terminological and definitional disunity added another dimension to this problem.

Luckily, statisticians and other experts from key international institutions come to the rescue. Collaboration, mutual alignments, and constant improvements of existing approaches culminated in something that is nowadays known as the 'Eurostat's tabular approach to exhaustiveness'[26]. Foundations of this multiprocedural estimation strategy were, in fact, laid down by the OECD, which brought out the conceptual and analytical framework for quantifying economic activities that remained under the radar of the national statistical offices (OECD, 2002). This framework, inspired by the work of the Italian Bureau of Statistics (Istituto Nazionale di Statistica), has been upgraded and further developed not only by the OECD but also by the UN, ILO, and Eurostat, among others (Dell'Anno, 2024).

These joint efforts brought to light the concept of the non-observed economy, which was elaborated on in detail earlier in this report. As explained, the non-observed economy refers to all productive activities that count towards the country's GDP, but for some reason remained out of the scope of the official statistics (UNECE, 2008). These activities are divided into seven categories, depending on the exact reason why they remained unaccounted for (Eurostat, 2021b). It is, however, important to stress that the goal of national statistical offices is not to estimate budgetary losses as such (i.e., categories N1 and N6), but rather to account for all activities overlooked by official statistics, regardless of the underlying reasons. The conceptual framework based on seven categories hence primarily works in the service of the analytical framework for quantifying these activities[27] (Eurostat, 2021b; UNECE, 2008).

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[26] It should be noted that other institutions apply own modifications of this framework. Here we focus on the Eurostat's approach given that it has been applied in most of the countries our study is focused on. The name of this particular estimation strategy comes from the tabular framework on which the process is grounded (Eurostat, 2021b).

[27] Regardless of that, this segmentation is quite useful from an analytical perspective, given that different families of activities require different policy actions (Fernandes, 2022; Thomas, 1999). For instance, while typically the

This is where the power of the Eurostat's tabular approach comes to the fore. Once the activities are systematized into the seven categories, it becomes much easier to tackle each of the categories individually (Eurostat, 2021b). Taking into account the country-specificities and differences in national accounts, Eurostat (and other institutions applying this or similar frameworks) did not strictly prescribe which methods should be used for which category. Instead, only a set of broad recommendations is given, and each country has the freedom to tailor its own approach based on the available data, technical capabilities, and human capital of the responsible institutions (Kazemier *et al*., 2019; OECD, 2002).

The recommendations, however, go in the direction of using discrepancy methods wherever and whenever possible (Eurostat, 2014a; UNECE, 2008). This stems from the notion that discrepancy methods make use of real and germane data, which is not the case with other estimation procedures (Fernandes, 2022; OECD, 2002). The list of endorsed discrepancy methods goes far beyond those discussed in this report, but it is worth stressing that the labour input method and various forms of the expenditure approach are high on the preference list (Eurostat, 2014a; OECD, 2002).

In situations where no suitable datasets exist, the reliance on direct estimation methods is encouraged, both in the form of questionnaire surveys and the secondary usage of tax audit data (Eurostat, 2014a). Indirect methods are also allowed, but if and only if no better alternative exists. Interestingly, qualitative studies and expert opinion surveys are also among acceptable tools, provided that these are applied to a small set of activities and rigorous methodology is followed (Eurostat, 2021b; OECD, 2002; UNECE, 2008). This reflects the overall philosophy of Eurostat's tabular approach, which is to apply an individual method on a 'microcosm' in which its strengths would come to the fore, while the biases would be minimized.

It is also important to stress that the usage of model-based methods is strongly discouraged (Eurostat, 2014a; Fernandes, 2022; OECD, 2002). As explained, these methods "suffer from serious problems that cast doubt on their utility for any purpose in which accuracy is important, such as the estimation of national accounts indicators" (Eurostat, 2014a, p. 129).

The list of methods used in practice is quite wide, so we will skip the discussion on this matter (for details see, for instance, Bechev *et al.*, 2019). What is interesting to emphasize at this point is that the information on the methodology applied across countries was quite scarce until recently. Even more, EU member states have been reluctant to publish the resulting figures, although they have been required to estimate and incorporate them into the final figures for GDP since 2016 (Fernandes, 2022). Fortunately, things have started to change since 2022, given that a range of country-level documents related to the estimation procedures and methodology updates have been made available in the open interest group 'Monitoring GNI for own resource purposes' on CIRCABC[28]. A closer inspection of the uploaded documents reveals that 21 member states have made their estimates of the non-observed economy and associated subcategories available for at least one year. Unfortunately, Lithuania and Latvia are among the few that still refrain from publishing the final figures.

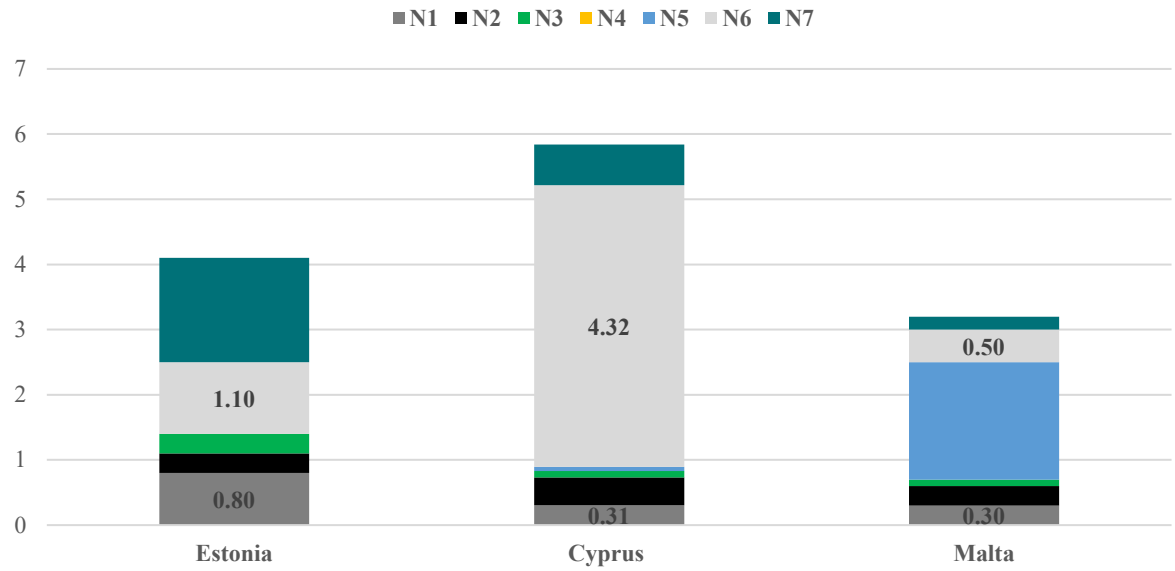
The estimates for Estonia, Cyprus, and Malta, which did publish the numbers for 2016, 2017, and 2010, respectively, shed a completely new light on our discussion about the pervasiveness of concealed economic activities. As evident from Figure F1, the estimates of the non-observed economy are way below the figures provided by most of the other methods discussed in this report. Even more, one should not forget that the non-observed economy embraces a much

goal is to foster formalization of the activities from categories N1 and N6, eradication is on the table in the case of N2 activities.

[28] https://circabc.europa.eu/ui/group/7eb29b7b-33b0-4c9f-851b-e370277bb9e5

wider set of activities than the shadow economy, undeclared work, and other phenomena typically quantified in academic studies.

**Figure F1. Estimates of the non-observed economy for Estonia (2016), Cyprus (2017), and Malta (2010), % of GDP**




*Note:* Estonia did not provide estimates for N4 and N5 | ***Sources:*** Eurostat (2021c); Eurostat (2021a); NSO (2015)

Specifically, the official estimates of the national statistical offices reveal that the non-observed economy represented 5.84% of the GDP in Cyprus, 4.1% of the GDP in Estonia, and only 3.2% of the GDP in Malta. The figures for Estonia are incomplete since categories N4 and N5 were for some reason left out. In any case, looking only at the categories N1 and N6, which together speak about the prevalence of undeclared work, one can conclude that such activities contributed to only 0.8% of GDP in Malta and 1.9% in Estonia (Figure F1). Despite being somewhat larger, the estimates for Cyprus (4.63% of GDP) are also suspiciously low.

As Dell'Anno (2024) argues, Eurostat's tabular approach is indeed biased downward in its current form. Many of the key reasons for this have to do with the limited human and technical capacities and capabilities of national statistical offices in some countries. For instance, to address these limitations, Eurostat recommended the application of the 'materiality threshold', which stipulates that these institutions "should avoid committing disproportionate resources to calculate insignificant items" (Eurostat, 2014b, p. 2). Another closely related obstacle, which is quite important from our perspective, concerns the fact that adjustments (for N6 above all) target mainly small and medium-sized businesses, while large companies are neglected.

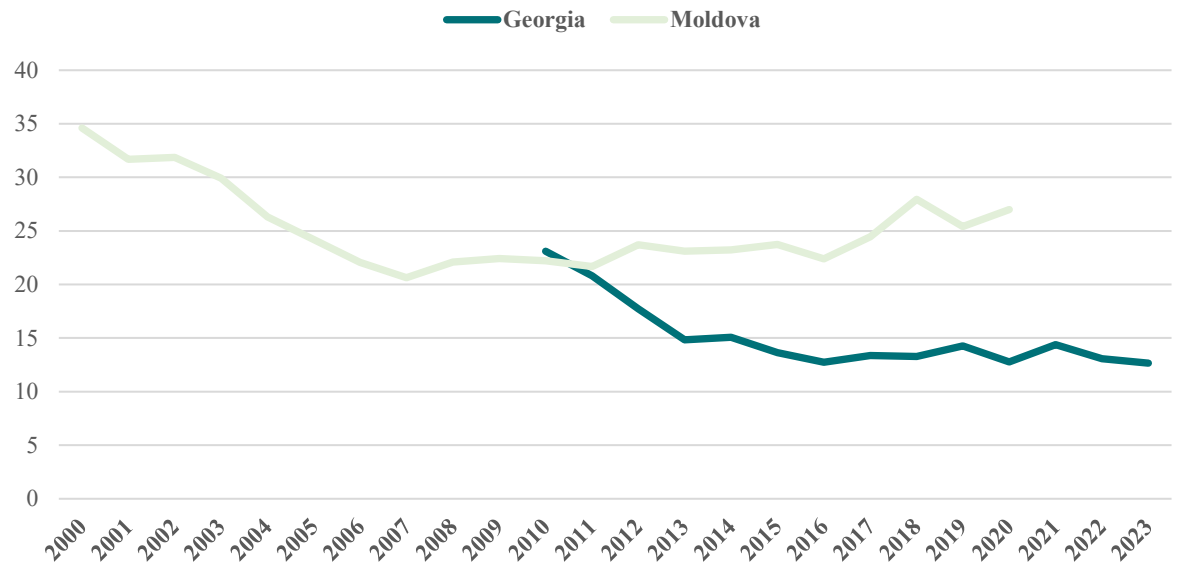
The limited ability of the labour input method to capture various atypical and non-standard types of unregistered work, which was discussed earlier in this report, is yet another significant contributor to the downward bias (Dell'Anno, 2024). Particularly concerning in this respect is the rapid development of the digital economy, huge parts of which still remain out of the reach of the Eurostat's tabular approach to exhaustiveness of national accounts[29].

[29] More about recent attempts to account for this aspect of the economy is given in Appendix E.

Nevertheless, none of these problems seems to be unsolvable. In fact, a lot of effort has been invested in methodological enhancements during the last several years[30]. Given this, it is expected that the estimates of the non-observed economy and its components will get more reliable in due time (Fernandes, 2022). These joint efforts to improve the quality of the national account assessments have also been recognised on a global scale, given that this estimation approach has been getting increasing attention from other authorities around Europe and beyond.

Although members of the European Economic Area dominate in this respect, there are some interesting examples of countries outside this circle (Fernandes, 2022; UNECE, 2008). Moldova and Georgia are among them, with a cautionary note that their approach is leaned towards the OECD methodology. Specifically, the national bureaus of statistics from these two countries only disaggregate figures at the sectoral levels, with no insight based on the N-type breakdown (Biroul Național de Statistică, 2024; Geostat, 2024). The final estimates are published and regularly updated on official websites in the form of time series. For Moldova, the results are available for the period 2000-2020, while for Georgia the period in question is 2010-2023. An overview of these figures is given in Figure F2.

**Figure F2. Estimates of the non-observed economy for Moldova (% of GDP, 2000-2020) and Georgia (% of GVA, 2010-2023)**




***Sources:*** Geostat (2024); Biroul Național de Statistică (2024)

Despite also being substantially lower than the single-method estimates of narrower phenomena, these figures appear more realistic than the ones produced by the statistical offices of EU member states. Starting with Georgia, the results suggest that the non-observed economy almost halved during the last decade, following a steady decline from 23.1% of GVA in 2010 to 12.7% of GVA in 2023. The situation is not so bright for Moldova. As can be seen, the non-observed economy has been on the rise since 2007, after noteworthy improvements during the early 2010s (Figure F2). The latest available estimate, for 2020, reveals that it stands at 27% of GDP.

[30] The accompanying documentation is also publicly available in the CIRCABC's group 'Monitoring GNI for own resource purposes'.

Being realistic or not, the figures for Moldova and Georgia cannot be directly compared with those from the EU member states. As a matter of fact, even the cross-country comparison on the EU level is not recommended given that each country applies its own set of estimation methods (Bechev *et al*., 2019; Kazemier *et al*., 2019). While understandable, this methodological diversity represents a significant obstacle to the popularization of Eurostat's tabular approach. Even though Eurostat did emphasise the need for the alignment of estimation approaches (Eurostat, 2014a), it yet remains to see whether, and to what extent, will this happen in the near future.

The comparability issues are, however, not the biggest impediment to a greater reliance on this estimation strategy. Besides requiring proficiency in dozens of individual estimation methods, Eurostat's tabular approach is actually an extremely time-consuming procedure (Dell'Anno, 2024; Fernandes, 2022). This explains why even EU member states do not apply it annually[31].

Problem number one, however, lies in the fact that datasets needed for the estimation are available only to a closed group of stakeholders. Due to the reluctance of national statistical offices and other gatekeepers to make raw data publicly available, the academic community remains excluded from the process. This, in turn, paves the way for the publication of 'grey' figures based on methods of questionable credibility (Fernandes, 2022).

The publication of resulting estimates and documents underpinning estimation procedures for some EU member states represents a noteworthy step in the right direction. However, there is a lot of work ahead in terms of public access to procedures and estimates of the non-observed economy and its composites (Dell'Anno, 2024). One should not forget that there is also a political dimension in the publication of these details (UNECE, 2008), which further complicates things in this respect.

Nevertheless, as recently the calls for greater transparency have become louder, it is reasonable to expect further positive movements towards the ultimate goal, which is the full disclosure of estimation methodology and data required for this purpose. Until this happens, we will keep witnessing the publication of single-method studies and the resulting guestimates of undeclared work, the shadow economy, and other illegitimate practices.

[31] Since annual adjustments of national accounts are needed, the figures from the year in which the procedure is applied are commonly projected to subsequent years using various statistical techniques (Dell'Anno, 2024).

## *Appendix G*

### Quantifying digital shadow economy – an overview of available studies

The term 'digital economy' designates economic activities that are conducted by linking individuals, businesses, devices, data, and operations through digital technology (TechTarget, 2024). It assumes the online connections and transactions taking place across multiple sectors and technologies, such as the Internet, mobile networks, big data, and ICTs. According to Remeikiene *et al.* (2018, p. 696) (citing Holz *et al.* (2012)), "growing scopes of e-activities have stimulated dishonest financial gains from digital businesses, which has led to the steep rise of the digital shadow economy". However, unlike the 'physical sphere' of the shadow economy, its digital part has still been insufficiently researched. Consequently, the determinants of the digital shadow economy have not been included in the methods proposed for estimating the size of the shadow economy. This not only impedes understanding of the real scale of this phenomenon but also complicates the development of adequate policy responses.

In line with this, this section provides a critical analysis of the studies focused on the digital shadow economy. The list of studies and methods employed in them, together with the major advantages and disadvantages in terms of representing the size of the digital shadow economy, is given in Table G1.

**Table G1.** List of studies evaluating the pervasiveness of the digital shadow economy

| No. | Paper | Research method | Advantages | Disadvantages |
|---|---|---|---|---|
| 1 | Ohrimenco *et al.* (2024) | Development of theoretical foundations | Revealed general features of the shadow economy, including digital aspects | Size of the digital shadow economy is not estimated |
| 2 | Van *et al. (2022)* | Microdata research | Manifestations of the shadow economy are evaluated at the micro level; the spillover effects in a supply chain are considered | Only indirect evidence regarding the relationship between the impact of online cash registers on corporate VAT payments is provided; the size of the digital shadow economy is not estimated |
| 3 | Chacaltana *et al.* (2024) | Cross-country regressions, partial correlation and dispersions, endogeneity and Granger tests | Informality and development of technologies are each represented by 3 indicators. The multifaceted and multidirectional relationship between | The indicators used for the empirical research did not measure the size of the digital shadow economy |

| | | | | |
|---|---|---|---|---|
| | | | technology and informality is revealed | |
| 4 | Zokirovich *et al.* (2021) | Adjusted MIMIC method | Inclusion of dependent variables; selection of the indicators representing electronic payments; assessment of their impact on the size of the shadow economy | Debit and credit card payments are treated as determinants of the size of the overall shadow economy rather than of the digital shadow economy |
| 5 | Khmyz *et al. (2023)* | Analysis of legal acts, logical and critical analysis of the current situation | The authors recognise the potential impact of the use of modern information systems in the field of taxation on the reduction of the size of the shadow economy | Estimations showing the extent to which the selected factors can reduce the size of the shadow economy are not provided; the size of the digital shadow economy is not estimated |
| 6 | Muminov *et al.* (2020) | Logical and critical analysis of the current situation | The effect of factors such as electronic commerce and a 'virtual' cash desk in retail trade on the shadow economy is recognised | The results are not based on mathematical or statistical calculations |
| 7 | Amanova (2023) | MIMIC model, the Ordinary Least Squares regression model | Inclusion of the variables that represent the digital economic environment (e.g. the Online Service Index, the Telecommunication Infrastructure Index, etc.); recognition of the cost of R&D and the effects of advanced technologies as a stimulus for reducing the size of the shadow economy | The author analyses the effects of the selected indicators not on the digital shadow economy, but on the percentage of the shadow labour force, and through this – the effects on the share of the shadow economy as a whole |
| 8 | Remeikienė *et al.* (2017) | MIMIC model | The method allows an approximate measurement of the size of the digital shadow economy, which is not considered in the traditional shadow economy calculations | The method requires a sufficient amount of indicative and causal data |

***Source:*** own processing

The study by Ohrimenco *et al.* (2024) sets the theoretical foundations for the evaluation of the digital shadow economy. Among other things, the authors propose the definition of the 'shadow digital economy' and identify legal, mathematical, socio-psychological, and managerial approaches for its analysis. They also discuss the general features of the phenomenon, with a specific focus on its latent nature and pervasiveness across all phases of social production. Even though the authors do not provide any method to estimate the size of the digital shadow economy, the features they highlight can be used by other authors searching for specific indicators that reflect the digital shadow economy.

Van *et al.* (2022) use microdata to study the effects of electronic fiscal devices (EFD), including the automated and systemic sharing of sales and online cash registers (OCR), on the incidence of undeclared digital business transactions. More precisely, the authors assess what effect the installation of OCR systems has on the turnover and VAT payments by firms and, according to the change in VAT payments, assess what part of VAT remains hidden from tax authorities. Data on VAT returns linked to OCR, as well as on corporate income tax (CIT) returns are used for this purpose. The main advantage of this approach can be found in the fact that the manifestations of the shadow economy are assessed at the micro level, while many authors delve into the macro level. These micro-level data can help assess the spillover effect of the OCR systems on VAT payments through the supply chain, which can aid the efforts to reduce the VAT gap. Turning to the drawbacks of the study, it provides only indirect evidence on the relationship between the impact of OCRs on corporate VAT payments and VAT evasion. Moreover, the data employed in the study do not always reflect real business activities. That is to say, the figures pertain only to the activities that the company declares, which do not have to be aligned with its real activities nor necessarily represent the full scope of activities. Finally, the methodology is intended to assess the impact of digitalisation and digital fiscal tools on the shadow economy, but not to measure the size of the digital shadow economy.

Another interesting study is the one by Chacaltana *et al*. (2024), who explored the relationship between new technologies, e-government, and informality in 203 countries during the period 2002-2019. Here the focus is on the influence of mobile phone subscriptions, Internet access, automation, and e-government on informal employment, precarious employment, and the shadow economy. The authors selected three alternative indicators to represent informality: the informal employment rate, the precarious employment rate, and the size of the shadow economy (measured in % of GDP). The precarious employment rate was used as a proxy for informal employment, and the size of the shadow economy was used as a proxy for informal production. The pervasiveness of digital technologies was evaluated by the following three indicators: 1) the yearly rate of Internet users in a country; 2) the yearly rate of mobile cellular subscriptions; and 3) the yearly trade value of imports of robots and other machinery per active and working population in an economy (measured in US dollars). The digital capabilities of a national government were conceptualised by the E-Government Development Index (EGDI), which is provided by the United Nations Department of Economic and Social Affairs every two years[32]. The relationships between different indicators representing technology and informality were scrutinised by using cross-country regressions. Partial correlations and dispersion, identified with scatter plots, were considered the preliminary evidence of digitalisation as a determinant of formalisation. Endogeneity and Granger tests were used for robustness checks. Specifically, the authors wanted to check whether the development of technology in a country could have been affected by the size of the shadow economy, or whether both were actually affected by external factors not included in the estimated models.

The study exposes the multifaceted and multidirectional relationship between technology and informality. The results, on the one hand, suggest that technology adoption can reduce the scale of informality by enhancing productivity and government capacity. On the other hand, the proliferation of own-account work makes preconditions for informal work. The technology indicators employed for the empirical research did not measure the size of the digital shadow economy, as this was not the purpose of the study.

[32] EGDI is a composite index of provision of online services, telecommunication connectivity, and human capacity. It assesses to what extent are e-government policies and strategies applied in general and specific sectors for delivery of essential services.

There are, however, certain issues with some of the indicators selected to represent technology in the relationship with the shadow economy. For instance, the authors recognise that the yearly trade value of imports of robots and other machinery is not a perfect measure for automation. Likewise, there is a lack of reliable data needed for the quantitative analysis of automation trends. Moreover, the EGDI is designed in a relative rather than in an absolute sense (i.e., it rates countries relative to one another). Finally, the EGDI rates are available only for ten years (2003, 2004, 2005, 2007, 2009, 2011, 2013, 2015, 2017, and 2019), which limits the potential of a long-term trend analysis.

Zokirovich *et al.* (2021), on the other hand, analysed the effects of electronic payments on the size of the shadow economy. The authors estimated to which extent cashless payment methods can reduce the size of the shadow economy in developed and developing countries. In their study, which covers 57 economies (28 developed and 29 developing), the size of the shadow economy is used as a dependent variable. Debit and credit card transactions are used as the main independent variable, while GDP per capita, unemployment rate, the share of agriculture in GDP, tax compliance, and regulatory quality serve as control variables. The authors test the effect of the volume of debit card transactions on the size of the shadow economy. The results reveal negative correlations between the variables: an increase of 1 percentage point in the volume of debit card transactions was found to reduce the size of the shadow economy by more than 2 percent, *ceteris paribus*. Similarly, the volume of credit card transactions also shows a negative, although somewhat smaller, effect on the size of the shadow economy. Specifically, an increase of 1 percent in the volume of credit card transactions tends to reduce the size of the informal economy by about 0.4 percent.

The choice of the indicators to represent electronic payments represents the major strength of this approach since, according to the authors, payment methods are a bridge between a producer and a consumer, and the digital shadow economy is associated with electronic payments, while the shadow economy is related to traditional payment methods (e.g., cash). When it comes to deficiencies, it should be stressed that all predictors have theoretically expected signs and conventional significance levels with minor deviations from previous findings. In addition, the study treats debit card payments and credit card payments as determinants of the size of the general shadow economy rather than of the digital shadow economy.

Khmyz *et al.* (2023) researched the effects of tax system digitalisation and tax regulation on the shadow economy in Ukraine. The authors argue that the high tax burden and incomplete tax policy are the essential reasons for the existence of the shadow economy in Ukraine, so they presume that the control and improvement of the above-mentioned factors could reduce the occurrence of non-compliant behaviour. The study, which is based on the analysis of legal acts and a critical analysis of the current situation in the country, advocates the use of modern information systems in the field of taxation due to their role in optimising tax payment management processes. The positive side-effects include effective collection, processing, and dissemination of tax information, a palette of options for in-depth and detailed analysis, the improved quality of tax service, faster interaction between tax authorities and taxpayers, and the reduction of the time required to complete tax reporting. Accordingly, these factors are considered the ones which can reduce the shadow economy.

Unfortunately, the authors do not provide any calculations that would show the extent to which the selected factors can reduce the size of the shadow economy. Moreover, the indicators do not allow us to estimate the size of the digital shadow economy. The study finds the likely impact of digitalisation on the size of the shadow economy, but this is more of a theoretical and logical insight.

Muminov *et al.* (2020) focus on the effects of electronic commerce and the introduction of a 'virtual' cash desk in retail trade on the shadow economy in the context of the general use of electronic applications in Uzbekistan. Presuming that the digital economy is an integral part of the information (digital) environment with basic elements such as digital technologies, ecosystems, and transformations, which are interconnected and interdependent, the authors analyse whether the proposed procedure for the electronic transfer of information on bank accounts by the Central Bank and commercial banks of the Republic of Uzbekistan to the State Tax Committee can help reduce the size of the shadow economy. They find that the aforementioned procedure can reduce the size of the shadow economy through legalization of e-commerce through timely registration of business entities, a reliable tax base, systematic tax risk management, and the creation of a business-favourable environment. Nevertheless, as in the case of the study by Khmyz *et al.* (2023), the analysis is based on logical and critical thinking, rather than on mathematical or statistical calculations.

Amanova (2023) analysed whether R&D and digitalization affect the shadow economy in Uzbekistan. The focus was on the impact of R&D spending (economic development) and the prevalence and availability of the Internet among the population and in business firms. Nevertheless, the study assessed the effects of the aforementioned factors not on the digital shadow economy, but on the percentage of the shadow labour force, and through that - the effects on the share of the shadow economy as a whole. The research covered the period 2000-2020 and was based on the MIMIC modeling and the Ordinary Least Squares regression.

The study made use of data from the E-Government Survey, with EGDI being the major index for the overall condition of e-government in the country[33]. E-participation index (EPI) was taken as an independent variable, while the dependent variables were the share of the shadow economy and the share of informal employment in Uzbekistan. R&D expenditures (in % of GDP), the number of Internet users (in % of population), Internet access of firms (in % of firms), and the number of PCs in firms were selected as the control variables.

The major advantage of this study lies in the inclusion of the variables that represent the digital economic environment (e.g., the Online Service Index, the Telecommunication Infrastructure Index, etc.). The author considers the cost of R&D and the effects of advanced technologies and innovations, which are recognised as a stimulus for reducing the size of the shadow economy. However, this approach does not allow a separate calculation of the size of the digital shadow economy, as its share remains hidden in the overall size of the shadow economy.

The enumerated studies mainly examined the relationship between particular aspects of digitalisation (e.g., technology, digital finance, etc.) and the shadow economy. In other words, the authors delved into what effects the selected aspects of digitalisation have on the size of the shadow economy and whether they can help reduce it. The literature, however, lacks methods and indicators for the expression and measurement of the digital shadow economy. To the best of our knowledge, the most comprehensive methodology for measuring the size of the digital shadow economy is proposed by Remeikienė *et al.* (2017). The authors presented the adjusted version of the MIMIC model, in which the digital shadow economy is conceptualized as a latent variable. As already discussed, the traditional MIMIC model comprises the indicators and the causal variables of the major latent variable under research. The indicators capture the changes in the latent variable, while the causal variables exert an impact on its size. The MIMIC model itself represents the interaction between the indicators and causal variables.

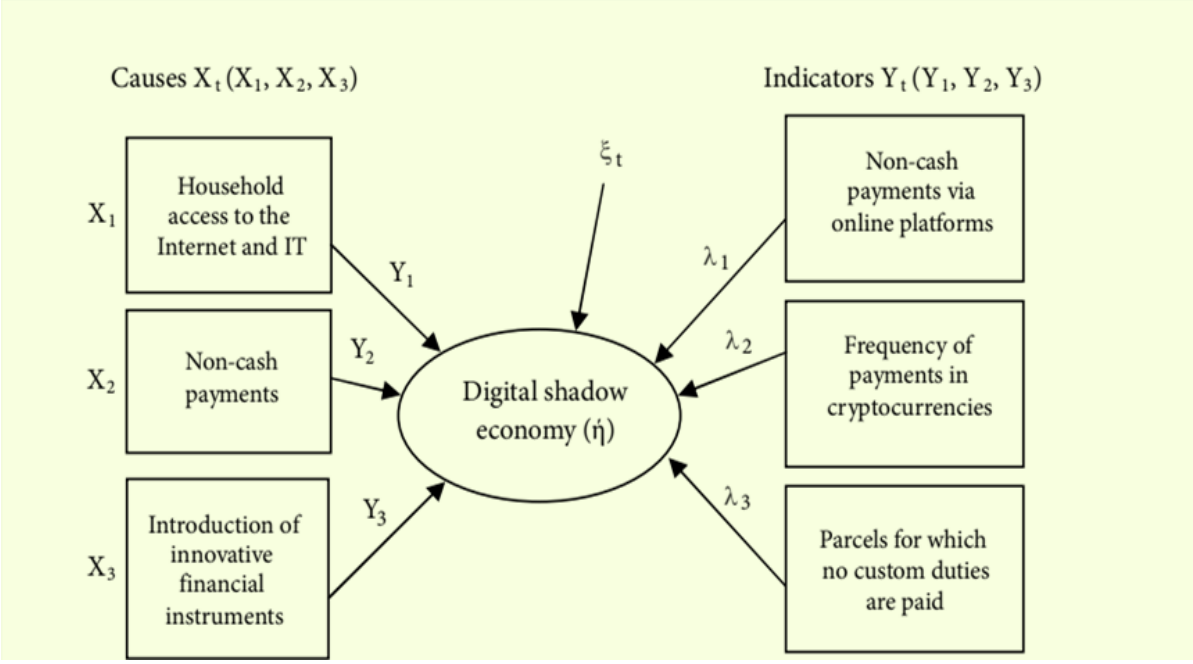
[33] The EGDI comprises 3 sub-indices: the Online Service Index (OSI), Human Capital Index (HCI), and the Telecommunication Infrastructure Index (TII). A higher value of the index indicates a better quality of e-government.

Having analysed the similarities between the traditional and digital shadow economy highlighted in previous studies, the authors found that the income (profit) earned in the traditional and digital shadow economy tends to be invested in merchandise and other means which can help ensure business continuity and that payments in both sectors of the shadow economy are made not only in cash.

The expert evaluation further revealed that the approximate size of the digital shadow economy can be estimated if considering three major indicators: the volumes of payments in cryptocurrencies, non-cash transfers via online payment platforms, and the monetary value of the parcels for which no customs duties are paid. Specifically, the studies by the European Central Bank (Vanini, 2012), Eyal and Sirer (2014), and Siddik *et al.* (2016) linked the international settlements in cryptocurrencies to particular financial risks, for instance, loss of money in cryptocurrency exchange, steals of money from a digital wallet, lack of protection, value fluctuations and poor obligations to comply with tax regulations. Likewise, the study by the Lithuanian Free Market Institute (2013) confirmed that non-cash payments via online platforms make preconditions for the digital shadow economy.

Considering these findings, the volumes of payments in cryptocurrencies and non-cash transfers via online payment platforms were included in the methodology proposed by Remeikienė *et al.* (2017). Selection of the monetary value of the parcels for which no customs duties are paid is explained by invoking the fact that if goods are ordered from a third country and the payment is made, for instance, in cryptocurrencies, these goods have to pass customs. If no custom duties are paid for the delivery (import) of this good, then the monetary value of such parcels can be considered as an indicator of the digital shadow economy.

**Figure G1. General structure of MIMIC 3-1-3 for estimation of the size of digital shadow economy. Numbers 3-1-3 mark that 3 causal variables, and 3 indicators are included in the model**




***Source:*** own processing

Accordingly, the authors selected access to the Internet and a computer in households, non-cash payments, and usage of innovative market instruments (e.g., a 'Revolut' card) as causal

variables[34]. Non-cash money transfers via online platforms, frequency and amounts of payments in cryptographic currencies, and parcels for which no taxes (or custom duties) are paid (i.e., non-cash settlements are made) were selected as indicators. This resulted in the MIMIC 3-1-3 model, whose parameters were evaluated by analysing the links between the observed variables in the dispersion and covariation (see Figure G1).

This model allows at least an approximate measurement of the size of the digital shadow economy, which commonly remains unaccounted for in the traditional shadow economy calculations. Regardless of all issues with the application of MIMIC at the macro level, this methodology hence can be quite powerful when applied to specific subparts of the economy.

However, the presented model requires that sufficient indicative and causal data are available. Unfortunately, official statistical databases rarely contain the data required for robust estimates. In some cases (e.g., regarding the frequency of payments in cryptocurrencies), the official data are not accumulated at all. For that reason, the country-level estimates have not yet been produced. In order to assess the level of the digital shadow economy in Lithuania, the project team managed to collect only 11 values. During the pilot study, the aim was to gather as much statistical information as possible on causal factors and indicators describing the digital shadow economy.

The following limitations were encountered during the pilot study:

- The introduction of innovative financial instruments to the market (the chosen payment card ‘Revolut‘) faced a lack of data availability. The British startup card ‘Revolut‘ entered the Lithuanian payment market only in August 2016, and furthermore, payments made with these cards are available only in global statistical frameworks, without classifying the data by country or specific regions.
- The turnover of ‘PayPal‘ and the frequency of Bitcoin transactions could be traced back to 2008, but this data is also on a global scale. There is no possibility to obtain statistical data for a specific country.
- Shipments for which taxes are not paid were not included in the initial calculations of the model, as according to the current legal directives, the Lithuanian Customs does not collect data on the numeric expression of incoming shipments.

[34] These variables were selected based on expert evaluations during the national project ‘Digital Shadow Economy (MIP-15642)‘ implemented by the Scientists' Group.

## *Appendix H*

**Table H1.** List of studies identified in the systematic review of the methods for measuring illicit economic activities

| No. | Paper name | Authors | Year | Publisher | Type of the publication | Countries covered | Time period covered | Estimated phenomenon | Estimation method | Estimation unit |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Measuring the informal economy in the Caucasus and Central Asia | Abdih, Y. & Medina, L. | 2013 | International Monetary Fund | Working paper | Six countries from the Caucasus and Central Asia (including Georgia) | 2008 | Informal economy - economic activities that circumvent the costs and are excluded from the benefits and rights incorporated in the laws and administrative rules covering property relationships, commercial licensing, labor contracts, torts, financial credit, and social systems | MIMIC | % of GDP |
| 2 | New estimate of shadow economy based on the total energy consumption. Evidence from the European Union countries | Achim, V. M, Postea, M. M, & Noja, G.G. | 2024 | Energy Economics | Journal article | 26 EU countries (Lithuania excluded) | 2001-2021 | Shadow economy - used as a synonym for the non-observed economy (i.e., all productive activities that may not be captured in the basic data sources used for compiling national accounts) | Energy consumption method | % of official GDP |
| 3 | The shadow economy in Cyprus: Evidence from the electricity consumption and currency demand methods | Andreou, C., Andreou, E., Michael, S., & Syrichas, G. | 2021 | Cyprus Economic Policy Review | Journal article | Cyprus | 1995-2018 | Shadow economy - market-based activities that are hidden from the authorities, and therefore are neither taxed nor included in national statistics | Energy consumption method and currency demand method | % of GDP |
| 4 | Income under-reporting and the shadow economy in Cyprus: Evidence from household survey data | Andreou, E., Papadopoulos, G., & Syrichas, G. | 2020 | University of Cyprus | Working paper | Cyprus | 2009 | Income under-reporting of the self-employed | Expenditure-based approach using the Household Budget Survey and the Household Finance and | % of total income |

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| | | | | | | | | | Consumption Survey | |
| 5 | An expenditure-based estimate of Latvia's shadow economy | Bernotaite, R. & Piskunova, A. | 2005 | Stockholm School of Economics in Riga | Working paper | Latvia | 2003 | Shadow economy - the value of economic activity that would be taxable were it reported to the authorities | Expenditure method by Pissarides and Weber (1989) - data from the Household budget survey | % of GDP |
| 6 | Economia neobservată (2015-2020) | Biroul Național de Statistică | 2024 | National Bureau of Statistics of the Republic of Moldova | Online database | Moldova | 2000-2020 | Unobserved/non-observed economy - all productive activities that may not be captured in the basic data sources used for compiling national accounts | OECD's multi-method approach to the exhaustiveness of national accounts | % of GDP |
| 7 | Uncovering the main characteristics of shadow economies in Romania and Moldova for strengthening the labour market resilience | Davidescu, A. A., Putniņš, T., & Sauka, A. | 2022 | Springer | Book chapter | Moldova and Romania | 2017 and 2018 | Shadow economy - all legal production of goods and services produced by registered firms that are deliberately concealed from public authorities | Survey of company owners and managers (505 in Moldova and 303 in Romania) | % of GDP |
| 8 | Currency demand and MIMIC models: towards a structured hybrid method of measuring the shadow economy | Dybka, P., Kowalczuk, M., Olesiński, B., Torój, A., & Rozkrut, M. | 2019 | International Tax and Public Finance | Journal article | 43 countries around the world (including Moldova) | 2005-2015 | Shadow economy - unreported transactions made by both registered and unregistered entities | MIMIC and currency demand method | % of GDP |
| 9 | Shadow economies around the world: Model based estimates | Elgin, C. & Oztunali, O. | 2012 | Bogazici University | Working paper | 161 countries around the world (including Estonia, Lithuania, Latvia, Cyprus, Malta, Georgia and Moldova) | 1950-2009 | Shadow economy - a set of economic activities that take place outside the framework of bureaucratic public and private sector establishments | Dynamic General Equilibrium (DGE) | % of GDP |
| 10 | Strategic development plan 2023 | Estonian Tax and Customs Board | 2023 | Estonian Tax and Customs Board | Working paper | Estonia | 2019-2022 | Tax gap - tax revenue not collected which impedes fair competition and decreases state revenue | Analysis of national account discrepancies | % of paid taxes |
| 11 | Special Eurobarometer 284: Undeclared | European Commission | 2007 | European Commission | Report | 27 EU member states (including Estonia, | 2007 | Undeclared work - any paid activities that are lawful as regards their nature, but are not declared to | Survey of individuals (approximately | % of population |

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| | work in the European Union | | | | | Lithuania, Latvia, Cyprus and Malta) | | the public authorities, taking into account the differences in the regulatory systems of the Member States | 1,000 per country) | |
| 12 | Special Eurobarometer 402: Undeclared work in the European Union | European Commission | 2014 | European Commission | Report | 28 EU member states (including Estonia, Lithuania, Latvia, Cyprus and Malta) | 2013 | Undeclared work - any paid activities that are lawful as regards their nature, but are not declared to the public authorities, taking into account the differences in the regulatory systems of the Member States | Survey of individuals (approximately 1,000 per country) | % of population |
| 13 | Special Eurobarometer 498 - Undeclared work in the European Union | European Commission | 2020 | European Commission | Report | 27 EU member states (including Estonia, Lithuania, Latvia, Cyprus and Malta) | 2019 | Undeclared work - any paid activities that are lawful as regards their nature, but are not declared to the public authorities, taking into account the differences in the regulatory systems of the Member States | Survey of individuals (approximately 1,000 per country) | % of population |
| 14 | VAT gap in the EU | European Commission | 2023 | European Commission | Report | 27 EU member states (including Estonia, Lithuania, Latvia, Cyprus and Malta) | 2000-2022 | VAT compliance gap - a measure of overall non-compliance in VAT. It represents more than just fraud and evasion and their associated policy measures. The VAT compliance gap also covers VAT lost due to, for example, insolvencies, bankruptcies, administrative errors, and legal tax optimisation. | Top-down consumption-side approach | % of total revenue that would be collected in the case of full compliance |
| 15 | Gross National Income Inventory - ESA 2010 - Estonia | Eurostat | 2021 | Eurostat | Report | Estonia | 2016 | Non-observed economy - all productive activities that may not be captured in the basic data sources used for compiling national accounts | Eurostat's Tabular Approach to exhaustiveness of national accounts | % of GDP |
| 16 | Cyprus - Process tables | Eurostat | 2021 | Eurostat | Online database | Cyprus | 2017 | Non-observed economy - all productive activities that may not be captured in the basic data sources used for compiling national accounts | Eurostat's Tabular Approach to exhaustiveness of national accounts | % of GDP |
| 17 | Gross National Income Inventory - ESA 2010 - Estonia | Eurostat | 2016 | Eurostat | Report | Estonia | 2010 | Non-observed economy - all productive activities that may not be captured in the basic data sources used for compiling national accounts | Eurostat's Tabular Approach to exhaustiveness | % of GDP |

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| | | | | | | | | of national accounts | |
| 18 | Estimating the size of the Cypriot underground economy. A comparison with European experience | Fethi, M. D, Fethi, S., & Katircioglu, S. T. | 2006 | International Journal of Manpower | Journal article | Cyprus | 1960-2003 | Underground economy - legitimate (legal) activities resulting in transactions which are not taxed or concealed from the tax authorities and should be included in national statistics | 4 methods: 1) labour force participation method: 2) currency demand method; 3) transaction approach; 4) simple currency ratio | % of GDP |
| 19 | Extent of undeclared work in the European Union | Franic, J., Horodnic, I. A., & Williams, C. C. | 2023 | European Labour Authority | Report | 27 EU countries | 2019 | Undeclared work - any paid activities that are lawful as regards their nature, but are not declared to the public authorities, taking into account the differences in the regulatory systems of the Member States | Labour input method | % of official GVA + % of total workforce |
| 20 | An analysis of the shadow economy in Malta: A currency demand and MIMIC model approach | Gauci, T. M. & Rapa, N. | 2020 | Central Bank of Malta | Working paper | Malta | 2000-2019 | Shadow economy - activities which are productive and legal but are deliberately concealed from public authorities to avoid taxation and having to meet certain legal standards | Currency demand method | % of GDP |
| 21 | Share of non-observed value added | Geostat | 2024 | National Statistics Office of Georgia | Online database | Georgia | 2010-2023 | Non-observed economy - all productive activities that may not be captured in the basic data sources used for compiling national accounts | OECD's multi-method approach to the exhaustiveness of national accounts | % of GVA |
| 22 | Informal employment | Geostat | 2024 | National Statistics Office of Georgia | Online database | Georgia | 2017-2023 | Informal employment in non-agricultural sector - all workers not covered or insufficiently covered by formal arrangements through their work (didn't pay income tax from remuneration; employed didn't benefit from paid annual leave or employed didn't benefit from paid sick leave in case of illness; or employer didn`t contribute to the pension fund) or employed defined her status in employment as a contributing family worker or the | Labour force survey | % of informal employment in non-agricultural employment |

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| | | | | | | | | enterprises where they worked weren`t registered. | | |
| 23 | Statistics on the informal economy (Informal employment rate by sex - % annual) | ILOSTAT | 2024 | International Labour Organization | Online database | 143 countries around the world (including Estonia, Lithuania, Latvia, Georgia, Cyprus and Malta) | depending on the country (up to 2023) | Informal employment – undeclared work + do-it-yourself work | The harmonized series on informality derived from national household survey microdata files | % total workforce |
| 24 | Explaining the shadow economy in Europe: Size, causes and policy options | Kelmanson, B., Kirabaeva, K., Medina, L., Mircheva, B. & Weiss, J. | 2019 | International Monetary Fund | Working paper | 47 European countries (including Estonia, Lithuania, Latvia, Cyprus and Malta) | 2000-2016 | Shadow economy - mostly the legal economic and productive activities that are deliberately hidden from official authorities and that, if recorded, would contribute to GDP (excluding illegal or criminal activities, and do-it-yourself, charitable or household activities) | MIMIC | % of GDP |
| 25 | Europe's shadow economies: Estimating size and outlining policy | Kelmanson, B., Kirabaeva, K. & Medina, L. | 2021 | International Monetary Fund | Book chapter | 47 European countries (including Estonia, Lithuania, Latvia, and Cyprus) | 2000-2019 | Informal economy - mostly legal and productive economic activities deliberately hidden from official authorities that, if recorded, would contribute to GDP (excluding illegal or criminal activities and do-it-yourself, charitable, or household activities) | MIMIC | % of GDP |
| 26 | Cheating in Europe: underreporting of self-employment income in comparative perspective | Kukk, M., Paulus, A. & Staehr, K. | 2020 | International Tax and Public Finance | Journal article | 14 EU member states (including Estonia, Latvia, Lithuania, and Cyprus) | 2010 | Underreporting of income by self-employed individuals | Expenditure method by Pissarides and Weber (1989) - data from the 2010 wave of the Household Budget Survey | % of income |
| 27 | Shadow economies in the Baltic see region | Lithuanian Free Market Institute | 2015 | Lithuanian Free Market Institute | Report | Lithuania, Latvia, Estonia, Poland, Sweden and Belarus | 2015 | Shadow economy - economic activities (goods produced and services rendered) conducted in non-compliance with applicable laws for the purpose of avoiding taxes/or and regulations | Survey of individuals (approximately 1,000 per country) | % of GDP |
| 28 | Shedding light on the shadow economy: A global database and the interaction | Medina, L. & Schneider, F. | 2019 | Ifo Institute | Working paper | 157 countries around the world (including Estonia, Latvia, Lithuania, Cyprus, | 1991-2017 | Shadow economy - all economic activities that are hidden from official authorities for monetary, regulatory, and institutional reasons | MIMIC | % of GDP |

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| | with the official one | | | | | Georgia, Malta and Moldova) | | | | |
| 29 | The evolution of shadow economies through the 21st century | Medina, L. & Schneider, F. | 2021 | International Monetary Fund | Book chapter | 158 countries around the world (including Estonia, Latvia, Lithuania, Cyprus, Georgia, Malta and Moldova) | 1991-2015 | Shadow economy - all economic activities that are hidden from official authorities for monetary, regulatory, and institutional reasons | MIMIC | % of GDP |
| 30 | Estimating the size of shadow economy with electricity consumption method | Missiou, O. | 2016 | Hellenic International University | Master's degree thesis | 19 EU countries (including Estonia and Latvia) | 2007-2013 | Shadow economy - all undeclared economic activities without the inclusion of do-it-yourself activities | Electricity consumption method | % of official GDP |
| 31 | Gross National Income Inventory - MALTA | National Statistics Office of Malta | 2015 | Eurostat | Report | Malta | 2010 | Non-observed economy - all productive activities that may not be captured in the basic data sources used for compiling national accounts | Eurostat's Tabular Approach to exhaustiveness of national accounts | % of GDP |
| 32 | Income tax evasion, inequality and poverty | Pashardes, P. & Polycarpou, A. | 2008 | Cyprus Economic Policy Review | Journal article | Cyprus | 2002 | Income under-reporting of the self-employed | Expenditure method by Pissarides and Weber (1989) - data from the Family Expenditure Survey | % GDP |
| 33 | Income underreporting based on income-expenditure gaps: survey vs tax records | Paulus, A. | 2015 | Institute for Social and Economic Research | Working paper | Estonia | 2008 | Underreporting of income among working households - results for self-employed | Expenditure method by Pissarides and Weber (1989) - data from the Estonian Social Survey (part of EU-SILC) - pooled 2007 and 2008 waves | % of income |
| 34 | Tax evasion in the context of the shadow economy. Evidence for the European Union countries | Postea, M. M., Achim, M. V., & Lucut Capras, I. | 2023 | Annales Universitatis Apulensis Series Oeconomica | Journal article | 25 EU member states (Estonia and Lithuania excluded) | 2001-2021 | Shadow economy - undeclared work + criminal activities | Electricity consumption method | % of official GDP |

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| 35 | Energy based estimation of the shadow economy: The role of governance quality | Psychoyios, D., Missiou, O. & Dergiades, T. | 2021 | The Quarterly Review of Economics and Finance | Journal article | 19 EU countries (excluding Lithuania, Cyprus and Malta) | 2007-2013 | Shadow economy - economic activities and the income derived from them that circumvent or otherwise avoid government regulation, taxation or observation | Energy consumption method | % of official GDP |
| 36 | Shadow Economy Index for Moldova and Romania | Putniņš, T., Sauka, A. & Davidescu, A. A. | 2019 | Springer | Book chapter | Moldova and Romania | 2015 and 2016 | Shadow economy - all legal production of goods and services produced by registered firms that is deliberately concealed from public authorities | Survey of company owners and managers (503 in Moldova and 420 in Romania) | % of GDP |
| 37 | Some alternative estimates of underground economies in 12 new EU member states | Quintano, C. & Mazzoci, P. | 2010 | International Economic Journal | Journal article | Bulgaria, Cyprus, Hungary, Malta, Poland, Slovenia, Czech Republic, Estonia, Latvia, Lithuania, Romania, and Slovakia | Depending on the country, with maximum range between 1996 and 2008 | Non-observed economy - all productive activities that may not be captured in the basic data sources used for compiling national accounts | SEM-PLS model | % of official GDP |
| 38 | The shadow economy beyond European public governance | Quintano, C. & Mazzoci, P. | 2013 | Economic Systems | Journal article | 33 European countries (including Estonia, Latvia, Lithuania, Cyprus and Malta) | 2005-2010 | Shadow economy - all market-based legal production of goods and services that are deliberately concealed from public authorities for the following reasons: (1) to avoid payment of income, value added or other taxes, (2) to avoid payment of social security contributions, (3) to avoid having to meet certain legal labour market standards, such as minimum wages, maximum working hours, safety standards, etc., and (4) to avoid complying with certain administrative procedures, such as completing statistical questionnaires or other administrative forms | SEM-PLS model | % of official GDP |
| 39 | Behind the GDP: some remarks on the shadow economy in Mediterranean countries | Quintano, C. & Mazzoci, P. | 2018 | European Journal of Law and Economics | Journal article | 25 Mediterranean countries (including Cyprus and Malta) | 1995-2010 | Shadow economy - all market-based legal production of goods and services that are deliberately concealed from public authorities for the following reasons: (1) to avoid payment of income, value added or other taxes; (2) to avoid payment of social security contributions; (3) to avoid having to | SEM-PLS model | % of official GDP |

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|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | meet certain legal labor market standards, such as minimum wages, maximum working hours, safety standards, etc., and (4) to avoid complying with certain administrative procedures, such as completing statistical questionnaires or other administrative forms | | |
| 40 | Tax gap in the global economy | Raczkowski, K. & Mróz, B. | 2018 | Journal of Money Laundering Control | Journal article | 35 countries around the world (including Estonia, Lithuania, Latvia, Cyprus and Malta) | 2011-2015 | Shadow economy - used as a synonym for undeclared work (i.e., any paid activities that are lawful as regards their nature, but are not declared to the public authorities) | MIMIC | % of GDP |
| 41 | Shadow Economy Index for the Baltic Countries 2009–2023 | Sauka, A. & Putnis, T. | 2024 | Stockholm School of Economics | Report | Estonia, Latvia and Lithuania | 2009-2023 | Shadow economy - all legal production of goods and services that is deliberately concealed from public authorities | Survey of company owners and managers (around 500 per country each year) | % of GDP |
| 42 | New COVID-related results for estimating the shadow economy in the global economy in 2021 and 2022 | Schneider, F. | 2022 | International Economics and Economic Policy | Journal article | 36 European and OECD countries (including Estonia, Lithuania, Latvia, Cyprus and Malta) | 2003-2022 | Shadow economy - all economic activities that are hidden from official authorities for monetary, regulatory, and institutional reasons | MIMIC + currency demand method | % of official GDP |
| 43 | Taxation of the informal economy in the EU | Schneider, F. & Asllani, A., | 2022 | European Parliament | Report | 31 European and 5 non-European countries (including Estonia, Lithuania, Latvia, Cyprus and Malta) | 2003-2022 | Shadow economy - all economic activities that are hidden from official authorities for monetary, regulatory, and institutional reasons | MIMIC | % of GDP |
| 44 | Energy consumption in assessment of shadow economy | Sedmikova, E., Vasylieva, T., Tiutiunyk, I., & Navickas, N. | 2021 | European Journal of Interdisciplinary Studies | Journal article | EU + Ukraine | 2013-2016 | Shadow economy - both legal and illegal production of goods, works, and services that are not reflected in official estimates are carried out | Energy consumption method | % of GDP |
| 45 | Some new estimates of shadow economy for 80 countries using pooled | Tan, Y, Habibullah, M. S. Kaliappan, | 2017 | International Journal of Business and Society | Journal article | 80 countries around the world (including Lithuania, Latvia, and Moldova) | 1975-2012 | Shadow economy - cash transactions that are typically taking place outside the control of the government authorities | Tanzi method | % of GDP |

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|---|---|---|---|---|---|---|---|---|---|---|
| | mean group estimator | S. R., & Radam, A. | | | | | | | | |
| 46 | Tax reform in Georgia and the size of the shadow economy | Torosyan, K. & Filer, R. K. | 2014 | Economics of Transition | Journal article | Georgia | 2003-2007 | Underreporting of income by self-employed individuals | Expenditure method by Pissarides and Weber (1989) | % of income |
| 47 | Women's economic inactivity and engagement in the informal sector in Georgia | UN Women | 2018 | United Nations | Report | Georgia | 2018 | Informal employment - all people working in an unregistered business (whether the owner or an employee); contributing household workers; and own accounts workers and employees without a recognized employment relationship to be in informal employment | Representative survey of 1,438 individuals from the whole country | % of employment |
| 48 | An evaluation of the scale of undeclared work in the European Union and its structural determinants | Williams, C. C, Bejakovic, P., Mikulic, D., Franic, J., Kedir, A., & Horidnic, I. A. | 2017 | European Commission | Report | 28 EU countries (excluding Malta) | 2013 | Undeclared work - any paid activities that are lawful as regards their nature, but are not declared to the public authorities, taking into account the differences in the regulatory systems of the Member States | Labour input method | % of official GVA + % of total workforce |
| 49 | Informal Economy Database | World Bank Group | 2024 | World Bank Group | Online database | 196 countries around the world (including Estonia, Lithuania, Latvia, Georgia, Moldova, Cyprus and Malta) | 1990-2020 | Informal economy - market-based and legal production of goods and services that is hidden from public authorities for monetary, regulatory, or institutional reasons | Dynamic General Equilibrium (DGE) & MIMIC | % of official GDP |

***Source:*** own processing

## Table I1. Adapted ECOBIAS checklist

| No. | Type of bias | Issues addressed (questions to consider) | Score |
|---|---|---|---|
| **PART A. Overall checklist for bias in economic evaluation** | | | |
| 1 | Narrow perspective bias | Was a societal perspective adopted? If not, has a different perspective been justified? | 0-10 |
| 2 | Inefficient comparator bias | Was the best alternative chosen as comparator? Was current practice chosen as a comparator? Have all comparators been described in sufficient detail? | 0-10 |
| 3 | Cost measurement omission bias | Were all costs relevant to the disease and intervention identified and considered? | 0-10 |
| 4 | Intermittent data collection bias | Was the resource use measured continuously? | 0-10 |
| 5 | Invalid valuation bias | Is the price calculation presented in a detailed manner? Have reference prices been used? | 0-10 |
| 6 | Ordinal ICER bias | Have cardinal scales for the outcomes measure in a CEA been used? | 0-10 |
| 7 | Double-counting bias | Are variables adequately checked for double-counting? | 0-10 |
| 8 | Inappropriate discounting bias | Have discounting rates from guidelines been applied? | 0-10 |
| 9 | Limited sensitivity analysis bias | Have the four principles of uncertainty (methodological, structural, heterogeneity, parameter) been considered in sufficient detail? | 0-10 |
| 10 | Sponsor bias | Have sponsorships been disclosed? Is the study protocol freely accessible? | 0-10 |
| 11 | Reporting and dissemination bias | Has the study/trial been listed in a trial register? Have all results been reported according to the study protocol? | 0-10 |
| **PART B. Model-specific aspects of bias in economic evaluation** | | | |
| ***I Bias related to structure*** | | | |
| 12 | Structural assumptions bias | Is the model structure in line with coherent theory? Do treatment pathways reflect the nature of disease? | 0-10 |
| 13 | No treatment comparator bias | Is there an adequate comparator, i.e. care as usual? | 0-10 |
| 14 | Wrong model bias | Is the model chosen adequate regarding the decision problem? | 0-10 |
| 15 | Limited time horizon bias | Was a lifetime horizon chosen? Were shorter time horizons adequately justified? | 0-10 |
| ***II Bias related to data*** | | | |

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| 16 | Bias related to data identification | Are the methods of data identification transparent? Are all choices justified adequately? Do the input parameters come from high-quality and well-designed studies? | 0-10 |
| 17 | Bias related to baseline data | Are probabilities, for example, based on natural history data? Is transformation of rates into transition probabilities done accurately? | 0-10 |
| 18 | Bias related to treatment effects | Are relative treatment effects synthesized using appropriate meta- analytic techniques? Are extrapolations documented and well justified? Are alternative assumptions explored regarding extrapolation? | 0-10 |
| 19 | Bias related to quality- of-life weights (utilities) | Are the utilities incorporated appropriate for the specific decision problem? | 0-10 |
| 20 | Non-transparent data incorporation bias | Is the process of data incorporation transparent? Are all data and their sources described in detail? | 0-10 |
| 21 | Limited scope bias | Have the four principles of uncertainty (methodological, structural, heterogeneity, parameter) been considered? | 0-10 |
| ***III Bias related to consistency*** | | | |
| 22 | Bias related to internal consistency | Has internal consistency in terms of mathematical logic been evaluated? | 0-10 |

***Source:*** own processing based on Adarkwah *et al*. (2016)

**Table I2.** Critical appraisal of the studies identified in the systematic review of the methods for measuring illicit economic activities – the adapted ECOBIAS checklist

| No. | Paper name | Authors | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | Q11 | Q12 | Q13 | Q14 | Q15 | Q16 | Q17 | Q18 | Q19 | Q20 | Q21 | Q22 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Measuring the informal economy in the Caucasus and Central Asia | Abdih, Y. & Medina, L. | 6 | 10 | - | 7 | - | - | 6 | - | 8 | 10 | - | 10 | 7 | 5 | 7 | 10 | - | - | - | 7 | 7 | 10 |
| 2 | New estimate of shadow economy based on the total energy consumption. Evidence from the European Union countries | Achim, V. M, Postea, M. M, & Noja, G.G. | 10 | 10 | - | 10 | - | - | 6 | - | 6 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 6 | 10 |
| 3 | The shadow economy in Cyprus: Evidence from the electricity consumption and currency demand methods | Andreou, C., Andreou, E., Michael, S., & Syrichas, G. | 10 | 10 | - | 10 | - | - | 10 | - | 10 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 10 | 10 |
| 4 | Income under-reporting and the shadow economy in Cyprus: Evidence from household survey data | Andreou, E., Papadopoulos, G., & Syrichas, G. | 10 | 8 | - | 10 | - | - | 10 | - | 7 | 7 | - | 10 | 10 | 10 | 10 | 7 | - | - | - | 10 | 7 | 10 |
| 5 | An expenditure-based estimate of Latvia's shadow economy | Bernotaite, R. & Piskunova, A. | 10 | 10 | - | 10 | - | - | 10 | - | 10 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 10 | 10 |
| 6 | Economia neobservată (2015-2020) | Biroul Național de Statistică | 10 | 10 | - | 10 | - | - | 10 | - | 10 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 10 | 10 |
| 7 | Uncovering the main characteristics of shadow economies in | Davidescu, A. A., Putniņš, T., & Sauka, A. | 10 | 7 | - | 10 | - | - | 10 | - | 7 | 6 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 7 | 10 |

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| | Romania and Moldova for strengthening the labour market resilience | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | Currency demand and MIMIC models: towards a structured hybrid method of measuring the shadow economy | Dybka, P., Kowalczuk, M., Olesiński, B., Torój, A., & Rozkrut, M. | 10 | 3 | - | 10 | - | - | 10 | - | 10 | 10 | - | 3 | 10 | 10 | 10 | 10 | - | - | - | 10 | 10 | 10 |
| 9 | Shadow economies around the world: Model based estimates | Elgin, C. & Oztunali, O. | 3 | 10 | - | 10 | - | - | 6 | - | 7 | 6 | - | 10 | 10 | 4 | 10 | 6 | - | - | - | 6 | 6 | 10 |
| 10 | Strategic development plan 2023 | Estonian Tax and Customs Board | 10 | 8 | - | 10 | - | - | 8 | - | 8 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 10 | 8 |
| 11 | Special Eurobarometer 284: Undeclared work in the European Union | European Commission | 10 | 10 | - | 10 | - | - | 10 | - | 10 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 10 | 10 |
| 12 | Special Eurobarometer 402: Undeclared work in the European Union | European Commission | 10 | 10 | - | 10 | - | - | 10 | - | 10 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 10 | 10 |
| 13 | Special Eurobarometer 498 - Undeclared work in the European Union | European Commission | 10 | 10 | - | 10 | - | - | 10 | - | 10 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 10 | 10 |
| 14 | VAT gap in the EU | European Commission | 10 | 10 | - | 10 | - | - | 10 | - | 10 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 10 | 10 |
| 15 | Gross National Income Inventory - ESA 2010 - Estonia (2016) | Eurostat | 10 | 10 | - | 10 | - | - | 10 | - | 10 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 10 | 10 |
| 16 | Cyprus - Process tables | Eurostat | 10 | 10 | - | 10 | - | - | 10 | - | 10 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 10 | 10 |

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| 17 | Gross National Income Inventory - ESA 2010 - Estonia (2021) | Eurostat | 10 | 10 | - | 10 | - | - | 10 | - | 10 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 10 | 10 |
| 18 | Estimating the size of the Cypriot underground economy. A comparison with European experience | Fethi, M. D, Fethi, S., & Katircioglu, S. T. | 10 | 10 | - | 10 | - | - | 10 | - | 10 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 10 | 10 |
| 19 | Extent of undeclared work in the European Union | Franic, J., Horodnic, I. A., & Williams, C. C. | 10 | 10 | - | 10 | - | - | 10 | - | 10 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 10 | 10 |
| 20 | An analysis of the shadow economy in Malta: A currency demand and MIMIC model approach | Gauci, T. M. & Rapa, N. | 10 | 10 | - | 10 | - | - | 10 | - | 10 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 10 | 10 |
| 21 | Share of non-observed value added | Geostat | 10 | 10 | - | 10 | - | - | 10 | - | 10 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 10 | 10 |
| 22 | Informal employment | Geostat | 10 | 10 | - | 10 | - | - | 10 | - | 10 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 10 | 10 |
| 23 | Statistics on the informal economy (Informal employment rate by sex - % annual) | ILOSTAT | 10 | 10 | - | 10 | - | - | 10 | - | 10 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 10 | 10 |
| 24 | Explaining the shadow economy in Europe: Size, causes and policy options | Kelmanson, B., Kirabaeva, K., Medina, L., Mircheva, B. & Weiss, J. | 10 | 10 | - | 10 | - | - | 6 | - | 6 | 10 | - | 10 | 7 | 10 | 10 | 10 | - | - | - | 10 | 7 | 10 |
| 25 | Europe's shadow economies: Estimating size | Kelmanson, B., Kirabaeva, | 10 | 10 | - | 10 | - | - | 6 | - | 6 | 10 | - | 10 | 7 | 10 | 10 | 10 | - | - | - | 10 | 7 | 10 |

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| | and outlining policy | K. & Medina, L. | | | | | | | | | | | | | | | | | | | | | | |
| 26 | Cheating in Europe: underreporting of self-employment income in comparative perspective | Kukk, M., Paulus, A. & Staehr, K. | 10 | 10 | - | 10 | - | - | 10 | - | 10 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 10 | 10 |
| 27 | Shadow economies in the Baltic see region | Lithuanian Free Market Institute | 10 | - | - | 10 | - | - | - | - | 6 | 6 | - | 10 | - | 10 | 10 | 6 | 10 | 10 | - | 6 | 6 | 10 |
| 28 | Shedding light on the shadow economy: A global database and the interaction with the official one | Medina, L. & Schneider, F. | 7 | 10 | - | 10 | - | - | 7 | - | 7 | 10 | - | 10 | 10 | 5 | 10 | 10 | - | - | - | 7 | 7 | 10 |
| 29 | The evolution of shadow economies through the 21st century | Medina, L. & Schneider, F. | 10 | 10 | - | 10 | - | - | 10 | - | 7 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 7 | 7 | 10 |
| 30 | Estimating the size of shadow economy with electricity consumption method | Missiou, O. | 5 | 10 | - | 10 | - | - | 6 | - | 5 | 5 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 5 | 10 |
| 31 | Gross National Income Inventory - MALTA | National Statistics Office of Malta | 10 | 10 | - | 10 | - | - | 10 | - | 10 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 10 | 10 |
| 32 | Income tax evasion, inequality and poverty | Pashardes, P. & Polycarpou, A. | 10 | 10 | - | 10 | - | - | 7 | - | 10 | 10 | - | 10 | 10 | 10 | 10 | 7 | - | - | - | 7 | 7 | 10 |
| 33 | Income underreporting based on income-expenditure gaps: survey vs tax records | Paulus, A. | 10 | 10 | - | 10 | - | - | 10 | - | 10 | 10 | - | 10 | 10 | 10 | 10 | 5 | - | - | - | 10 | 10 | 10 |

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| 34 | Tax evasion in the context of the shadow economy. Evidence for the European Union countries | Postea, M. M., Achim, M. V., & Lucut Capras, I. | 10 | 7 | - | 10 | - | - | 8 | - | 10 | 8 | - | 10 | 10 | 7 | 10 | 7 | - | - | - | 7 | 7 | 10 |
| 35 | Energy based estimation of the shadow economy: The role of governance quality | Psychoyios, D., Missiou, O. & Dergiades, T. | 10 | 10 | - | 10 | - | - | 10 | - | 10 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 10 | 10 |
| 36 | Shadow Economy Index for Moldova and Romania | Putniņš, T., Sauka, A. & Davidescu, A. A. | 10 | 10 | - | 10 | - | - | 10 | - | 7 | 7 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 7 | 10 |
| 37 | Some alternative estimates of underground economies in 12 new EU member states | Quintano, C. & Mazzoci, P. | 10 | 3 | - | 10 | - | - | 5 | - | 5 | 10 | - | 5 | 5 | 5 | 10 | 10 | - | - | - | 10 | 10 | 10 |
| 38 | The shadow economy beyond European public governance | Quintano, C. & Mazzoci, P. | 10 | 10 | - | 10 | - | - | 10 | - | 10 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 10 | 10 |
| 39 | Behind the GDP: some remarks on the shadow economy in Mediterranean countries | Quintano, C. & Mazzoci, P. | 10 | 10 | - | 10 | - | - | 10 | - | 10 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 7 | 10 |
| 40 | Tax gap in the global economy | Raczkowski, K. & Mróz, B. | 10 | 10 | - | 10 | - | - | 7 | - | 7 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 7 | 10 |
| 41 | Shadow Economy Index for the Baltic Countries 2009–2023 | Sauka, A. & Putnis, T. | 10 | 7 | - | 10 | - | - | 10 | - | 7 | 6 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 7 | 10 |
| 42 | New COVID-related results for estimating the shadow economy | Schneider, F. | 6 | 10 | - | 10 | - | - | 7 | - | 7 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 7 | 7 | 10 |

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| | in the global economy in 2021 and 2022 | | | | | | | | | | | | | | | | | | | | | | |
| 43 | Taxation of the informal economy in the EU | Schneider, F. & Asllani, A., | 6 | 10 | - | 10 | - | - | 7 | - | 7 | 10 | - | 10 | 10 | 8 | 10 | 10 | - | - | - | 7 | 7 | 10 |
| 44 | Energy consumption in assessment of shadow economy | Sedmikova, E., Vasylieva, T., Tiutiunyk, I., & Navickas, N. | 10 | 3 | - | 10 | - | - | 4 | - | 5 | 10 | - | 5 | - | 10 | 10 | 5 | - | - | - | 10 | 5 | 10 |
| 45 | Some new estimates of shadow economy for 80 countries using pooled mean group estimator | Tan, Y, Habibullah, M. S. Kaliappan, S. R., & Radam, A. | 10 | 10 | - | 10 | - | - | 9 | - | 8 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 8 | 10 |
| 46 | Tax reform in Georgia and the size of the shadow economy | Torosyan, K. & Filer, R. K. | 10 | 10 | - | 10 | - | - | 10 | - | 10 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 10 | 10 |
| 47 | Women's economic inactivity and engagement in the informal sector in Georgia | UN Women | 10 | 10 | - | 10 | - | - | 10 | - | 10 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 10 | 10 |
| 48 | An evaluation of the scale of undeclared work in the European Union and its structural determinants | Williams, C. C, Bejakovic, P., Mikulic, D., Franic, J., Kedir, A., & Horidnic, I. A. | 10 | 10 | - | 10 | - | - | 10 | - | 10 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 10 | 10 |
| 49 | Informal Economy Database | World Bank Group | 10 | 10 | - | 10 | - | - | 7 | - | 8 | 10 | - | 10 | 10 | 10 | 10 | 10 | - | - | - | 10 | 8 | 10 |

***Note:*** '-' designates that the question is not relevant to the study | ***Source:*** own processing