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Mihails Hazans

Abstract

This study develops two methods of estimating the proportion of envelope wage receivers and the share of envelope earnings in the wage bill. Both methods are applicable for the whole economy, as well as by sectors and by socio-economic groups, if some combination of survey and administrative earnings data is available. The Mixed Data Method (MDM) estimates envelope wages by comparing survey and administrative data for the same employee. In addition, MDM applies a matching procedure to produce estimates in cases of survey non-response. MDM is suitable for large survey datasets with integrated (or matched) administrative data, as is the case for the national versions of EU-SILC in many countries, including Latvia. According to the MDM estimates based on the Latvian EU-SILC, the average envelope share across all employees (including those declaring all earnings) dropped from 30% in 2007 to 23% in 2011-2012 and 21% in 2015-2016. The envelope share in the wage bill is higher for low-income workers, but the total amount of undeclared earnings is larger among high-income employees.

The Distribution Matching Method (DMM) is less demanding in terms of data but provides only lower-bound estimates. DMM assumes that, for some measure of earnings and some set of intervals, administrative data on distribution of employees by officially declared earnings are available along with representative survey data on distribution of employees by total (declared plus undeclared) earnings. Completely informal employees should be either excluded from the survey or identifiable among respondents. In this case, DMM provides lower bounds for the share of registered employees receiving envelope wages. Moreover, the weighted average of sectoral, regional or age-specific lower bounds usually improves the economy-wide lower bound estimated directly.

Keywords: undeclared work, complete informality, envelope wages

JEL: H26, J46

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European Centre of Expertise (ECE) in the field of labour law, employment and labour market policy

Ad hoc request on
Undeclared work

Latvia



1 Informal economy and undeclared work in Latvia

It is widely accepted by policymakers, foreign investors and scholars that the shadow economy¹ in general and envelope wages in particular is a serious problem for Latvia. However, different methods produce significantly different estimates of the size of Latvia's informal economy and its recent trends; moreover, there is no consensus even on the question of how Latvia compares to its Baltic neighbours, Estonia and Lithuania, in terms of the size of the informal economy and the incidence of envelope wages.

According to the Shadow Economy Index for the Baltic Countries based on surveys of private sector managers (Putniņš and Sauka 2015, 2018), the share of the informal economy in private sector GDP in Latvia was larger than in Estonia and Lithuania during the whole period 2009-2018. The difference decreased from about ten percentage points in 2014 to about five - seven points (still statistically significant) in 2018, when the estimate was 24.2% for Latvia, 18.7% for Lithuania and 16.7% for Estonia.

Various sources confirm the prominent role of envelope wages in Latvia's shadow economy. According to the managers' surveys, envelope wages paid to registered (formal) and unregistered (informal) employees accounted for 57% to 63% of Latvia's shadow economy in 2012-2018 (Putniņš and Sauka 2015-2018). Likewise, employees accounted for 60% of labour input into undeclared work in 2013 (Williams et al 2017). Finally, according to SRS estimates, the share of envelope wages paid to registered employees in total undeclared income of natural persons increased from 66% in 2015 to 72% in 2017 (see Table 1).

Table 1. Undeclared income of natural persons by source. Latvia, 2015-2017, %

	2015	2016	2017
Envelope wages (general tax regime employees)	57	61	61
Envelope wages (microenterprise employees)	9	8	11
Undeclared income from self-employment	9	8	5
Undeclared income of unknown origin (including envelope wages paid to unregistered employees)	25	24	24
Total	100	100	100

Source: Latvia's State Revenue Service data, https://www.vid.gov.lv/sites/default/files/vsaoi_un_iin_plaisa_2018.gada_aprekins_lv.pdf

According to surveys of private sector managers, both the proportion of completely informal employees (in full-time equivalent) in the private sector and the share of unreported earnings among officially registered private sector employees in Latvia are larger than in Lithuania and Estonia (Putniņš and Sauka 2015, 2018). Consequently, also the total proportion of unregistered earnings in the private sector wage bill in Latvia is larger than in its neighbours. This is consistent with Eurobarometer 2013 results (European Commission, 2014; Williams and Padmore 2013, Williams et al 2015), as well as with population surveys conducted in the Baltic countries (as well as Poland, the

¹ Schneider and Buehn (2012) define the informal economy as the sum of "all economic activities and income earned that circumvent government regulation, taxation or observation. More narrowly, the shadow economy includes monetary and non-monetary transactions of legal nature, hence all productive economic activities that would generally be taxable were they reported to the state (tax) authorities."

Czech Republic and Sweden) by the Lithuanian Free Market Institute in 2016 (Schneider and Žukauskas 2016) and 2018 (SSE Riga 2019).

On the other hand, for 2015 and 2017 two other methods - MIMIC and adjusted MIMIC - (Medina and Schneider 2018; Haigner and Schneider 2018, Dybka et al. 2109) suggest that the share of shadow economy in Latvia is smaller than in Estonia and Lithuania. Williams et al (2017) find that in 2013 undeclared work (estimated by the labour input method) accounted for 22.3% of gross value added and 18.3% of labour input in the private sector in Latvia, above Estonia (21.3% and 14.8%, respectively) but well below Lithuania (25.2% and 19.8%).

These apparent contradictions reflect the difficulties of documenting informality with any degree of precision and measuring "envelope wages", but also call for application of alternative methods.

This study applies the *Mixed Data Method* (Hazans et al 2017; Hazans 2017) which combines survey and administrative data integrated in the Latvian national version of EU-SILC 2008-2017. We provide worker level estimates of the incidence of complete and partial informality among employees², as well as estimates of the unreported share of the wage bill. Due to large annual sample size, results are available for different economic activities, regions and demographic groups, as well as for the whole economy and for the private sector.

In addition, we develop a very simple new method (*the Distribution Matching Method* hereafter) which is less demanding in terms of data and provides lower-bound estimates. This method combines official earnings distribution information based on administrative data with comparable survey-based information. The Distribution Matching Method thus is applicable also when micro-level data combining administrative and survey earnings information are not available.

The rest of the paper is organised as follows. Section 2 briefly describes the methods of measuring envelope wages found in the literature and introduces our methods. Sections 3 and 4 present our estimates of complete informality and undeclared earnings, respectively. Section 5 describes the impact of recent measures to reduce undeclared work and envelope wages. Section 6 concludes.

2 Measuring undeclared earnings with EU-SILC data

2.1 Completely and partially informal employees

In Latvia, informal work largely takes the form of under-reported earnings such that payments to workers exceed the wages reported to tax authorities, with the remainder paid informally ("envelope wages"). We refer to such situation as that of *partial informality*. In this case, social security contributions are paid but they do not cover the whole employee income received by the individual. By contrast, *complete informality* refers to the situation of individuals who receive their entire employee income in the form of envelope wages; in this case, no social insurance contributions are paid although the individual reports positive employee income. Section 2.4 below describes the procedure of identification of informal employees in the Latvian EU-SILC data.

² This study leaves aside other types of undeclared work, such as informal self-employment, family work, as well as do-it-yourself activities.

2.2 Methodological approaches to estimating envelope earnings

The literature suggests several approaches to estimating envelope earnings. A number of studies (Merrikull and Staehr 2010, Williams and Padmore 2013, Williams and Horodnic 2015, Williams, Horodnic and Windebank 2015 among others) rely on *direct survey method*, i.e. use of surveys asking respondents directly about the size of *their* undeclared earnings. Putnins and Sauka (2015-2018) use instead *surveys of private sector managers*; this is an *indirect survey method* because the managers are asked not about their enterprises but about “companies in your industry”. Another variation of the *indirect survey method* is a general population survey where respondents are asked whether they know someone who has worked without an employment contract or has received envelope wages within the past 12 months (Schneider and Žukauskas 2016; SSE Riga 2019). The *Labour Input Method* (Williams et al 2017) estimates undeclared work by comparing reported labour supply (from the Labour Force Survey data) and labour demand (from statistical and/or administrative data on private sector enterprises). Finally, *SRS worker-level estimates* of wage gaps (SRS of Latvia 2018-2019) are based on full-coverage job-level data on declared earnings and hours worked. For each job, the data are compared with benchmarks based on detailed occupation and region. An hourly wage rate below 70% of the average for occupation and region, as well as number of hours worked significantly below the national average for the occupation, signal envelope wages. Results are presented by two-digit, as well as four-digit industry NACE codes, by occupations, age groups, regions, etc. However, **the SRS method does not cover unregistered jobs (even those performed by employees having some registered job)**.

This study follows the *Mixed Data Method*, or MDM, developed in Hazans et al (2017) and Hazans (2017)³. MDM estimates envelope wages by comparing survey and administrative earnings data for the same employee. We use the national versions of EU-SILC data, which integrate administrative data. In addition, MDM applies a matching procedure to produce estimates in cases of survey non-response (see details in Section 2.5 below).

Table 2 below compares various estimates of the share of undeclared earnings in private sector wage bill for the years 2014-2018. SRS estimates suggest a steady decline of the envelope share among registered employees. This is true both under the general tax regime and when microenterprise workers are added, although for the latter group the envelope share increased from 28% in 2016 to 35% in 2017, following an increase in the microenterprise tax rate from 9% to 15%. On the other hand, survey-based estimates by Putnins and Sauka (2015-2018) feature an increase in the envelope share in 2017 and 2018, both among registered employees and (even stronger) among all employees.

For 2014-2016, estimates by Putnins and Sauka are significantly lower than those by SRS when only registered employees are considered, but for 2017, the two estimates are very close (at about 21%). After accounting for informal employees, estimates by Putnins and Sauka (falling from 28% in 2014 to 24% in 2016 but bouncing back to 29% in 2018) are, expectedly, higher than SRS estimates, which disregard informal employees. For 2014-2016, our estimates (which account for informal employees) are well in line with those by Putnins and Sauka: the difference declines from 2.5 points in 2014 to 1.1 points in 2015 and 0.5 points in 2016.

³ See also Barrios et al (2017).

Table 2. Share of undeclared earnings in private sector wage bill. Latvia, 2014-2018, various estimates

	Registered employees			All employees		
	SRS estimates			Managers' surveys (Putnins & Sauka)	This study	
	General tax regime	Microenterpr. tax regime	Total	Total	Total	Total
2014	23.7	30.9	24.5	20.3	28.0	25.5
2015	22.7	31.2	23.6	17.9	25.8	24.7
2016	21.6	28.2	22.3	18.1	24.3	24.8
2017	19.9	35.6	21.4	20.9	26.8	NA
2018	19.3	NA	NA	21.5	29.0	NA

Sources: SRS (2018-2019); Putnins and Sauka (2015-2018); national EU-SILC (2014-2017) data; author's calculation.

Finally, we develop a new (simpler and less data-demanding) *Distribution Matching Method*, or DMM, which provides only lower-bound estimates. The idea is as follows. Assume that for some measure of earnings (say, annual average gross monthly earnings in all jobs over months with positive earnings) we know distribution of employees by officially declared earnings $Y_{declared}$, i.e. the shares

$$S_k = \Pr(Y_{declared} \leq C_k | Y_{declared} > 0), k=1, \dots, m \quad (1a)$$

for some set of thresholds $c_1 < \dots < c_m$. Assume further that from some representative survey of employees similar information is available on total (declared plus undeclared) earnings Y_{total} :

$$s_k = \Pr(Y_{total} \leq C_k | Y_{declared} > 0, k=1, \dots, m). \quad (1b)$$

Note that condition $Y_{declared} > 0$ means that informal employees have to be excluded, which is possible if the survey data allow identifying informal employees and estimating their share θ^* (say, 5%). Assume that for some c_k (e.g. the minimum wage), $S_k > s_k$; say, 30% of registered workers with positive earnings officially earn \leq €500 per month, while according to the survey, just 20% of workers, which are not completely informal, earn \leq €500 per month. This means that 30% - 20% = 10% of registered employees with positive earnings officially earn up to €500, but in fact earn more, i.e. receive some undeclared earnings. Hence, 10% is a lower bound for the share of registered employees receiving envelope wages. For some other threshold, the estimated lower bound could be larger. Say, 38% officially earn up to €700, while in the survey just 24% reported total earnings not exceeding €700. The lower bound of interest thus reaches 38% - 24% = 14%. This way, scrolling over all cut points c_k , one finds the maximal lower bound for the share of envelope wage receivers among registered employees:

$$\tau^* = \max \{S_k - s_k | k=1, \dots, m\}. \quad (2)$$

Figure 1 illustrates calculation of τ^* for employees with main job in construction in year 2008. Administrative (State Revenue Service) data on distribution of registered employees by the 2008 annual average gross monthly declared earnings in all jobs (over months with positive earnings) are matched with survey (EU-SILC 2009) data on similar distribution by total earnings. According to Figure 1, at least 18.1% of registered employees in construction received envelope wages in 2008; officially, their average gross monthly earnings were \leq €500, while in fact they earned above €500. **Importantly, for more than a half of these 18.1% (or 11.2% of all registered employees in construction) declared earnings did not exceed the minimum wage (Figure 1).**

Figure 1. **Example of stage 1 of the Distribution Matching Method.**
Derivation of lower bound estimates for the share of envelope wage receivers among registered employees



Note: For $X > €1500$, the distribution curve for total earnings is above the curve for declared earnings. Sources: EU-SILC - National EU-SILC microdata; SRS - Statistics Latvia data; own calculation.

The above procedure is more efficient for homogeneous in some sense categories of employees than at the aggregate level. Hence, we recommend estimating the lower bounds τ^* for each category of workers (economic activity/sector of main job, region, age group, etc.) for which distribution by declared earnings is available. Weighted average of sectoral lower bounds τ^* gives an estimate of the lower bound τ^*_{total} for the share of envelope wage receivers among registered employees for the whole economy. Likewise, weighted averages of regional or age-specific lower bounds τ^* provide alternative estimates of τ^*_{total} . The largest of these estimates serves as τ^*_{total} .

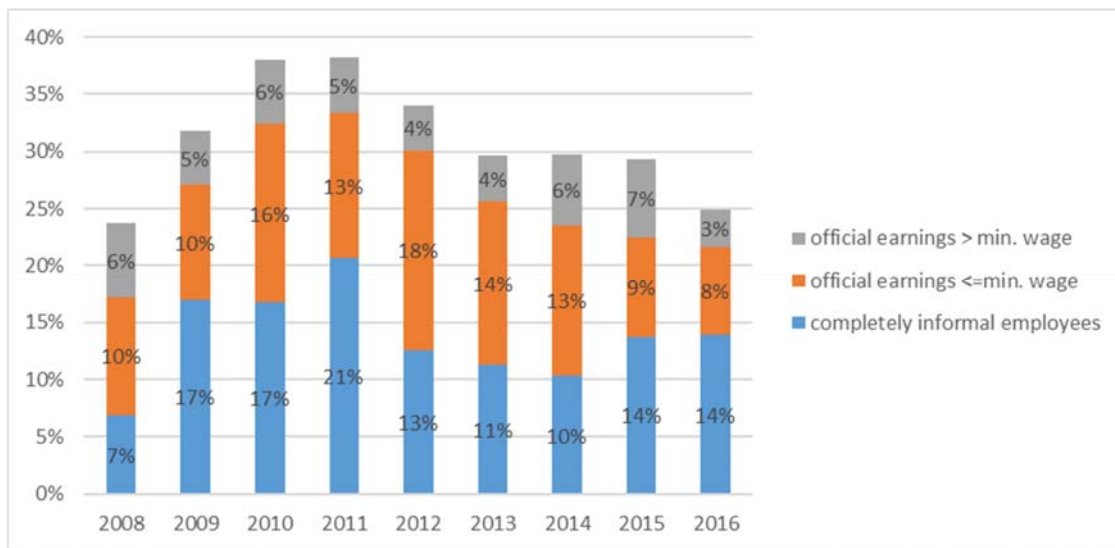
Finally, one combines the lower bound τ^* for the share of envelope wage receivers among registered employees with the estimated share of informal employees (θ^*) to arrive to a lower-bound estimate of the share of envelope receivers among all (formal and informal) employees:

$$\varepsilon^* = \theta^* + \tau^*(1 - \theta^*) \quad (3)$$

In our hypothetical example, assuming $\theta^* = 0.05$ and $\tau^* = 0.14$, one gets: $\varepsilon^* = 0.183 = 18.3\%$.

Figure 2 presents the Distribution Matching Method lower bounds ε^* of the share of envelope wage receivers among workers with main job in construction for years 2008-2016.

Figure 2. **Distribution Matching Method lower-bound estimates of the annual average share of envelope receivers among employees with positive earnings and main job in construction, 2008-2016**



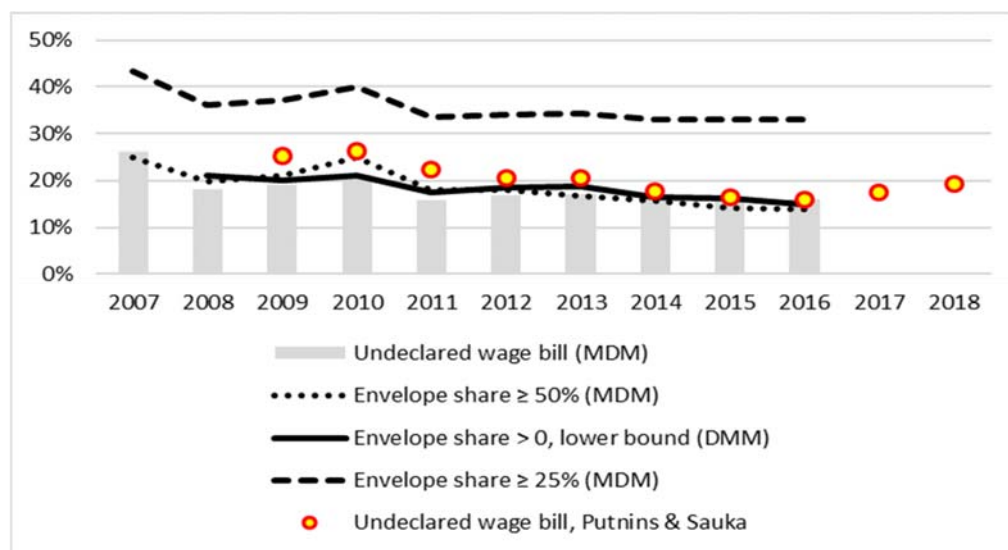
Sources: National EU-SILC 2009-2017 microdata; Statistics Latvia data on distribution of declared earnings; own calculation

Figure 3 compares, for the whole economy, the Mixed Data Method estimates of undeclared earnings with the Distribution Matching Method lower-bound estimates and with Putniņš and Sauka (2015-2019) estimates⁴ obtained via surveys of managers. Two findings appear from Figure 3. First, for the whole economy our Mixed Data Method results are well in line with those by Putniņš and Sauka⁵. Second, the DMM lower-bound estimates of the share of envelope wage receivers are remarkably close to the MDM estimates of the share of employees which undeclare at least 50% of their earnings (but well below the share of those undeclaring at least 25% of earnings). This suggests that the DMM lower-bound estimates can serve as valuable and not too demanding in terms of data diagnostic tool, especially at the sectoral or regional level,

⁴ Results by Putniņš and Sauka refer to the private sector only. We convert their estimates to estimates for the whole economy using the shares of private sector in the whole economy in terms of wage bill and in terms of number of employees.

⁵ Compared to the method by Putniņš and Sauka, our method provides much more possibilities to obtain disaggregated estimates.

Figure 3. **Alternative estimates of undeclared earnings in the whole economy, 2007-2018**



Sources: National EU-SILC 2009-2017 microdata; Statistics Latvia data on distribution of declared earnings; Putniņš and Sauka 2015-2019; own calculation.

2.3 Earnings information in the Latvian EU-SILC data

In order to quantify the incidence of complete and partial informality we combine data from surveys and administrative sources. Here we focus on employees leaving aside informal self-employment. Our main data source is the national version of the European Union Statistics on Income and Living Conditions (EU-SILC) for 2008-2017. This provides estimates of actual annual gross and net earnings in 2007-2016, thus covering pre-crisis, crisis and post-crisis periods. Table A1.1 outlines the process of obtaining these estimates, disregarding less important details or relatively rare deviations from the "mainstream" procedures. Note that we focus on cash (or near-cash) employee income, ignoring in-kind income and employee benefits (health insurance, company car, etc.).

In Latvia, earnings recorded in EU-SILC come from two sources: survey and administrative data. The State Revenue Service (SRS) provides most of the administrative data; in some cases, these are combined with the State Social Insurance Agency (SSIA) data. If respondent's earnings (from all jobs) according to SRS records ($E2$) exceed those reported in the survey ($E1$), EU-SILC records SRS-based earnings. This is the case also when $E2$ is between $0.95E1$ and $E1$ (allowing for respondent's error within 5%), as well as in the case of non-response; otherwise survey-based earnings $E1$ are kept. If a respondent reports having some earnings but both $E1$ and $E2$ are missing, statistical imputation is used. Note that SRS data would be missing if during the income reference period the respondent was an informal employee or worked only abroad or for employers which are not taxpayers in Latvia.

2.4 Identification of informal employees

Completely informal employees (referred to simply as *informal employees* hereafter) now can be identified in EU-SILC as employees with positive earnings for whom no mandatory social security contributions (MSSC hereafter) have been paid by employers during the income reference period (i.e. the previous calendar year)⁶. Table A1.2

⁶ This approach has been used by Perry et al (2007) and OECD (2016) among others.

specifies this definition in terms of EU-SILC variables and additional data collected by Statistics Latvia.

Below we describe some issues that complicate identification of informal employees. To address these issues we have used details of data collection process and additional survey and administrative data added to EU-SILC datasets on our request⁷.

First, some observations feature zero employer social contribution but positive difference between gross and net earnings, which implies that some payroll taxes have been paid. Obviously, respective employees are not completely informal, at least in the year to which these observations refer⁸.

Second, starting from the year 2012 (income reference period 2011) some employees receive earnings from *microenterprises* which are subject to a special taxation regime: the only tax they pay is the microenterprise tax (9% of turnover⁹). Although part of this tax (65 to 70% in different years) is transferred to social security, the Latvian EU-SILC data for 2011-2015 in most such cases recorded zero employer social security contribution¹⁰. However, these employees are not completely informal because earnings from microenterprises are registered in SRS. Since 2016, employer MSSC recorded in the Latvian EU-SILC data include respective part of the microenterprise tax.

Third, about 2% of EU-SILC respondents with non-negligible earnings in the income reference period report in the survey that some of these earnings were gained abroad. Earnings gained abroad in most cases are not recorded in SRS data, hence respondents who worked only abroad would appear as informal based on zero mandatory social security contributions. We exclude these respondents from the analysis of informality and envelope wages.

2.5 The Mixed Data Method of Estimating Undeclared Earnings

This section describes application of the Mixed Data method developed in Hazans et al (2017) and Hazans (2017) in the context of the Latvian EU-SILC data.

After identifying informal employees, the next steps towards measuring envelope wages are to estimate, for every respondent, annual gross earnings G reported for tax purposes (referred to as *declared earnings* hereafter), as well as undeclared earnings. Tables A1.3 and A1.4 provide technical details.

For informal employees (which are identified as described above) $G = 0$. For other employees, G is available (and received by Statistics Latvia) from administrative data. In cases of survey non-response G is available directly from the data (as variable PY010g, see Table A1.1).

*When both survey-based and declared (administrative) gross earnings (say, G_1 and G) are available, income flags variables available in EU-SILC data allow to identify G_1 and G separately (due to the fact that *Statistics Latvia* treats earnings from administrative data as imputed rather than collected), except for the cases when earnings recorded in EU-SILC equal survey-based earnings. After excluding informal employees, such cases (which account for about one-third of all observations, see Table A1.3) are dealt with as follows:*

⁷ We thank very much Viktors Veretjanovs from Statistics Latvia.

⁸ The apparent contradiction is due to a conflict between two sources of administrative data (SRS and SSIA).

⁹ This rate increased as of taxation year 2017, but our data cover taxation years 2007-2016.

¹⁰ This is the case for all respondents whose only employee income comes from microenterprises in EU-SILC 2012-2013 (i.e. income gained in 2011-2012) and for 99% of such respondents in EU-SILC 2014-2015.

$$\text{Declared gross earnings} = (\text{Employer MSSC})/(\text{Employer MSSC rate}). \quad (4)$$

Employer MSSC are directly available from EU-SILC as (*PY030g* - *PY031g*) (see Table A1.1). In the "general" case, employer MSSC rate in Latvia was 24.09% throughout the 2007-2013 period and 23.59% in 2014-2017. Individuals having reached the retirement age, benefit from reduced employer social contributions rates that vary by year from 19.9% to 20.8% ¹¹.

For employees with earnings from both microenterprises and under the general tax regime, we define total declared gross earnings as follows:

$$\text{Declared gross earnings of microenterprise employees} = ME/ME_{sh} = (\text{Earnings in microenterprises})/(\text{Share of these earnings in total declared earnings}),$$

where *ME* and *ME_{sh}* are SRS-based additional variables provided by Statistics Latvia.

Finally, for employees which are neither informal nor microenterprise workers but feature zero employer MSSC due to data imperfections, declared gross earnings are derived from the difference between gross and net earnings (see Table A1.4 for details).

In estimating *undeclared* (a.k.a. *envelope*) *earnings* we again distinguish several cases (which are numbered from [1] to [6] in Table A1.3). In case [1], EU-SILC variable *PY010g* estimates total gross earnings, and declared gross earnings *G* are also available (as described above). The difference between the two, when positive (which is almost always the case), is our estimate of undeclared earnings *B*, otherwise estimated to be zero. The share of undeclared earnings β is calculated as B/G . Cases [2] and [4] refer to informal employees, when $B = PY010g$, and $\beta = 1$. Cases [1], [2] and [4] together cover about 40% of observations. Case [5], when self-reported earnings are below the declared ones (by about 18% on average) also covers about 40% of observations. In this case *B* (therefore, also β) is assumed to be zero (hence our estimates of undeclared earnings should be seen as lower bounds). In case [6] (less than 5% of observations), self-reported earnings *G1* slightly (within 5%) exceed the declared ones *G*. *Statistics Latvia* ignores this difference and reports in such cases the SRS data, but for our purposes it makes sense to assume that the difference is due to undeclared earnings, so we estimate $B = G1 - G$ and $\beta = B/G1$.

The remaining case [3] corresponds to *survey non-response* (between 15% and 20% of respondents depending on the year), when only declared gross earnings $G = PY010g$ are available. There is no reason to assume that respondents, which have not answered the survey question on earnings, do not receive envelope wages. On the other hand, excluding this (rather sizable) group could result in selection bias. We use imputation procedure to estimate the share of undeclared earnings β (given our estimates for cases [1], [2], [4], [5] and [6]). A proxy equal to the average share of undeclared earnings in the same year across employees with respondent's education level, gender and sector of economic activity (21 sector) has been imputed in most cases; when the economic sector is unknown, ethnicity and citizenship (3 categories) have been taken into account as well.

We have also used the rotating annual panel structure of the data: instead of the above-mentioned proxy, we impute, when available, the average of the shares of undeclared earnings in the previous and in the next year for the same respondent. When only one of these respondent-specific values is available, we impute the average of this values and the above-mentioned proxy.

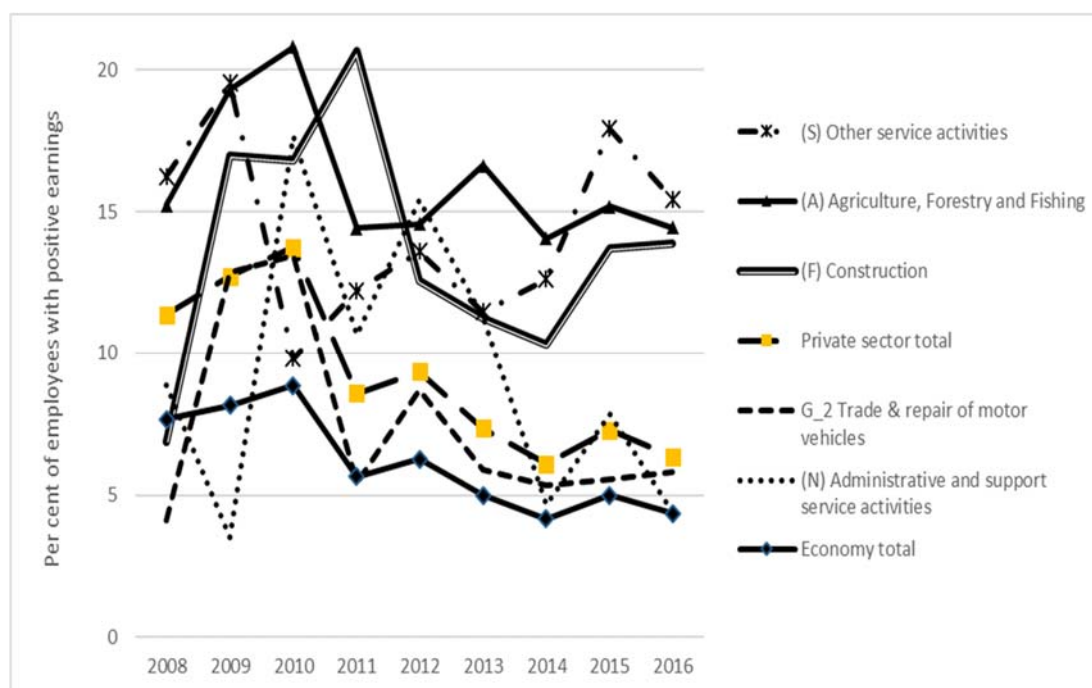
Table A1.5 summarizes various indicators of undeclared earnings used in the analysis.

¹¹ There are several other groups with employer MSSC rate different from the general case, but these groups are relatively small; moreover, the standard EU-SILC data do not allow identifying respondents belonging to these groups.

3 Estimates of complete informality

According to estimates based on EU-SILC microdata, the proportion of fully informal employees and the average (across workers) envelope share in earnings dropped with introduction of the microenterprise regime in 2011. **Since then, the incidence of complete informality in the whole economy featured a decreasing trend until 2014 but stabilized in 2015-2016, while developments in different sectors were more diverse** (Figure 4). However, in such sectors as Other service activities, Agriculture, Forestry, Construction, Trade and repair of motor vehicles and Administrative and support service activities informality levels remained above average during the period 2008-2016 (with a couple of exceptions in 2008-2009).

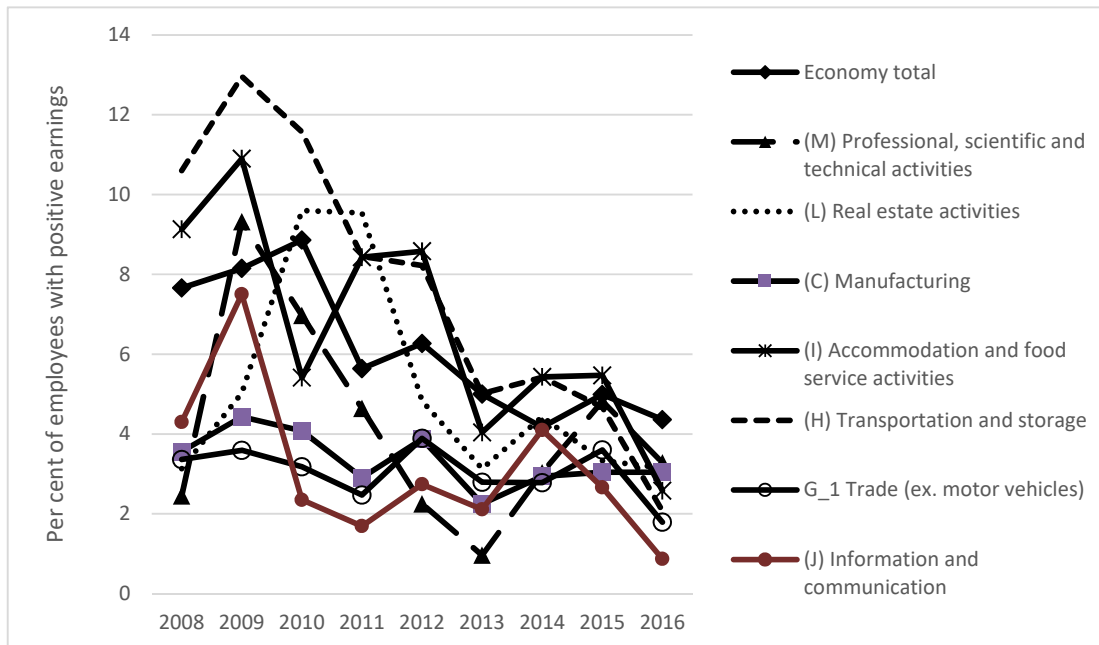
Figure 4. *Incidence of complete informality in the whole economy and in the high-informality sectors, 2008-2016*



Note: The sample includes individuals with positive earnings in the respective year.
Sources: Calculation with national EU-SILC (2008-2017) and SRS (2007-2016) data.

Manufacturing, Trade (except motor vehicles), as well as Information and Communication, featured below-average informality level during 2008-2016, but Transportation and Storage, Accommodation and Food Service and Real Estate activities moved from above-average to the economy average or below-average informality (Figure 5).

Figure 5. **Incidence of complete informality in the whole economy and recently low-informality sectors**



Note: The sample includes individuals with positive earnings in respective year.
Sources: Calculation with national EU-SILC (2008-2017) and SRS (2007-2016) data.

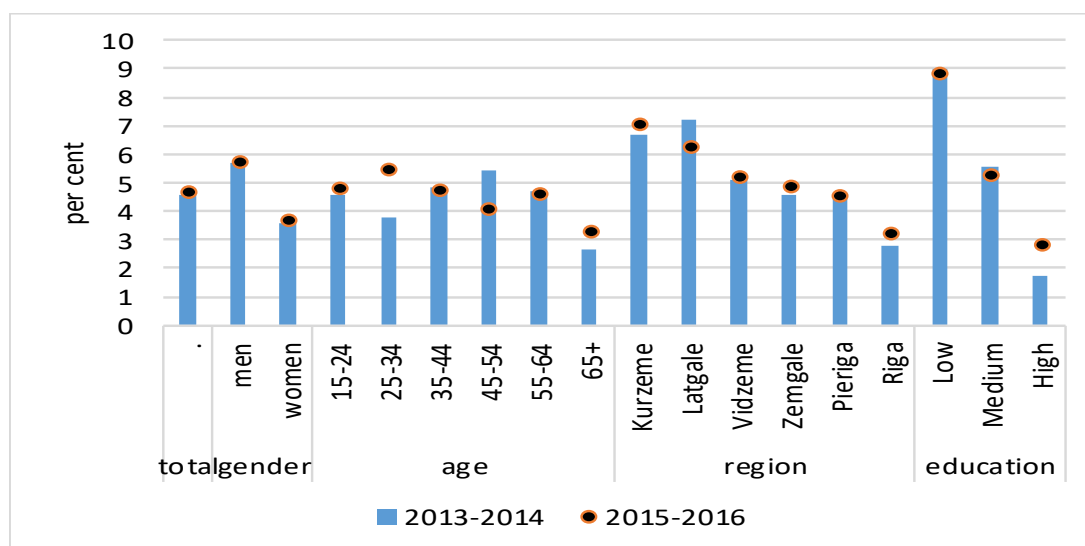
Figure 6 compares the incidence of complete informality in 2013-2014 and 2015-2016 across employees' gender, age, education level and region of residence. **On average, slightly less than 5% of employees are informal in both periods.**

Male employees feature a higher informality level than their female counterparts (5.7% and 3.7%, respectively; the difference is statistically significant). Full informality rate does not vary strongly across working age groups and is lower in retirement age. Among workers aged 25-34 this rate, however, was somewhat higher in 2015-2016 than in 2013-2014, while it was the other way around among workers aged 45-54.

The estimated informality level in Kurzeme (about 7%) and Latgale (6.3% in 2015-2016, down from 7.2% in 2013-2014) is higher than in Zemgale, Pieriga and Vidzeme (about 5%), but, among workers living in Riga, just 3% are informal.

The incidence of full informality is inversely related to educational level, falling from 9% among low-educated workers to 5% among medium-educated to 3% among high-educated (Figure 6).

Figure 6. **Incidence of complete informality (in percent of employees with positive earnings), by worker gender, age, education and residence region, 2013-2014 and 2015-2016**



Note: The sample includes individuals with positive earnings in respective year.
Sources: Calculation with national EU-SILC (2014-2017) and SRS (2013-2016) data.

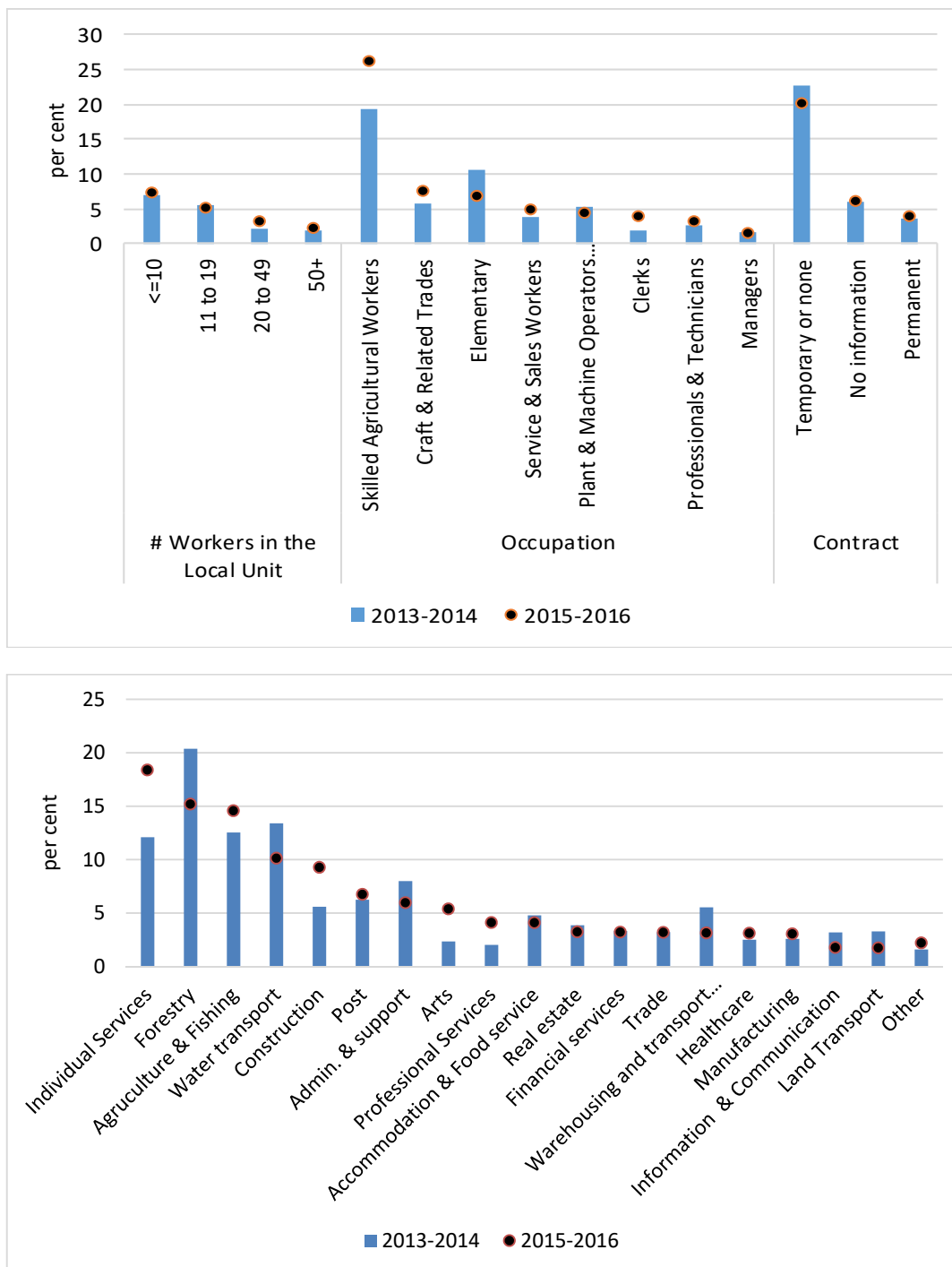
Figure 7 presents the incidence of complete informality in 2013-2014 and 2015-2016 by firm size, worker occupation and contract type (top panel), as well as by sector of economic activity (bottom panel). As expected, **workers with temporary contracts or without contracts feature very high (above 20%) incidence of complete informality**. Level of **informality falls with the size of local unit** from 7% in establishments with up to 10 employees to 2% in units with 50+ workers. Nevertheless, informality is not restricted to only very small enterprises: establishments with 11 to 19 workers also feature above-average levels of informality.

In terms of occupation, the highest incidence of informality is among skilled agricultural workers (26% in 2015-2016, up from 19% in 2013-2014) and other skilled manual workers¹² (7.5% in 2015-2016, up from 5.7% in 2013-2014), as well as elementary occupations (6.9% in 2015-2016, down from 10.5% in 2013-2014).

In 2015-2016, informal employees were especially often found in Personal Services (18%), Forestry, Agriculture and Fishing (about 15%), Water Transport (10%) and Construction (9%), followed by Post services (7%), Administrative and Support activities (6%) and Arts (5.4 %). In other sectors, the proportion of informal workers varies from 4% to less than 2%. **Compared to 2013-2014, the level of complete informality substantially increased in Personal Services, Construction, Arts and Professional Services, while it went down in Forestry, Transportation and Information and Communication.**

¹² ISCO major group 7, including e.g. machinery mechanics and repairers, handicraft workers, electrical and electronic equipment installers and repairers, printing workers, woodworking and food processing workers, building finishers, painters and other skilled building workers.

Figure 7. **Incidence of complete informality (in percent of employees with positive earnings), 2013-2014 and 2015-2016**
 Top: by firm size, worker occupation and contract type
 Bottom: By sector of economic activity



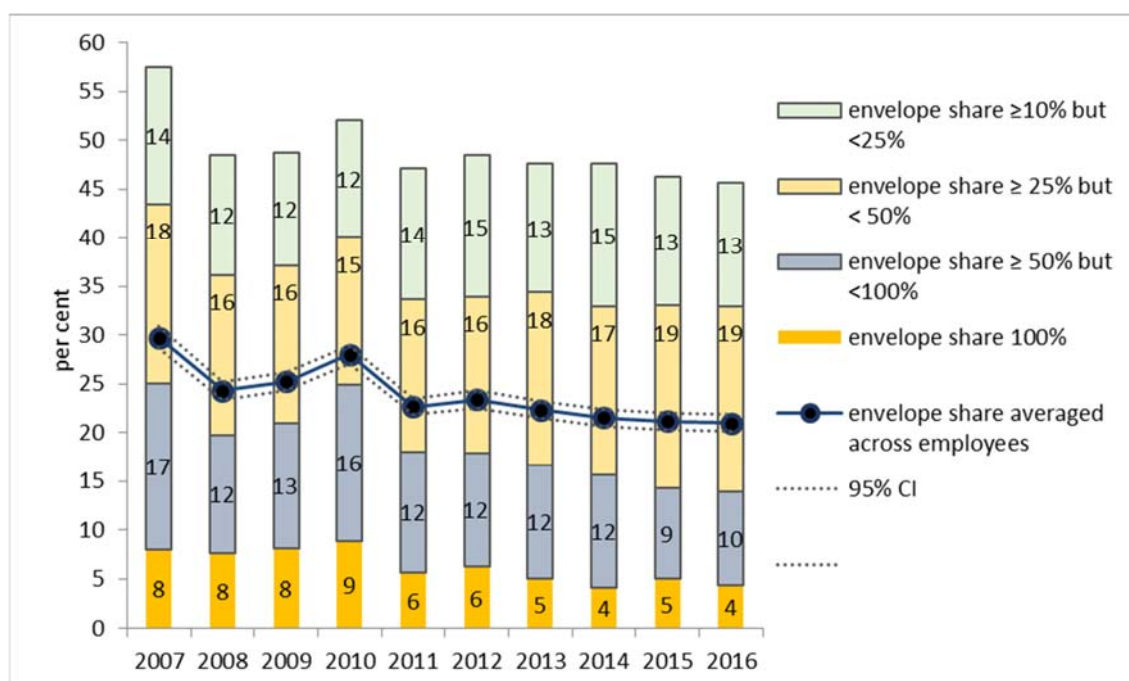
Note: The sample includes individuals with positive earnings in respective year. "Other" includes predominantly public sector activities (Public Administration, Education and Utilities), as well as Mining.
 Sources: Calculation with national EU-SILC (2014-2017) and SRS (2013-2016) data.

4 Estimates of undeclared earnings

4.1 Aggregated estimates

According to estimates based on EU-SILC microdata and the Mixed Data Method, **the average envelope share** across all employees (including those declaring all earnings) **dropped from 30% in 2007 to 23% in 2011-2012 and 21% in 2015-2016** (Figure 8). Likewise, the proportion of employees hiding from taxation at least 50% of their earnings feature a decreasing trend in 2011-2016 (Figure 8).

Figure 8. Incidence of complete informality and envelope earnings (in percent of employees with positive earnings during the year), and average envelope share (in percent of total gross earnings). 2007-2016



*Note: The sample includes individuals with positive earnings in respective year.
Sources: Calculation with national EU-SILC (2008-2017) data.*

According to the most recent estimates, in 2016, 4.4% of all employees with positive earnings were fully informal, and 41.3% were partially informal with envelope share at least 10%. **At least 50% of earnings were received “in envelopes” by 14% of employees in 2016, down from 18% in 2012-2013 and from 25% in 2011** (Figure 8).

Figure 8 thus provides several competing answers to the question “How big is the proportion of employees receiving substantial envelope wages?” The answer depends of course on the meaning of “substantial”. While the 10% threshold is perhaps too low but the 50% is clearly too high, the 25% one seem reasonable. **During 2011-2016, estimated one-third of all employees (and about 30% of registered employees) received at least 25% of their earnings “in envelopes”.** This estimate is somewhat higher than estimated by the SRS share of registered jobs with high risk of envelope wages being close to one-fourth in 2016-2017 (Cirule 2016; SRS of Latvia, 2017-2018). These SRS estimates (see Section 2.2 above for methodology) refer to

jobs with monthly envelope wages above 100 EUR for at least five months during the calendar year.

Our method applied to a similar threshold gives estimates in line with the SRS ones, but slightly higher: in 2015-2016, about 28% of registered employees¹³ and about 30% of all employees during the calendar year received in envelopes > 500 EUR and worked for at least 5 months (Table 3).

Table 3. Share of employees receiving > 500 EUR as envelope wages during the calendar year (and working for at least 5 months). EU-SILC based estimates (2014 – 2016) and SRS estimates (2016 – 2018)

Per cent

	Registered jobs				Registered employees ^b	All employees ^c	
	SRS estimates, by tax regime ^a				EU-SILC based estimates		
	General		Microent.	All	Excl. microent. workers ^d	All ^e	All ^e
	Private sector	Total	Total	Total	Total	Total	Total
2014					29.3	28.8	31.3
2015					28.0	27.4	30.1
2016	39.3	25.0	> 19.0	> 24.4	28.5	27.8	29.7
2017	38.2	24.6	> 52.0	> 27.2	NA	NA	NA
2018	35.0	22.7		NA	NA	NA	NA

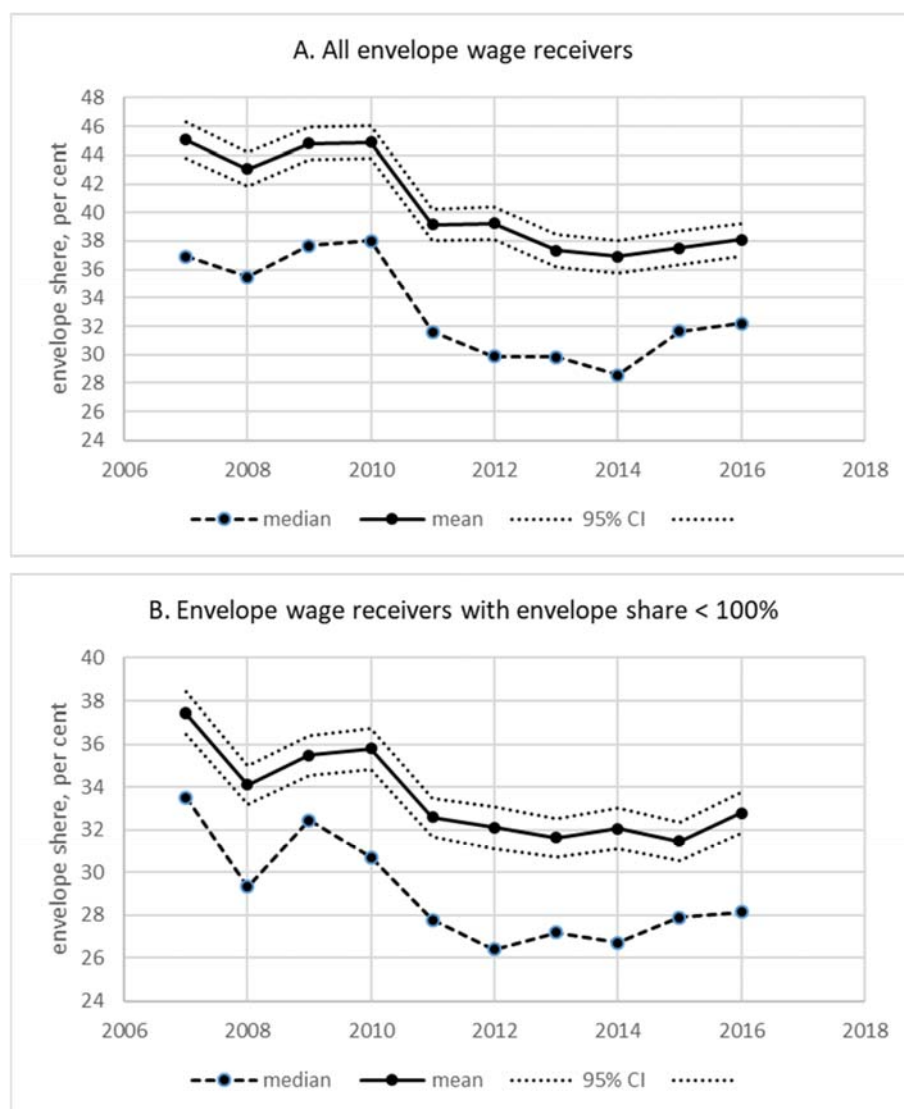
Notes: ^a The SRS estimates refer to monthly envelope wages > 100 EUR for at least five months during the calendar year in a single registered job (for microenterprise jobs – envelope wages > 1200 EUR during the calendar year). The base for the SRS estimates excludes jobs and periods with missing detailed occupation or NACE code. Estimates in bold are provided in SRS (2017-2019a), while other estimates are derived. ^b Registered employees are those receiving some declared earnings during the calendar year; they might have some unregistered (informal) jobs in addition. ^c Including fully informal employees. ^d During the year, the person worked at least five months as employee (not in a microenterprise) and received in total > 500 EUR in envelope in all jobs (some of which might be unregistered). ^e During the year, the person worked at least five months as employee and received in total > 500 EUR in envelope in all jobs (including microenterprise and unregistered). Sources: SRS (2017-2019), national EU-SILC data, author's calculations.

One reason why our estimate is somewhat higher (28.5% vs. 25%) is that **our method accounts for envelope wages received in all jobs** of the given employee, while the **SRS estimates refer to single jobs**. Moreover, the **SRS estimates do not really identify the receivers of envelope wages**, but just indicate "high risk". Consider an employee with declared gross wage at 75% of the average in the occupation-region cell of the job. While not considered a "high risk" case, he/she can easily receive more than 500 EUR in the envelope during a year.

¹³ Here, "registered" employees are those receiving some declared earnings during the calendar year; they might have some unregistered (informal) jobs in addition. The base for the estimate exclude those earning less than 500 EUR during the calendar year. To facilitate comparison with the SRS results, we keep in the base those working as employees for less than 5 months.

Figure 9 presents dynamics of the envelope share in earnings among envelope wage receivers. In 2011-2016, the mean envelope share in earnings of envelope wage receivers varied in a narrow range between 37% and 39% (down from 45% in 2009-2010), while the median envelope share fluctuated between 28% and 32%, down from 38% in 2009-2010 (Figure 9, panel A). Both the mean and the median increased between 2014 and 2016. This suggests that **the decreasing trend in the average envelope share among all employees (see Figure 8) is due to some decline in the proportion of employees receiving a large share (say, at least 50%) of their earnings in envelope.**

Figure 9. *Mean and median envelope share in earnings of envelope wage receivers*



Note: The sample includes envelope wage receivers.

Sources: Calculation with national EU-SILC (2008-2017) and SRS (2007-2016) data

Among envelope wage receivers with envelope share below 100%, the mean envelope share in earnings in 2011-2016 was about one-third, while the median fluctuated between 26% and 28% (Figure 9, panel B).

Table 4 presents percentiles and mean of the absolute size of undeclared monthly earnings among envelope wage receivers (excluding those with envelope share below 10%, as well as those with total annual earnings below one monthly minimum wage).

Table 4. Mean and percentiles of undeclared monthly earnings of envelope wage receivers, 2007-2016.

Full-time equivalent, EUR

year	p25	p50	p75	p90	p95	p99	mean
2007	102	201	360	631	854	1524	294
2008	106	201	356	581	812	1462	289
2009	105	184	312	541	788	1779	272
2010	99	159	274	439	591	1138	236
2011	91	152	278	451	593	1250	227
2012	99	170	285	470	635	1138	236
2013	109	181	304	497	643	1447	254
2014	118	214	381	600	800	1761	307
2015	121	219	400	619	840	2000	321
2016	126	234	412	659	980	2000	357
2016*	126	233	403	630	884	1761	324

Notes: The sample includes employees with total annual earnings of at least one monthly minimum wage and estimated envelope share of at least 10%. When converting annual earnings into full-time equivalent average monthly earnings, a month of part-time work accounts for 1/2 of a full-time month. Workers with unknown number of months worked as employee are excluded. Line 2016* refers to workers with 12 months of full-time work. The sample size varies from 2801 in 2007 to 1782 in 2016. Sources: Calculation with national EU-SILC (2008-2017) and SRS (2007-2016) data.

Mean, median and higher percentiles of undeclared monthly earnings were falling in nominal terms during the crisis and post-crisis years 2008-2011 but increasing thereafter (Table 4). In 2016, the median monthly envelope contained 234 EUR, while the mean was worth 357 EUR (slightly below the minimum wage of 370 EUR). Top 10% of the envelopes were worth at least 659 EUR (more than average declared net monthly wage in the private sector in 2016); top 5% were worth at least 980 EUR, and top 1% - at least 2000 EUR (Table 4). Restricting the sample to employees working full-time for the whole year does not change the median, but top percentiles become somewhat smaller, and the mean falls by almost 10% (Table 4, line 2016*).

The ratio of the average value of the monthly envelope to the national average declared net monthly wage in the private sector decreased from four-fifths to one-half during the crisis and post-crisis years 2008-2011, and remained in the range between 50 and 60 % in 2012-2016 (Table 5). **Among envelope wage receivers working round year full-time**, the ratio in 2016 was at the same level (52%) as in 2011, implying that for this category of workers **undeclared earnings growth between 2011 and 2016 exactly matched growth of declared net earnings in the private sector**.

On the other hand, among all **envelope wage receivers**, the ratio of the average monthly envelope to the average declared net monthly wage increased from 50% in 2011 to 57% in 2016. It follows that **among envelope wage receivers working part-time and/or not full year**, undeclared earnings growth between 2011 and 2016 outpaced growth of declared net earnings in the private sector.

Table 5. Mean undeclared monthly earnings of envelope wage receivers as percentage of the minimum wage and of the average declared net monthly wage in the private sector, 2007-2016

	Per cent			
	% of net average wage		% of minimum wage	
	All workers	Round year full-time workers	All workers	Round year full-time workers
2007	79	80	172	173
2008	63	62	127	124
2009	59	59	106	105
2010	55	55	92	93
2011	50	52	80	83
2012	50	51	83	86
2013	51	52	89	91
2014	56	58	96	99
2015	54	56	89	92
2016	57	52	96	88

Notes: The sample includes employees with total annual earnings of at least one monthly minimum wage and estimated envelope share of at least 10%. Workers with unknown number of months worked as employee are excluded. Sources: Calculation with national EU-SILC (2008-2017) and SRS (2007-2016) data.

Wide dispersion of undeclared earnings across employees (reported in Table 4) is in line with the SRS (2019a: 18) estimates of average undeclared monthly earnings of envelope receivers in selected occupations in 2018 (Table 6).

Table 6. Average undeclared monthly earnings of envelope receivers in selected occupations, 2018

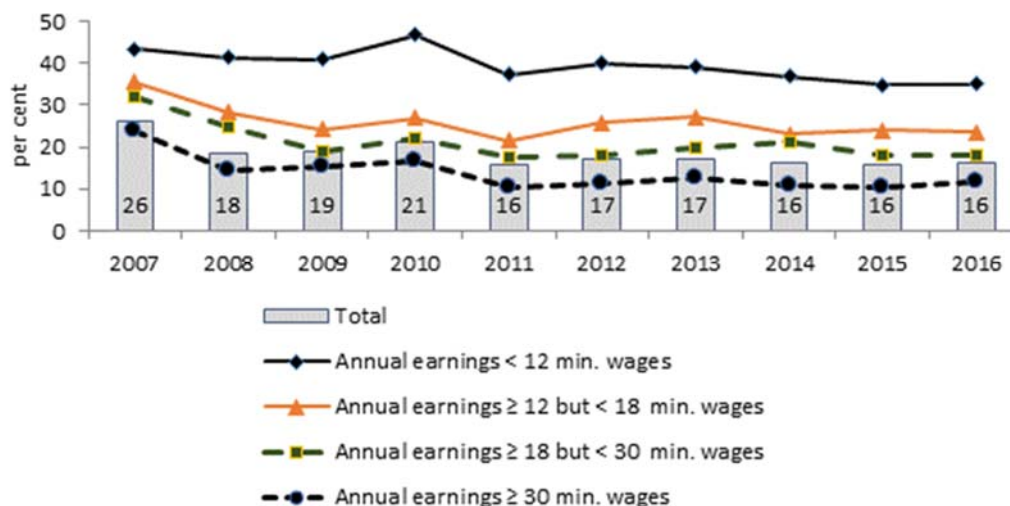
	Average monthly envelope, EUR	Envelope receivers
Programmer	1285	2009
Project supervisor	904	2244
Top manager	778	3501
Chief accountant	703	2210
Senior accountant	551	1385
Accountant	484	2082
Office manager	479	1421
Information processing operator	451	1662
Skilled manufacturing worker	446	1447
Car mechanic	391	1734
Car driver	379	1812
Skilled construction worker	364	2042
Truck driver	351	8150
Cook	332	2970
Security	320	1620
Labourer	261	4903
Shop assistant	259	8649
Cleaner	255	6453

Sources: SRS (2019a)

4.2 Estimates by worker income

The envelope share in the wage bill is higher for low-income workers, but the total amount of undeclared earnings is larger among high-income employees. Figure 10 compares the envelope share in total earnings (in the context of shadow economy a.k.a. wage gap) for four categories of workers which roughly correspond to earnings quartiles¹⁴. The low-income group features annual gross earnings less than 12 minimum monthly wages. Workers with annual earnings between 12 and 18 minimum monthly wages belong to the lower-middle income group, while those earning between 18 and 30 minimum monthly wages per annum constitute the upper-middle income group. Finally, those with annual gross earnings amounting to 30 minimum monthly wages or more are the high-income workers. It appears that the envelope share in the wage bill falls with the level of earnings: since 2008, it was 3 to 4 times higher among low-income workers than among high-income ones.

Figure 10. *Estimated envelope share in the total wage bill, by worker income group. 2007-2016*



Note: The sample includes individuals with positive earnings in respective year.
Sources: Calculation with national EU-SILC (2008-2017) and SRS (2007-2016) data.

From policy perspective, it might be more practical to categorize workers in terms of full-time monthly earnings (rather than annual earnings, which depend not only on monthly earnings but also on the number of months spent in employment). Figure 11 focuses on employees who spent 12 months in full-time work. We split them into quartiles by gross monthly earnings and find, in line with the previous results, that **the envelope share in the wage bill falls with the level of earnings.**

¹⁴ Results for quartiles are similar.

Figure 11. *Estimated envelope share in aggregate earnings, by quartile of gross monthly earnings of full-time employees*

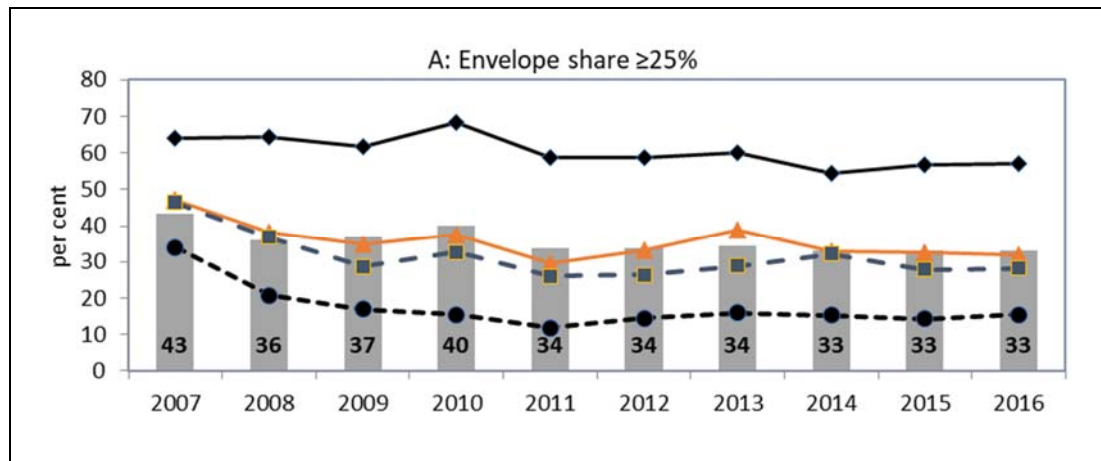


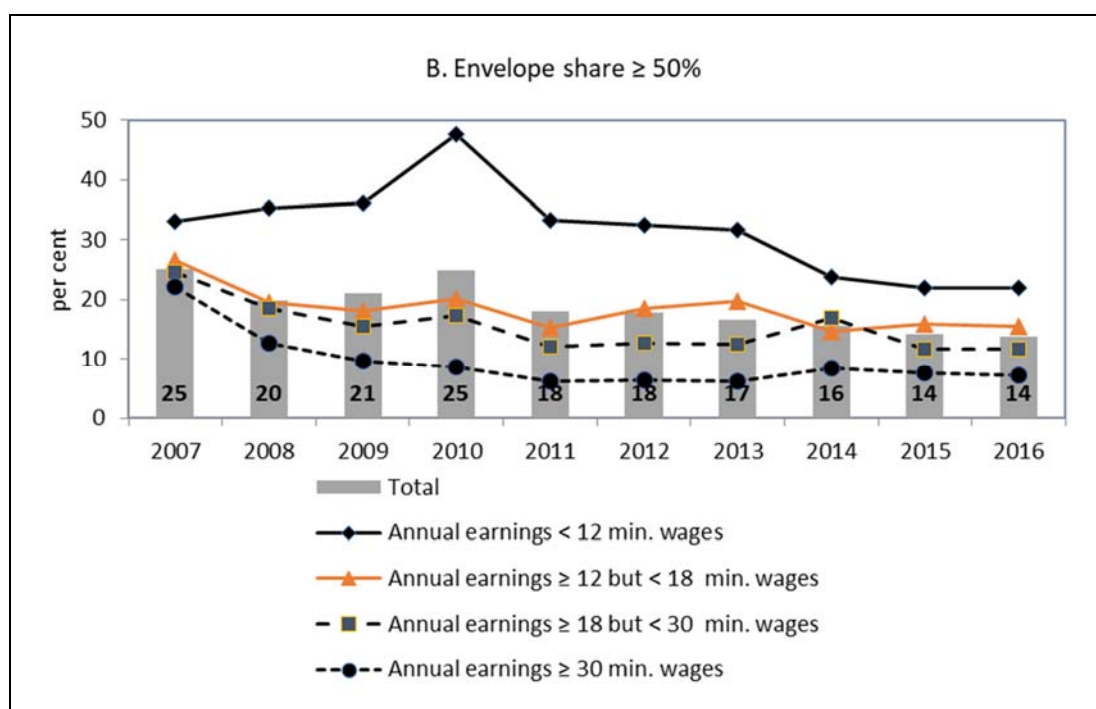
Note: The sample includes individuals with positive earnings in respective year.
Sources: Calculation with national EU-SILC (2008-2017) and SRS (2007-2016) data.

Comparison of estimates presented in Figure 11 with those in Figure 10 suggests that envelope wages are somewhat more widespread among workers who work part-time or employed not a full year.

Figure 12 presents incidence of high envelope shares in general and across the same income groups as used in Figure 10. In line with the previous findings, **high shares of envelope wages are more widespread among low-income workers** than among their high-income counterparts. On the other hand, **the incidence of high shares of envelope wages among lower-middle and upper-middle income workers is almost the same**, in particular starting from 2014.

Figure 12. *Incidence of high envelope shares, by worker annual earnings. 2007-2016*





Note: The sample includes individuals with positive earnings in respective year. Sources: Calculation with national EU-SILC (2008-2017) and SRS (2007-2016) data.

Overall, the proportion of employees with positive earnings who hide at least 25% of their earnings from the tax authorities remained stable at about one-third during 2011-2016, down from about two-fifths during 2007-2010 (Figure 12, Panel A).

By contrast, the share of workers which undeclared at least 50% of their earnings declined from 18% in 2011 to 14% in 2016 (Figure 12, Panel B).

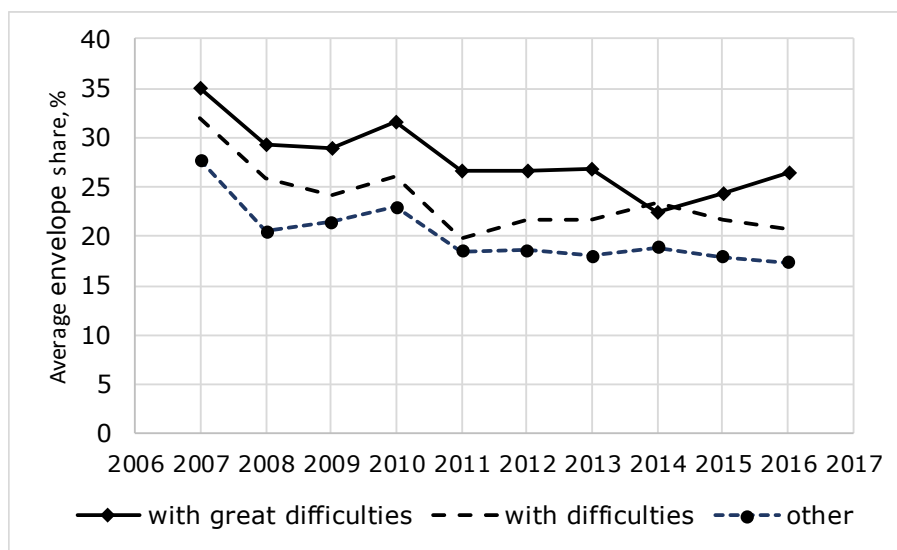
Noteworthy, **the results in Figure 12 for 2016 are broadly in line with the SRS (2018d: 19) estimates of the proportion of employees with high risk of envelope wages¹⁵ by range of declared gross annual earnings in 2017:**

- 24% among workers with declared earnings up to 12 minimum wages;
- 26% among workers with declared earnings above 12 but not more than 38.3 minimum wages (which is slightly above 12 national average declared gross monthly wages);
- 8.4% among workers with earnings above 38.3 minimum wages.

Figure 13 looks at the relationship between worker wealth and undeclared earnings from the household perspective. In most years, the average envelope share among workers whose households face great difficulties to make ends meet is by 7 to 9 percentage points larger than among those whose households make ends meet without substantial difficulties. Moreover, **in 2016-2017 the envelope share was increasing among those facing great difficulties, while among other workers it was falling.**

¹⁵ According to the SRS definition, a worker has high risk of envelope wages if her estimated envelope wage exceeds 100 EUR per month during at least 5 months in the calendar year; the SRS often refers to such workers as to "envelope wage receivers".

Figure 13. *Average envelope share in earnings by earner's household ability to make ends meet, 2007-2016*



Notes: The sample includes employees with total annual earnings of at least one monthly minimum wage. Category "other" refers to households making ends meet with some difficulties, easy or very easy. Figure 13 presents the envelope share averaged across employees rather than the envelope share in aggregate earnings (shown e.g. in Figure 10). Sources: Calculation with national EU-SILC (2008-2017) and SRS (2007-2016) data.

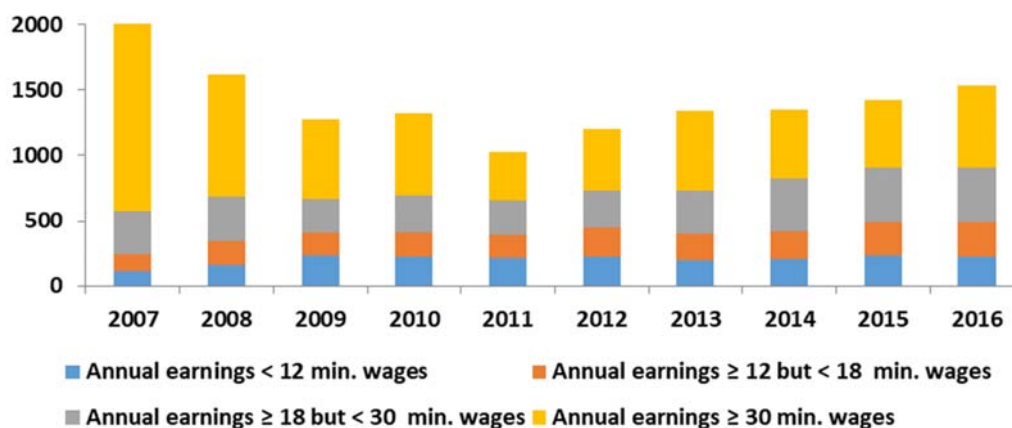
The findings in Figure 13 are in line with the following SRS (2017: 13; 2019a: 21) results:

- **typical envelope wage receiver in 2016 had low or middle income and faced difficulties to make ends meet;**
- **in 2018, asset ownership was significantly less widespread among workers with high risk of envelope wages than among other workers: 14% vs. 22% for land; 17% vs. 29% for apartments; 24% vs. 43% for passenger cars.**

Finally, Figure 14 provides an important complement to the previous findings about negative relationship between worker income and undeclared earnings: **total amount of undeclared earnings (and hence the amount of unpaid taxes) is larger among high-income employees.**

In 2016, estimated total amount of envelope wages was € 1.5 billion, of which 40.8% (€ 628 million) went to those earning at least 30 minimum monthly wages per year, while the share of this group among all employees was just 28.2%. High- and middle-high income workers together (those earning at least 18 minimum monthly wages per year, or 53.8% of all workers) received 68.0% of envelope wages.

Figure 14. *Estimated total envelope earnings, million EUR, by worker income*



Note: The sample includes individuals with positive earnings in respective year.
Sources: Calculation with national EU-SILC (2008-2017) and SRS (2007-2016) data.

4.3 Estimates by sector of economic activity

Table 7 presents the shares of undeclared earnings in 2015-2018 for industries where these shares are high according to the SRS estimates. Our mixed data method estimates for 2015-2016 are presented alongside and, with very few exceptions, are well in line with the SRS estimates. Our method provides significantly lower than SRS estimates for real estate activities, retail trade and computer programming. On the other hand, our estimates are higher (and likely more realistic) for construction of buildings and fishing.

Table 7. Estimated envelope share in aggregate earnings, by sector of economic activity, 2015-2018.

	SRS estimates			EU-SILC based estimates	
	2015	2016	2017	2018	2015-2016
Repair of computers and persona	44.9	45.1	43.7		25.4
Manufacture of leather and relate	45.5	44.3	35.9		28.8
Other personal services	37.3	37.4	35.7		44.2
Travel agencies	34.8	33.3	32.8		17.1
Sports and recreation	35.3	34.8	32.8		24.5
Other professional activities	33.8	33.5	31.4		14.4
Real estate activities	31.3	31.9	30.7	29.3	8.1
Veterinary	33.0	30.0	30.4		30.5
Specialised construction	31.5	30.7	28.7	27.5	20.8
Manufacture of metals	23.9	26.6	27.5		27.5
trade and repair of motor vehicle:	29.7	29.0	27.3	26.3	17.0
Land transport	26.9	27.9	26.0	25.0	20.4
Fishing	27.4	28.9	25.4		45.7
Forestry	25.8	26.3	25.0		20.8
Agriculture	25.5	26.7	25.0	24.3	21.6
Advertising and market research	26.0	25.8	24.7		23.5
Construction of buildings	26.3	26.0	24.0	22.2	36.4
Manufacture of furniture	25.8	25.9	23.8		23.2
Food service activities	25.7	25.4	23.6	21.9	21.2
Retail trade	24.2	23.8	22.4	21.6	13.7
Architectural and engineering act	25.2	23.6	22.1		19.2
Security and investigation	22.8	21.9	21.8		17.5
Acommodation	22.4	22.2	20.5		22.9
Manufacture of metal products	22.1	21.6	20.0		12.9
Employment activities	21.8	21.7	19.5		14.0
Manufacture of wood & wood prc	21.2	20.8	19.1	18.5	11.7
Waste collection	18.6	18.2	17.3		17.7
Computer programming	17.8	17.7	17.1	16.3	6.4
Civil engineering	15.0	15.8	13.3		12.8

Notes. For 2018, only selected estimates by the SRS were available.

Sources: SRS of Latvia (2018c, 2019a); Calculation with national EU-SILC (2008-2017) and SRS (2007-2016) data.

5 Impact of recent measures to reduce undeclared work and envelope wages¹⁶

According to the SRS estimates (see Table 2 above), the share of envelope wages in the private sector wage bill was slowly but steadily declining during 2015-2018 (SRS of Latvia 2019)¹⁷. Moreover, this was the case also in each of the sectors with high envelope shares: retail trade; wholesale trade; road transport (except for 2016); construction; trade and repair of motor vehicles; food services; agriculture; real estate activities (except for 2016); manufacturing of wood products (SRS of Latvia 2018c, 2019). In March 2019, the Ministry of Finance (2019) reported that, in comparison with 2017, SSC payments collected in 2018 more than doubled in taxi industry, while in construction, food service activities, security activities and trade of motor vehicles the increase in SSC payments was, respectively, 24.5%, 22.8%, 18.2% and 13.9% (TVNET/LETA 2019).

This section discusses to what extent recently implemented or planned measures to reduce undeclared work and envelope wages have contributed to these developments.

In 2016, The Latvian government together with its social and cooperation partners have approved the **shadow economy combating working plan**¹⁸ for 2016-2020 (Ministry of Finance 2016; SRS of Latvia 2016). Since then, the Shadow Economy Combating Council gathered in follow-up meetings twice a year to monitor implementation of the plan and produce its updated versions indicated the status of each task.

On the other hand, since 2017, the **Latvian SRS implements tax administration reform oriented on increased compliance**. The reform focuses on tax administration's more cooperative approach at sectoral and individual level, preventive action and "Consult first" principle. During 2018, in the framework of this reform, a joint EC – World Bank project¹⁹ "Supporting the Implementation of the Mid-Term Tax Strategy of the Government of Latvia" has brought to Latvia current and former experienced top-level tax administration professionals from the US, Australia, Germany, OECD and the World Bank who shared the best practices with the Latvian SRS staff. The project also provided a number of other **measures to strengthen analytical capacity of the Latvian SRS**, including training workshops and methodological support.

According to the SRS management, preventive action and a more cooperative approach have contributed substantially to the observed reduction in the envelope share²⁰. Opinions of some (though not all) members of Foreign Investors Council in Latvia in interviews conducted in September-November 2018 indirectly support this view with regard to more cooperative approach(quotes from Sauka (2019: p. 40):

¹⁶ This section draws substantially on interviews with Director General of the SRS Ieva Jaunzeme and Head of the Tax Administration Risk Management Division at the SRS Natālija Filipoviča conducted in July 2019. I thank Mrs Ieva Jaunzeme and Mrs Natālija Filipoviča for information, opinions and useful discussions.

¹⁷Alternative estimates by Putnins and Sauka (2019; see also Table 2 above) suggest, by contrast, an increase in the envelope share during 2017-2018. Given that SRS estimates rely on full coverage administrative data and simple methodology (not changing over time), while estimates by Putnins and Sauka reflect just opinions of a sample of managers, the SRS estimates are more likely to capture the trend correctly.

¹⁸ The plan is often referred to as "EEIP", which is abbreviation of its title in Latvian.

¹⁹ EC Contract No SRSS/S2018/044

²⁰ According to surveys of business managers, their average satisfaction (on a 5-point scale) with SRS performance increased from 3.2 in 2015 to about 3.4 in 2017-2018 (Putnins and Sauka 2019), obviously leaving a lot of room for further improvement in many respects, including cooperative approach. The current level is lower than that found in Estonia and Lithuania (3.5 to 3.6).

- “SRS has also tried to change their approach and attitude towards their customers which is a positive thing”;
- “...the SRS [...] is doing better and performing better, their staff are more responsive”;
- “(SRS) is moving in the right direction. It’s a smart move, to come up with campaigns of checking certain sectors [...] and letting them know that they will be double-checked ...” ().

However, according to the SRS management, **the specific measure effective in reducing envelope payments, was sending (via electronic declaration system) warning letters to the firms identified (by the risk management system) as the ones with high risk to pay envelope wages.** This measure is in place since 2015. About half of the firms receiving such letters responded by raising (not dramatically though) the official salaries and cutting envelope payments. The SRS followed up by selectively auditing the firms, which did not react. The threat of audit (and likely punishment) appeared to be an effective tool.

Other (more “aggressive”) **economy-wide measures aimed to reduce undeclared work and envelope wages** (see Table 8 for a summary) **were less successful.**

The most controversial measure was the **plan to link access to public healthcare to individual’s payment of social contributions – an idea clearly at odds with the principle of universal health coverage supported by the UN as a part of the Sustainable Development Goals** (WHO 2019). This reform, initiated by Mrs. Circene (health minister in 2011-2014) and supported by Mrs Čakša (health minister in 2016-2017), was approved by the parliament (as amendments to the Healthcare Financing Law, to be enforced since 2019) in December 2017, despite wide opposition from the medical community.

However, after parliamentary election in October 2018, the ruling coalition has changed, and two of the coalition parties, including the one in charge of the Ministry of Health, were against this reform. The questionable reform was postponed, and the new minister of Health, Mrs Vinķele, submitted to the government a proposal to reverse it. The Cabinet and then the Parliament (Saeima) supported this proposal in May and June, respectively (Ministry of Health 2019; Likumi.lv 2019). The current version of the Healthcare Financing Law envisages introduction of universal state mandatory health insurance.

According to the SRS management, there was **no evidence in 2018 that expectations of limited access to public health care would have caused many workers to come out from complete informality or from declaring monthly wages below minimum wage.**

Another short-living anti-envelope measure was more reasonable as such: it **denied access to public procurement to firms paying average wages below 70% of industry average.** The rationale for this measure was that such firms, very likely, pay envelope wages, which enables them to offer lower contract prices than honest taxpayers. It has been in force for a short period but overruled by the Constitutional Court. The argument against the policy was that, at the level of individual firm, the SRS might make a mistake in defining the relevant narrow industry and, therefore, the threshold wage level.

Yet **another somewhat unlucky measure was disclosure of employers with high risk of envelope wages.** Necessary amendments to the Law on Taxes and Duties are in force since July 2017, but, due to opposition from the business community, the measure still waits full implementation. SRS has developed taxpayers’ rating based on 12 indicators reflecting the following five domains: registration risks; tax debt; timeliness of submitting declarations; wage comparison with industry average; liquidity. However, currently the participation is voluntary, and the rating is not publicly available, although the firm can share its rating with partners if it wants. SRS plans to include the envelope wage risk in the rating in 2019. (Kirsons 2018).

Table 8. Economy-wide policy measures to reduce undeclared work and envelope wages in Latvia planned or implemented in 2016-2018

<i>Measure</i>	<i>Target sectors</i>	<i>Status</i>	<i>Impact</i>
Strengthening analytical capacity of the Latvian SRS	All	Ongoing	Substantial
More cooperative approach at sectoral and individual level; consulting or warning before punishing	All	Ongoing	Substantial
Linking access to public healthcare to payment of social contributions	All	Cancelled before start	Likely small
Denying access to public procurement to firms paying average wages below 70% of industry average	All	Overruled by the Constitutional Court	NA
Disclosure of employers with high risk of envelope wages (e.g. paying minimum wage or below)	All	Not yet implemented; moving in this direction, but facing strong resistance	NA
Including indicator of envelope wage risk into publicly available firm rating	All		NA

Sources: Ministry of Finance (2016); SRS of Latvia (2016); Ministry of Finance (2019); Ministry of Health (2019); Likumi.lv (2019); Author's interviews with Director General of the SRS Ieva Jaunzeme and Head of the Tax Administration Risk Management Division at the SRS Natālija Filipoviča conducted in July 2019.

Sector-specific measures against envelope wages implemented by SRS seem to have larger impact than economy-wide ones. Table 9 lists these measures (which often combine technological solutions with administrative action) along with their impact as reported by the SRS management.

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Table 9. Sector-specific policy measures to reduce undeclared work and envelope wages in Latvia planned or implemented in 2016-2018

<i>Measure</i>	<i>Target sectors</i>	<i>Status</i>	<i>Impact</i>
Mandatory electronic registration system for all workers present at the construction site (EDLUS)	Construction	Partially introduced in 2019	Big
Introducing binding general agreement about minimum monthly pay (above the official minimum wage)	Construction	On the way	Big (expected)
Extending tax responsibilities of the main contractor to workers employed by under-contractors	Construction	Cancelled	Potentially very big
Strengthening requirement to cash registers	Trade and services	Implemented by 82%	Big
Mandatory advanced SSC payments 130 EUR monthly for every car used as a taxi	Taxi industry	Implemented	Big
Mandatory advanced SSC payments 130 EUR monthly for every car used for providing passenger transportation services	Passenger road transport	On the way	Big (expected)
Electronic data submission to the SRS by Uber-like platforms	Taxi industry	On the way	Big (expected)
Electronic working time control	Security	Under discussion	Big (expected)
Announced targeted sector-specific checks	Taxi industry, Repair of motor vehicles, Food services	Implemented	Big
Automatic data exchange between healthcare and SRS information systems to identify payments for healthcare services received from natural persons	a/Healthcare; b/ All (easier to claim PIT rebates)	On the way	?

Sources: Ministry of Finance (2016); SRS of Latvia (2016); Ministry of Finance (2019); Author's interviews with Director General of the SRS Ieva Jaunzeme and Head of the Tax Administration Risk Management Division at the SRS Natālija Filipoviča conducted in July 2019.

Among recent general policy measures likely having indirect impact on envelope wages, the most important one is **gradual increase in minimum wage** from 320 EUR in 2014

to 430 EUR in 2018. For many receivers of envelope wage, official payment is at or near minimum wage. One possible scenario is that minimum wage increase forces employers to raise official payments at the expense of envelope wages, so that the envelope share falls.

However, another likely scenario is that both official and envelope pay increase more or less proportionally; this is consistent with the fact that official average wage in the private sector was growing in line with the minimum wage (both by 34% between 2014 and 2018). Yet another scenario assumes that to offset increase in labour cost, employers increase envelope shares for [some] workers earning more than minimum wage; this is consistent with the finding that for the workers with average monthly earnings between 100% and 150% of the minimum wage the envelope share was higher in 2015-2016 than in 2014 (Figure 10). To conclude, **the effect of minimum wage increases on the envelope share in earnings is ambiguous.**

6 Conclusion

This study is devoted to undeclared earnings of employees in Latvia.

We use the national version of EU-SILC data (amended with some additional indicators from administrative data) for 2008-2017 (income years 2007-2016), and develop two methods of estimating the proportion of envelope wage receivers and the share of envelope earnings in the wage bill. The methods are applicable for the whole economy, as well as by sector of economic activity and across socio-economic groups. Our results complement those obtained by other methods (managers' survey by Puntins and Sauka for 2009-2018 and the SRS tax gap method for 2014-2018) and are largely in line with them when comparison is possible.

We show that completely informal worker are more often found in Kurzeme and Latgale than elsewhere in Latvia.

The incidence of full informality is inversely related to educational level. In terms of occupation, the highest incidence of informality is among skilled agricultural workers and other skilled manual workers, as well as elementary occupations. Recently, informal employees were especially often found in personal services, forestry, agriculture and fishing and construction.

During 2011-2016, estimated one-third of all employees (and about 30% of registered employees) received at least 25% of their earnings "in envelopes". While not perfectly comparable, these estimates are in line with (but slightly higher than) the SRS ones.

The average envelope share across all employees (including those declaring all earnings) dropped from 30% in 2007 to 23% in 2011-2012 and 21% in 2015-2016

The decline is due to some decline in the proportion of employees receiving a large share (say, at least 50%) of their earnings in envelope.

The ratio of the average value of the monthly envelope to the national average declared net monthly wage in the private sector decreased from four-fifths to one-half during the crisis and post-crisis years 2008-2011, and remained in the range between 50 and 60 % in 2012-2016. This points out to strong persistency of the envelope wages in Latvia. Among envelope wage receivers working round year full-time, undeclared earnings growth between 2011 and 2016 exactly matched growth of declared net earnings in the private sector. On the other hand, among envelope wage receivers working part-time and/or not full year, undeclared earnings growth between 2011 and 2016 outpaced growth of declared net earnings in the private sector.

The envelope share in the wage bill is higher for low-income workers, but the total amount of undeclared earnings is larger among high-income employees. The incidence of high shares of envelope wages among lower-middle and upper-middle income workers is almost the same, in particular starting from 2014.

In 2016-2017, the envelope share was increasing among those facing great difficulties to make ends meet, while among other workers it was falling.

Preventive action and a more cooperative approach by the SRS, as well as strengthening its analytical capacity, have contributed substantially to the observed reduction in the envelope share. The specific measure effective in reducing envelope payments, was sending warnings to the firms identified as the ones with high risk to pay envelope wages.

Other (more "aggressive") economy-wide measures aimed to reduce undeclared work and envelope wages were less successful. This includes linking access to public healthcare to payment of social contributions (which was rightly cancelled before being enforced), denying access to public procurement to firms paying average wages below 70% of industry average (Overruled by the Constitutional Court), and Disclosure of employers with high risk of envelope wages (not yet implemented due to strong opposition).

Sector-specific measures against envelope wages (which often combine technological solutions with administrative action) seem to have larger impact than economy-wide ones. This includes strengthening requirement to cash registers; mandatory advanced monthly SSC payments for every car used as a taxi; pre-announced targeted sector-specific checks, etc.

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Appendix 1 Data and Methodology

Table A1.1 Estimation employee earnings (in all jobs) during the last calendar year in the Latvian national EU-SILC data, 2008-2017

Data collection method or EU-SILC variable	Data content and/or calculation formula
Survey item	<i>E1</i> : Net earnings
Administrative (SRS) data	<i>E2</i> : Net earnings
Statistical imputation	<i>E3</i> , only when <i>E1</i> is missing (non-response) and <i>E2</i> is missing as well (no earnings are recorded in SRS database)
<i>SILC, net earnings PY010n</i>	<i>E1</i> if <i>E2</i> is missing; <i>E1</i> if $E2 \leq 0.95E1$; <i>E2</i> if $E2 > 0.95E1$; <i>E2</i> if <i>E1</i> is missing (non-response); <i>E3</i> if both <i>E1</i> and <i>E2</i> are missing
Administrative (SRS) data (2)	MSSC1: Employee MSSC; PIT: personal income tax paid from earnings
<i>SILC, gross earnings PY010g</i>	$PY010n + MSSC1 + PIT$
Survey-based gross earnings <i>G1</i>	$E1 + MSSC1 + PIT$
<i>SILC, PY031g</i> (2007-2012: survey; since 2013: administrative (SRS))	Employer optional SSC
Administrative (SSIA) data	MSSC (employer + employee)
<i>SILC, Employer social security contributions PY030g</i>	Mandatory + optional: $MSSC - MSSC1 + PY031g$

Abbreviations: SRS - State Revenue Service; SSIA - State Social Insurance Agency; SSC - social security contributions; MSSC - Mandatory SSC.

Table A1.2 Identification of informal employees in the Latvian national EU-SILC data, 2008-2017

EU-SILC variables used	PY010g, PY010n, PY030g, PY031g
Additional survey items used	IQ38: Did the respondent during the income reference period gain some earnings abroad?
Additional SRS data received on request	Employee earnings from microenterprises (M_E) and share of these earnings in total declared earnings (M_E_sh) ¹ .
Definition of informal employee	<p>PY010g > 0 & PY010n=PY010g & (PY030g - PY031g = 0) & ME=0.</p> <p>Respondents with earnings abroad (IQ38=1) are excluded from analysis.</p>

Note: ¹The variable M_E_sh = (microenterprise earnings/total declared earnings) have not been received for 2016-2017.

Table A1.3 Estimation of declared and undeclared gross earnings in the Latvian national EU-SILC data, 2008-2017

Source of net earnings data (identifiable from data using flags)	Percentage of observations (by period)		Declared gross earnings, G	Undeclared ("envelope") earnings	
	2008-2011	2012-2015		Amount, B	Share in total earnings, β
[1] Survey (\geq SRS earnings)	35.1	31.5	See Table A1.4	$PY010g - G$ if positive; 0 otherwise	$B / PY010g$
[2] Survey (no SRS earnings) ^a	7.4	4.7	$G = 0$	$PY010g$	1
[3] SRS (survey non-response) ^b	15.5	18.6	$G = PY010g$	$\beta G / (1 - \beta)$	imputed
[4] Statistical imputation (no SRS earnings; survey non-response) ^a	0.7	0.5	$G = 0$	$PY010g$	1
[5] SRS ($>$ survey earnings) ^c	38.3	39.9	$G = PY010g$	0 (assumed)	0 (assumed)
[6] SRS (between 95% and 100% of survey earnings)	3.0	4.8	$G = PY010g$	$G1 - G$ ($G1$: see Table A1.1)	$B / G1$

Notes: ^a Cases [2] and [4] refer to informal employees (see Table A1.2).

^b In case [3], a proxy equal to the average share of undeclared earnings in the same year across employees with respondent's education level, gender and sector of economic activity (21 sector) has been imputed in most cases; when the economic sector was unknown, ethnicity and citizenship (3 categories) have been taken into account as well. In cases when the shares of undeclared earnings in the previous and in the next year for the same respondent were available, their average was imputed instead, and when only one of these respondent-specific values was available, the average of it and the above-mentioned proxy was imputed.

^c In case [5], survey-based gross earnings are, on average, by 17.6 % below administrative data. ^d Respondents with some earnings abroad during the income reference year are excluded from analysis.

Table A1.4 Estimation declared earnings in the Latvian national EU-SILC data when survey-based earnings are recorded, 2008-2017

Declared gross earnings G	
General case	$G = (\text{Employer MSSC}) / (\text{Employer MSSC rate}).$ Employer MSSC = $PY030g - PY031g$
Informal workers	$G = 0$
Microenterprise workers	$G = M_E / M_E_sh =$ (Gross earnings in microenterprises)/(Share of these earnings in total declared earnings)
Other workers with zero employer MSSC in EU-SILC data	$G = A = ((PY010g) - (PY010n) + tNM) / (s + t(1 - s))$ if $A(1 - s) > NM$, where t is income tax rate applied to earnings, N is monthly non-taxable minimum, M is number of months worked as employee, s is employee MSSC rate; $G = ((PY010g) - (PY010n)) / s$ if $A(1 - s) \leq NM$

Notes: PY010g, PY010n, PY030g, PY031g are EU-SILC variables (see Tables 1, 2). MSSC stands for "mandatory social security contributions".

Table A1.5 Indicators of under-reported earnings

Description	Definition
<i>Individual level measure</i>	
Share of undeclared earnings	$\beta = (\text{Estimated undeclared earnings}) / (\text{Estimated total gross earnings})$
<i>Measures applied at the level of economy, sector of economic activity, or a certain category of employees</i>	
Share of undeclared earnings averaged across employees	Average value of across all (or a group of) employees
Envelope share in aggregate earnings	Ratio of total undeclared earnings to total gross earnings
Incidence of envelope share above certain level (10%, 25%, 50%)	Proportion of employees with $\beta \geq 10\%$ (respectively, $\beta \geq 25\%$, $\beta \geq 50\%$) among all (or a category of) employees
Incidence of complete informality	θ = Proportion of informal employees among all (or a category of) employees
Incidence of partial informality (envelope earnings) among employees which are not completely informal	τ = Proportion of employees receiving some envelope earnings among employees receiving some declared earnings (during given reference period; in this study – year)
Total incidence of envelope earnings among all employees	$\varepsilon = \theta + \tau(1 - \theta)$
Estimated <i>lower bound of the total incidence of envelope earnings</i> , based on shares of employees with <i>official earnings</i> Y_{off} below some thresholds c_k : $S_k = \Pr(Y_{off} \leq c_k Y_{off} > 0)$, $k=1, \dots, m$ and survey-based shares of employees with <i>total earnings</i> Y below the same thresholds: $s_k = \Pr(Y \leq c_k Y_{off} > 0)$, $k=1, \dots, m$	$\varepsilon^* = \theta^* + \tau^*(1 - \theta^*)$, where $\tau^* = \max \{S_k - s_k k=1, \dots, m\}$, while θ^* is estimated (preferably, from the same survey) share of completely informal employees.

Notes: The [administrative] data on official earnings should use the same measure of earnings and the same reference period as the survey data. In this study, it is annual average gross monthly earnings in all jobs over months with positive earnings. If θ^* is not available, and the survey shares are among all employees with $Y > 0$ (rather than with $Y_{off} > 0$), $\varepsilon^* = \tau^*$ still provides a lower bound of the total incidence of envelope earnings. In our analysis, we have used all employees with positive earnings as the base. Alternatively, the analysis can be restricted only to employees with earnings above some threshold. Respondents with some earnings abroad during the income reference year are excluded from the analysis.

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