Size and determinants of shadow economies in the Baltic States[1]

Tālis J. Putniņš[2] and Arnis Sauka[3]

Abstract

This study develops and estimates an index of the size of shadow economies in Estonia, Latvia and Lithuania, and analyses the factors that influence participation in the shadow sector. The index can be used to track shadow economies through time or across sectors and therefore is a useful tool to evaluate the effectiveness of policies aimed at reducing the size of shadow economies. Our results suggest that the shadow economy in Latvia in 2010 is considerably larger than in neighbouring Estonia and Lithuania. While the shadow economy as a percentage of GDP in Estonia contracted from 2009 to 2010, it expanded in Latvia and Lithuania. An important driver of shadow activity in the Baltic States is entrepreneurs' dissatisfaction with and distrust in the government and the tax system. We also find that involvement in the shadow economy is more pervasive among younger firms and firms in the construction sector. The findings of this study have a number of policy implications: (i) the relatively large size of shadow economies in the Baltic States and their different expansion/contraction trends cause significant error in official estimates of GDP and its rates of change; (ii) tax compliance can be encouraged by addressing the high level of dissatisfaction with the tax system and with government (e.g., making tax policy more stable and increasing the transparency with which taxes are spent); and (iii) significant scope exists for all three governments to increase their tax revenues by bringing entrepreneurs 'out of the shadows'.

Keywords: shadow economy, tax evasion, Estonia, Latvia, Lithuania
JEL classification: E26, H26, D22, C43, C83

[1] This is a revised and shortened version of the SSE Riga report "The Shadow Economy Index for the Baltic States" presented at SSE Riga on 11 May 2011. This report was made possible by the financial support of SSE Riga and co-operation with the European Council for Small Business and Entrepreneurship. The authors acknowledge the valuable research assistance of Inese Rīdere, Guna Urbanoviča, Auseklis Sarkans, Linda Vīksne, Ēriks Petrovs, Mārcis Kļaviņš, Mārtiņš Sīlis, Raivis Blaumanis, Mārtiņš Kozlovskis, Hedijs Millers, Liene Ozola, Santa Grīva, Domantas Gervinskas, Paulius Jurgutis, Justas Lozinskas, Ingrida Petniunaite, Giedrius Jacunskas, Adomas Aleksandravicius, Liudvikas Galvanauskas, Auris Germanavicius, Andrius Ladauskas, Ruta Treinyte, Aismantas Bulanavicius; Veiko Paaplandi, and thank the entrepreneurs that participated in interviews.
[2] talis.putnins@sseriga.edu
[3] arnis.sauka@sseriga.edu

1. Introduction

Anecdotal evidence suggests that shadow economies in the Baltic States and other emerging Central and Eastern European countries are substantial in size relative to GDP. This is an important issue for these countries because informal production has a number of negative consequences. First, countries can spiral into a 'bad equilibrium': individuals go underground to escape taxes and social welfare contributions, eroding the tax and social security bases, causing increases in tax rates and/or budget deficits, pushing more production underground and ultimately weakening the economic and social basis for collective arrangements. Second, tax evasion can also hamper economic growth by diverting resources from productive uses (producing useful goods and services) to unproductive ones (mechanisms and schemes to conceal income, monitoring tax compliance, issuance and collection of penalties for non-compliance). Third, informal production can constrain entrepreneurs' ability to obtain debt or equity financing for productive investment because potential creditors/investors cannot verify the true (concealed) cash flows of the entrepreneur. This can further impede growth. Finally shadow activities distort official statistics such as GDP, which are important signals to policy makers.

The aim of this study is to measure the size of the shadow economies in Estonia, Latvia and Lithuania, and to analyse the factors that influence participation in the shadow sector. We use the term 'shadow economy' to refer to all legal production of goods and services that is deliberately concealed from public authorities.[4] This study also makes a methodological contribution by developing an index of the size of the shadow economies as a percentage of GDP. It is foreseen that the index will be published regularly. Although an index invites comparisons and maybe even 'competition' between countries, the purpose is not to create a 'Baltic championship' on shadow economies. The index should primarily be seen as a tool to promote discussion of the size and role of the shadow economy and to provide a metric which can be used to measure the degree of success in fighting the shadow economy.

Our estimates of the size of the shadow economies are derived from surveys of a representative sample of entrepreneurs in the three countries. The rationale for this approach is that those most likely to know how much production or income goes unreported are the entrepreneurs who themselves engage in misreporting and shadow production. Survey-based approaches face the risk of underestimating the total size of the shadow economy due to non-response and untruthful response given the sensitive nature of the topic. We minimise this risk by employing a number of survey and data collection techniques shown in previous studies to be effective in eliciting more truthful responses (e.g., Gerxhani, 2007; Kazemier and van Eck, 1992; Hanousek and Palda, 2004). These include framing the survey as a study of satisfaction with government policy, gradually introducing the most sensitive questions after less sensitive questions, phrasing misreporting questions indirectly and, in the analysis, controlling for factors that correlate with potential untruthful response such as tolerance

[4] This definition corresponds to what the Organisation for Economic Co-operation and Development (OECD) in their comprehensive 2002 handbook "Measuring the Non-observed Economy" as well as the System of National Accounts (SNA 1993) refer to as "underground production". It is also consistent with definitions employed by other researchers (e.g., the World Bank study of 162 countries by Schneider, Buehn and Montenegro (2010)).

towards misreporting. We aggregate entrepreneurs' responses about misreported business income, unregistered or hidden employees, as well as unreported 'envelope' wages to obtain estimates of the shadow economies as a proportion of GDP.

The next section describes how the index is constructed, including survey design, sample and computation of the index. The third section reports the results of the study: the size of the shadow economies, forms of shadow activity, determinants of involvement in the shadow economy, and entrepreneurs' opinions. The last section concludes.

2. Method

2.1. Survey design

We conduct a survey of company owners/managers in Estonia, Latvia and Lithuania between March and April, 2011. To increase the response rate and truthfulness of responses the questionnaire begins with non-sensitive questions about external influences, before moving to more sensitive questions about the shadow economy and deliberate misreporting. This 'gradual' approach is recommended by methodological studies of survey design in the context of tax evasion and the shadow economy (e.g., Gerxhani, 2007; and Kazemier and van Eck, 1992). Further, the survey is framed as a study of satisfaction with government policy, rather than a study of tax evasion and misreporting (similar to Hanousek and Palda (2004)).

The questionnaire consists of five main blocks: (i) external influences; (ii) amount of shadow activity; (iii) entrepreneurial orientation; (iv) company and owner characteristics; and (v) entrepreneurs' attitudes.[5] In the first survey block, external influences, respondents are asked to express their satisfaction with the State Revenue Service, tax policy, business legislation and government support for entrepreneurs in the respective country. The questions use a five point Likert scale, from "1" ("very unsatisfied") to "5" ("very satisfied"). The first section of the questionnaire also includes two questions related to entrepreneurs' social norms: entrepreneurs' tolerance towards tax evasion and towards bribery. Previous studies argue that entrepreneurs are likely to engage in more tax evasion when such behaviour is tolerated (Baumol, 1990). The measures of tolerance serve a second important role as control variables for possible understating of the extent of shadow activity due to the sensitivity of the topic.

The second section of the questionnaire, amount of informal business, is constructed based on the concepts of productive, unproductive and destructive entrepreneurship by Baumol (1990), assessment of 'deviance' or 'departure from norms' within organisations (e.g., Warren, 2003) and empirical studies of tax evasion in various settings (e.g., Fairlie, 2002; Aidis and Van Praag, 2007). We assess the amount of shadow activity by asking entrepreneurs to estimate for both 2009 and 2010 the degree of underreporting of business income (net profits), underreporting of the number of employees, underreporting of salaries paid to employees and the percentage of revenues that firms pay in bribes.

[5] The full questionnaire is available in the appendix to the original report, which can be found at http://www.sseriga.edu/en/research/projects/shadow-economy-index/.

We employ the 'indirect' approach for questions about informal business, asking entrepreneurs about 'firms in their industry' rather than 'their firm'.[6] This approach is discussed by Gerxhani (2007) as a method of obtaining more truthful answers, and is used by Hanousek and Palda (2004), for example. The study conducted by Sauka (2008) shows, that even if asked indirectly, entrepreneurs' answers can be attributed to the particular respondent or company that the respondent represents.[7] Furthermore, experience from Sauka (2008) suggests that phone interviews are an appropriate tool to ask questions about tax evasion.[8]

The third section of the questionnaire is used to assess entrepreneurial orientation (EO): a venture-level variable related to the firm's strategy, which not only directly influences company performance (e.g., Lechner and Dowling, 2002) but might also determine whether entrepreneurs choose to allocate effort to productive or unproductive uses, e.g., tax evasion (Baumol, 1990). The questions use the 7-point scale developed by Miller (1983) and Lumpkin and Dess (1996) to measure three dimensions of EO: innovativeness, risk-taking, and pro-activeness.

The fourth section of the questionnaire asks entrepreneurs about the performance of their companies (percentage change in net sales profit, sales turnover and employment from 2009 to 2010), the education of the company owner/manager, company age, industry and region. The fifth section of the questionnaire elicits entrepreneurs' opinions about why entrepreneurs evade taxes.

2.2. Sample

We obtain a list of all active firms in each of the three Baltic States from the *Orbis* database maintained by *Bureau Van Dijk*. For each country, we form size quintiles (using book value of assets) and take equal sized random samples from each size quintile. In total 591 phone interviews are conducted in Latvia, 536 in Lithuania and 500 in Estonia.

[6] Even when asked indirectly, some entrepreneurs choose not to answer sensitive questions about shadow activity. One way to avoid providing truthful answers to such questions is by simply answering "0" to all of the shadow activity questions, suggesting that no shadow activity of any kind has taken place during 2009 and 2010. We view it as much more likely that these responses reflect avoidance of sensitive questions than truthful opinions and therefore treat these cases as non-responses, in order to minimise the downward bias in estimates of shadow activity.

[7] Sauka (2008) used the following approach: in the follow up survey (one year after the initial survey), respondents are 'reminded' that in the initial survey they stated that, for example, the degree of involvement in underreporting business income by 'their firm' (not by 'firms in their industry' as formulated in the initial survey) was, for example, 23%. Each respondent is then asked whether the degree of underreporting in their companies is the same this year and if not, to what extent it has changed. The conclusion from using this method is that respondents tend to state the amount of underreporting in 'their firm' when asked about 'firms in their industry'.

[8] Sauka (2008) uses both face-to-face and phone interviews and concludes that willingness to talk about sensitive issues like tax evasion in Latvia does not differ significantly between the two methods.

2.3. Index construction

The index measures the size of the shadow economy - all legal production of goods and services that is deliberately concealed from public authorities - as a percentage of GDP.[9] There are three common methods of measuring GDP: the output, expenditure, and income approaches. Our index is based on the income approach, which calculates GDP as the sum of gross remuneration of employees (gross personal income) and gross operating income of firms (gross corporate income).

Computation of the index proceeds in three steps: (i) estimate the extent of underreporting of employee remuneration and underreporting of firms' operating income using the survey responses; (ii) estimate each firm's shadow production proportion as a weighted average of the two underreporting estimates with the weights reflecting the proportions of employee remuneration and firms' operating income in the composition of GDP; and (iii) calculate a production-weighted average of shadow production across firms.

In the first step, underreporting of firms' operating income, $UR_{operatingIncomeOfFirm}$, is estimated directly from the corresponding survey question (question 7). Underreporting of employee remuneration, however, consists of two components: (i) underreporting of salaries, or 'envelope wages' (question 11); and (ii) unreported employees (question 9). Combining the two components, the total unreported proportion of employee remuneration is:[10]

$$UR_{employeeRemuneration} = 1 - (1 - UR_{salaries})(1 - UR_{employees})$$

In the second step, for each firm we construct a weighted average of underreported personal and underreported corporate income, producing an estimate of the unreported (shadow) proportion of the firm's production (income):

$$ShadowProportion = \alpha UR_{employeeRemuneration} + (1 - \alpha) UR_{operatingIncomeOfFirm},$$

where α is the ratio of employees' remuneration (*Eurostat* item D.1) to the sum of employees' remuneration and gross operating income of firms (*Eurostat* items B.2g and B.3g). We calculate α for each of the three countries in each of the two years using data from *Eurostat*. Taking a weighted average of underreporting measures rather than a simple average is important for the shadow economy index to reflect a proportion of GDP.[11]

In the third step we take a weighted average of underreported production, *Shadow Proportion*, across firms. The weights are the relative contribution of each firm to the country's GDP,

[9] Two caveats are worth noting: (i) because we do not measure shadow activity in the state (public) sector, our estimates refer to private sector shadow activity as a percentage of private sector domestic output; and (ii) we do not attempt to measure the 'black economy', i.e., illegal goods and services such as narcotics.

[10] In deriving the formula we make the simplifying assumption that wages of unreported employees are on average equal to those of reported employees.

[11] For example, suppose in an economy wages sum to 80 and corporate income 20, giving true GDP of 100. Suppose that wages are underreported by 50% and corporate income by 10% giving an official reported GDP of 40+18=58. In this example the shadow economy is 42% of true GDP, i.e. (100-58)/100. A weighted average of the two underreporting proportions accurately estimates the size of the shadow economy: (0.8)(50%)+(1-0.8)(10%)=42%. However, neither of the two underreporting proportions themselves correctly represent the size of the shadow economy (50% and 10%), nor does an equal weighted average: (0.5)(50%)+(1-0.5)(10%)=30%.

which we approximate by the total amount of wages paid by the firm. Similar to the second step, the weighting in this final average is important to allow the shadow economy index to reflect a proportion of GDP.[12]

3. Results

3.1. Shadow economy index for the Baltic States in 2009 and 2010

Table 1 indicates that the shadow economy as a proportion of GDP is considerably larger in Latvia (38.1%) compared to Estonia (19.4%) and Lithuania (18.8%) in 2010. Only Estonia has managed to marginally decrease the proportional size of its shadow economy from 2009 to 2010 – a statistically significant decrease of 0.8 percentage points. In contrast, the proportional size of the shadow economies in Lithuania and Latvia has increased by an estimated 0.8 and 1.5 percentage points, respectively.

Table 1. Shadow economy index for the Baltic States

	2009	2010	2010 – 2009
Estonia	20.2% (18.7%, 21.7%)	19.4% (18.0%, 20.8%)	-0.8% (-1.3%, -0.3%)
Latvia	36.6% (34.3%, 38.9%)	38.1% (35.9%, 40.3%)	1.5% (0.8%, 2.2%)
Lithuania	17.7% (15.8%, 19.7%)	18.8% (16.9%, 20.6%)	0.8% (0.3%, 1.3%)

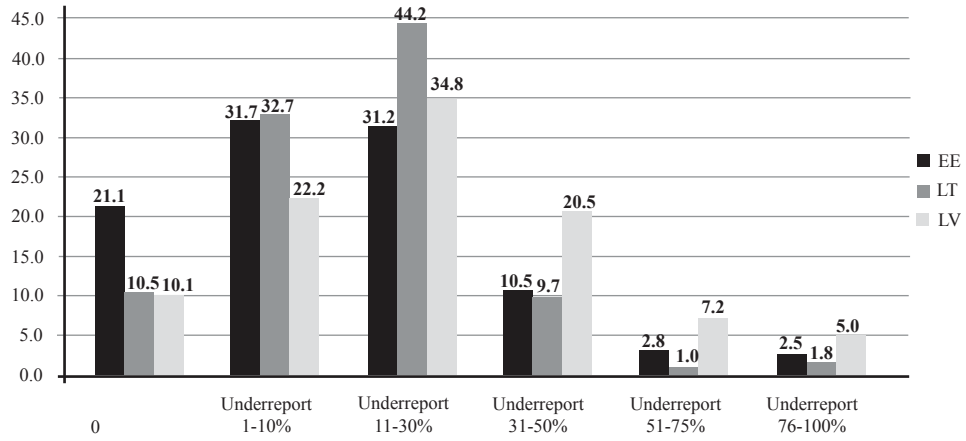
This table reports point estimates and 95% confidence intervals for the size of the shadow economies as a proportion of GDP. The third column reports the change in the relative size of the shadow economies from 2009 to 2010.

3.2. Forms of shadow activity

Figure 1 illustrates the distribution of underreporting of business income (profits). It indicates that 21.1% of respondents from Estonia, 10.5% from Lithuania and 10.1% from Latvia state that underreporting 'in the industry' is 0%, suggesting that companies report 100% of their actual profits. Proportionally more Latvian companies fall into the higher underreporting ranges. For example, 20.5% of respondents from Latvia underreport profits in the range 31-50%, compared to 10.5% and 9.7% of respondents from Estonia and Lithuania, respectively.

[12] For an example, consider the previous footnote's example replacing the two sources of income with two firms: a large one that produces income of 80 and a smaller one that produces income of 20.

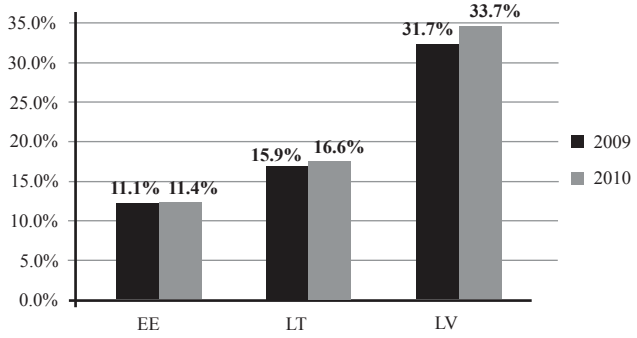
Figure 1. Distribution of underreporting of income (profits) in 2010.



The vertical axis measures the percentage of a country's respondents that fall within the underreporting range given by the horizontal axis.

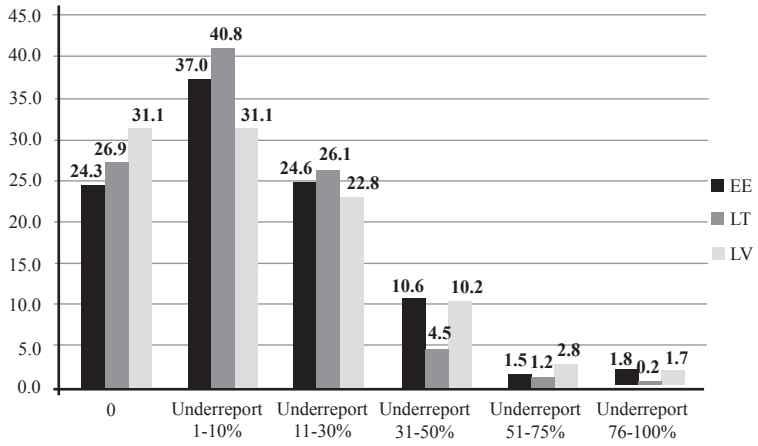
Figure 2 reports the average level of profit underreporting in each of the countries in 2009 and 2010. Consistent with Figure 1, the average level of underreporting is considerably higher (two to three times) in Latvia compared to Lithuania and Estonia.

Figure 2. Average level of underreporting of income (as a percentage of actual profits) in 2009 and 2010.



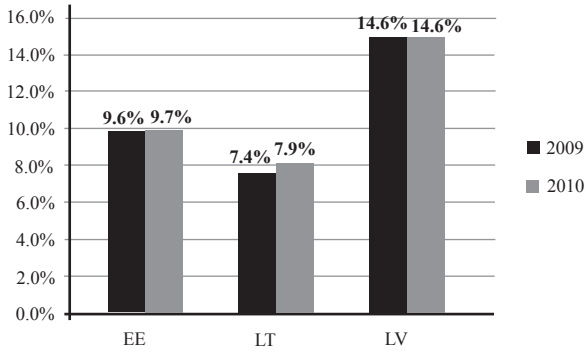
Figures 3 and 4 illustrate the distribution and level of underreporting of the number of employees. Figure 4 shows that Latvia has the highest level of underreporting of the number of employees (14.6% in both 2009 and 2010). The difference between Latvia and neighbouring countries, however, is not as high as for underreported profits. Approximately one third of all respondents in Latvia, 26.9% in Lithuania and 24.3% in Estonia state that no employee underreporting takes place (Figure 3).

Figure 3. Distribution of underreporting of the number of employees in 2010.



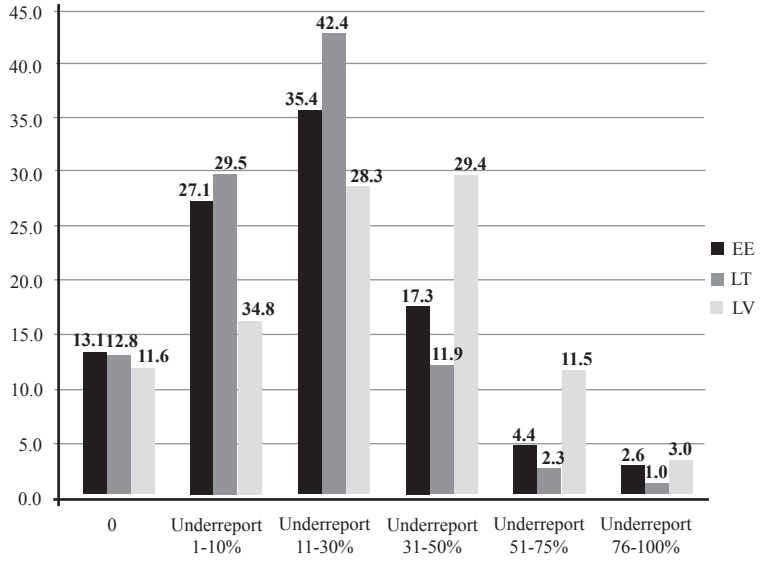
The vertical axis measures the percentage of a country's respondents that fall within the underreporting range given by the horizontal axis.

Figure 4. Average level of underreporting of the number of employees (as a percentage of the actual number of employees) in 2009 and 2010.



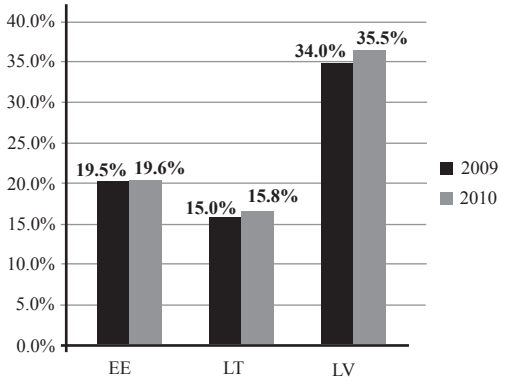
Underreporting of salaries (Figures 5 and 6) follows a similar trend as underreporting of profits. Latvia has a considerably higher salary underreporting level relative to the other Baltic States (34.0% in 2009 and 35.5% in 2010, compared to 19.5% in 2009 and 19.6% in 2010 in Lithuania, and 15.0% in 2009 and 15.8% in 2010 in Estonia). The proportion of firms that do not underreport salaries is very similar in all Baltic States, ranging from 11-13% of respondents (Figure 5).

Figure 5. Distribution of underreporting of salaries in 2010.



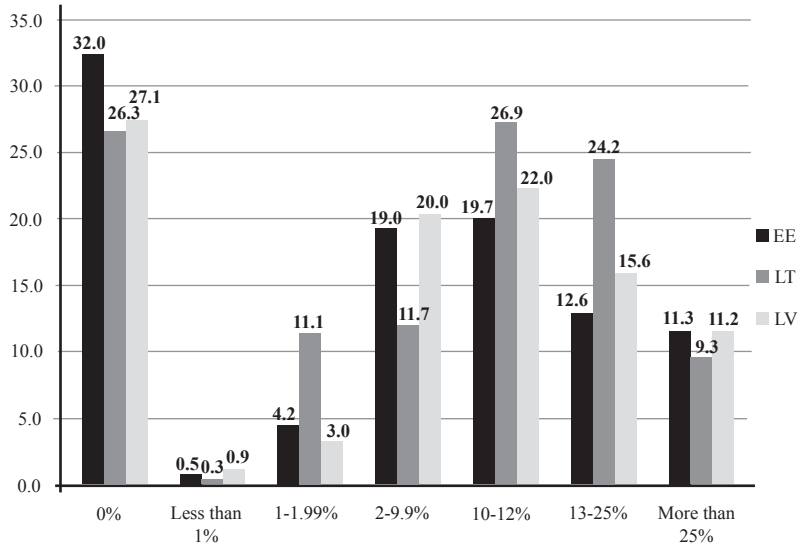
The vertical axis measures the percentage of a country's respondents that fall within the underreporting range given by the horizontal axis.

Figure 6. Average level of underreporting of salaries (as a percentage of actual salaries) in 2009 and 2010.



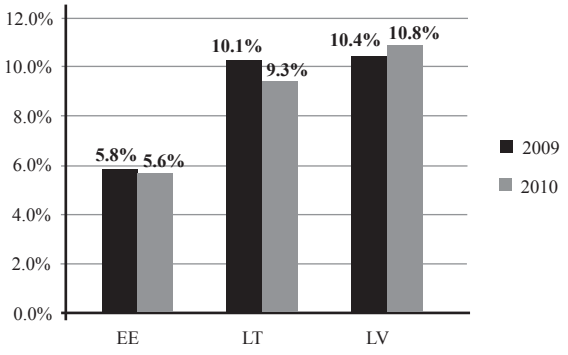
Entrepreneurs in Latvia and Lithuania are involved in a similar amount of bribery, with the difference that in Latvia bribery increased from 2009 to 2010 whereas in Lithuania it decreased. The average percentage of revenues paid by firms to 'get things done' in Lithuania is 10.1% in 2009 and 9.3% in 2010, whereas in Latvia the corresponding levels are 9.3% and 10.8% (Figure 8). Estonian companies are least involved in bribery: 5.8% and 5.6% of revenues in 2009 and 2010, respectively. Interestingly, around 10% (slightly less in Lithuania and slightly more in Estonia and Latvia) of respondents claim to pay more than 25% of their revenues in bribes (Figure 7), reflecting the hostile business environment in the Baltic States.

Figure 7. Distribution of bribery (percentage of revenue spent on payments 'to get things done') in 2010.



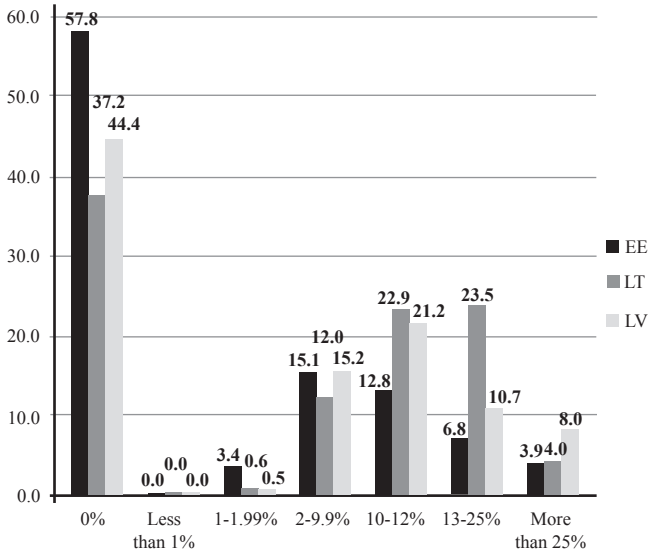
The vertical axis measures the percentage of a country's respondents that fall within the unofficial payment expenditure range (percentage of revenue) given by the horizontal axis.

Figure 8. Average level of bribery (percentage of revenue spent on payments 'to get things done') in 2009 and 2010.



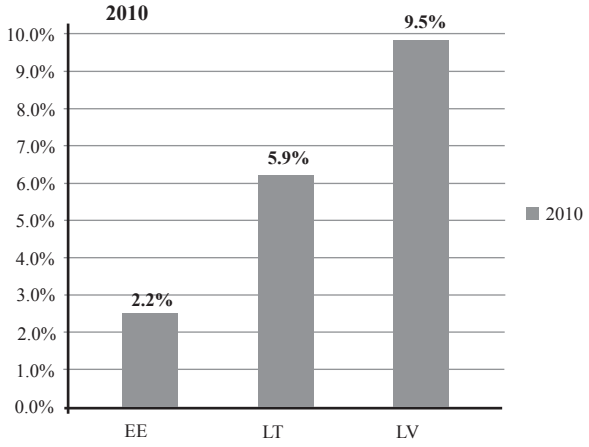
Figures 9 and 10 illustrate the value of bribes that are paid to secure contracts with the government (as a percentage of contract value). Companies in Latvia offer considerably larger bribes: almost 10% of contract value, whereas companies in Lithuania on average offer 6%, and companies in Estonia 'only' 2.2%.

Figure 9. Distribution of the value of bribes to secure contracts with the government in 2010.



The vertical axis measures the percentage of a country's respondents that fall within the government bribe value range (measured as a percentage of government contract value) given by the horizontal axis.

Figure 10. Average percentage of contract value paid to the government as a bribe to secure a cocontract in 2010.

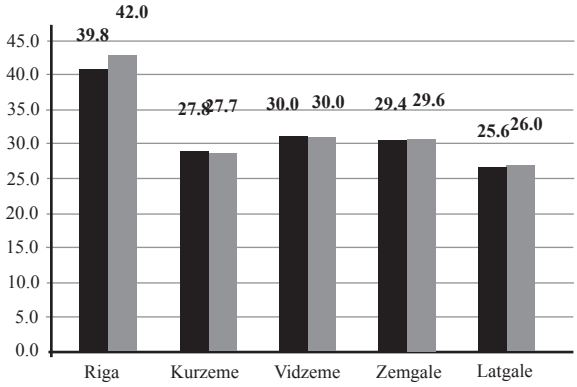


3.3. Determinants of involvement in the shadow economy

This section examines the factors that influence firms' decisions to participate in the shadow economy. First, we review the determinants identified by previous research. Second, we present some descriptive statistics of how the size of the shadow economy varies with the influential factors. Finally, we use regression analysis to identify the factors that are statistically related to firms' involvement in the shadow economy.

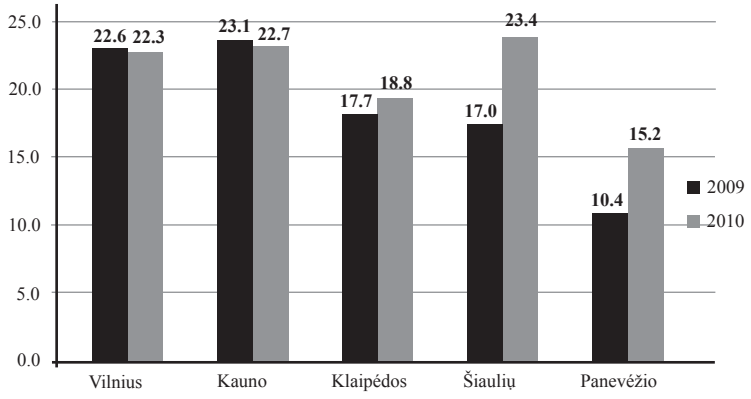
The literature on tax evasion identifies two main groups of factors that affect the decision to evade taxes and thus participate in the shadow economy. The first set emerges from rational choice models of the decision to evade taxes. In such models individuals or firms weigh up the benefits of evasion in the form of tax savings against the probability of being caught and the penalties that they expect to receive if caught. Therefore the decision to underreport income and participate in the shadow economy is affected by detection rates, the size and type of penalties, firms' attitudes towards risk-taking, and so on. These factors are likely to differ across countries, regions, sectors of the economy, size and age of firm, and entrepreneurial orientation (innovativeness, risk-taking tendencies, and pro-activeness).

Figure 11. Shadow economy by region in Latvia.



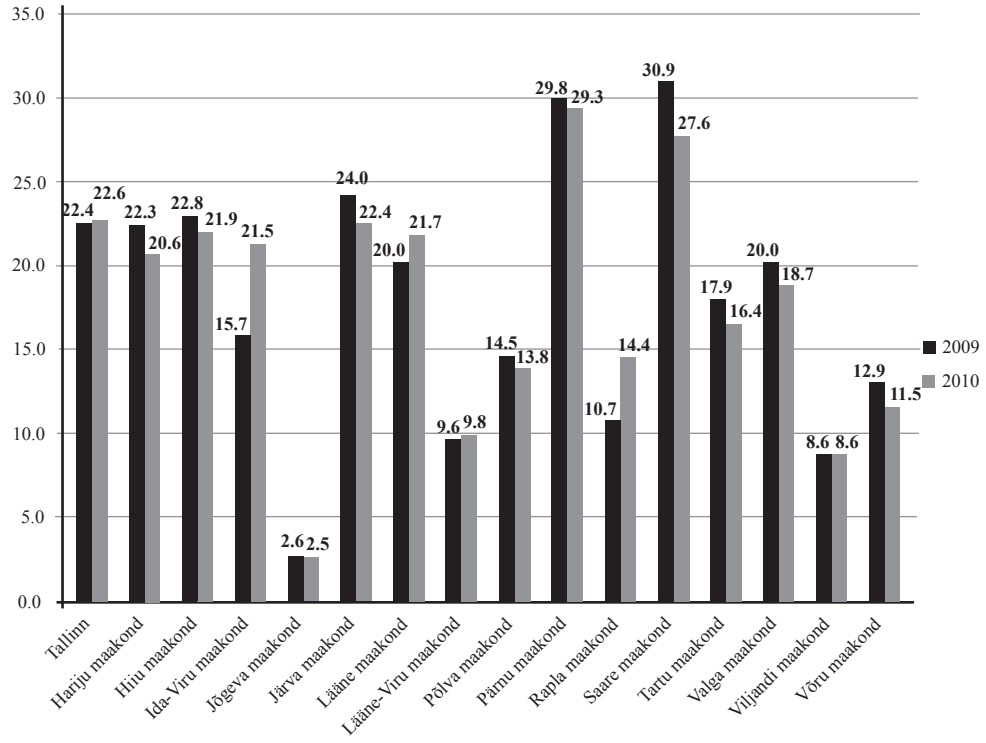
Empirical studies find that the actual amount of tax evasion is considerably lower than predicted by rational choice models based on pure economic self-interest. The difference is often attributed to the second, broader, set of tax evasion determinants – attitudes and social norms. These factors include perceived justice of the tax system, i.e., attitudes about whether the tax burden and administration of the tax system are fair. They also include attitudes about

Figure 12. Shadow economy by region in Lithuania.



how appropriately taxes are spent and how much firms trust the government. Finally, tax evasion is also influenced by social norms such as ethical values and moral convictions, as well as fear of feelings of guilt and social stigmatisation if caught.

Figure 13. Shadow economy by region in Estonia.



Figures 11-13 report the size of the shadow economy by region in Latvia, Lithuania and Estonia. In Latvia, shadow activity seems to be more widespread in the country's capital, Riga (42% in 2010), than in other regions; however, this pattern is not observed in Lithuania or Estonia. In Lithuania, the level of shadow activity appears to be lowest in the Panevėžio region (15.2% in 2010), although this region, together with Šiaulių, has seen the largest increase in shadow activity from 2009 to 2010. In Estonia, the region of Jõgeva Maakond reports relatively little shadow activity (2.5% in 2010), while Pärnu Maakond and Saare Maakond have the highest levels in the country (29.3% and 27.6%, respectively, in 2010).

Figure 14. Shadow economy by sector.

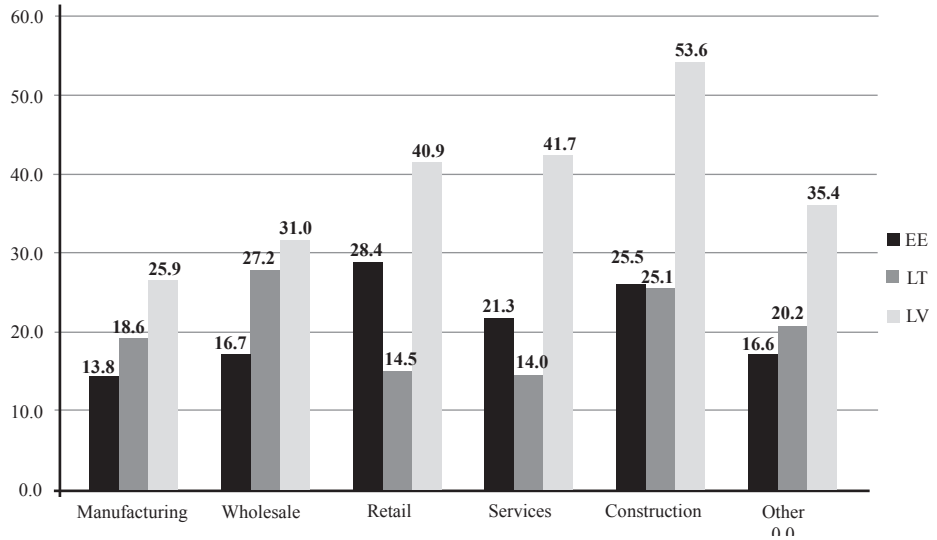


Figure 14 shows how the amount of shadow activity varies by sector. In Latvia the highest proportion of shadow activity occurs in the construction sector (53.6% in 2010), followed by services and retail (41.7% and 40.9%). The pattern differs in Lithuania and Estonia, where the wholesale and retail sectors have the highest proportion of shadow activity, respectively (27.2% and 28.4%).

Figure 15. Shadow economy by firm size (number of employees) in 2010.

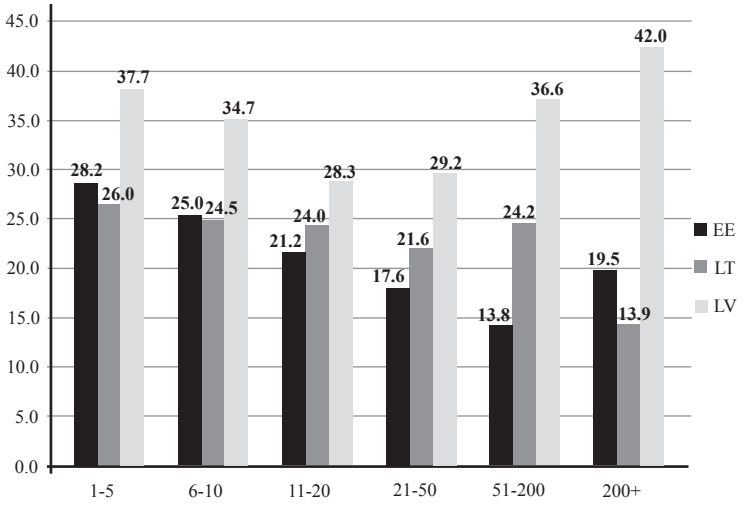
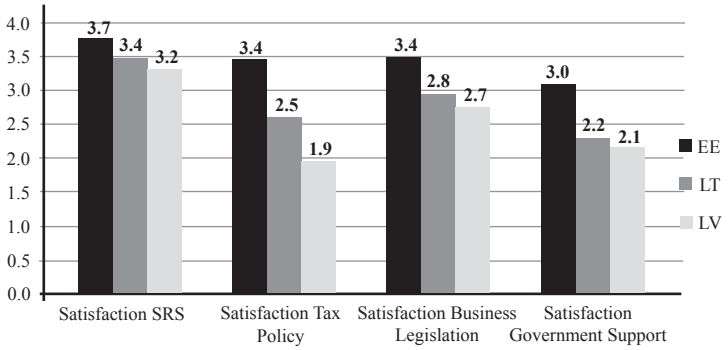


Figure 15 reports the level of shadow activity for different sized firms, with size measured by the number of employees. Estimates indicate that firms at both ends of the spectrum, i.e., small firms and large firms, tend to have relatively higher levels of shadow activity than medium sized firms of 10-50 employees. Somewhat surprisingly, particularly high levels of

shadow activity are found in large (more than 200 employees) Latvian firms (42% in 2010), whereas in Estonia and Lithuania, the highest levels of shadow activity occur in the smallest firms (1-5 employees).

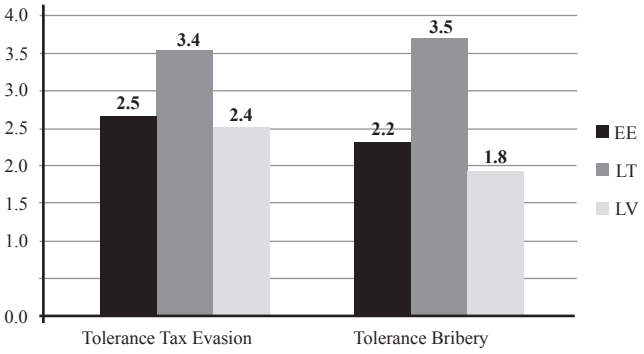
Figure 16. Average satisfaction of firms with the tax system and government in 2010.



These questions use a 5-point scale: 1="very unsatisfied"; 2="unsatisfied"; 3="neither satisfied nor unsatisfied"; 4="satisfied"; and 5="very satisfied".

Figure 16 summarises the degree of satisfaction with the State Revenue Service (SRS), tax policy, business legislation and government support for entrepreneurs, in each of the Baltic States. The vertical axis measures country means in each of the satisfaction areas, with higher scores indicating more satisfaction. Overall, a clear pattern emerges: firms in Estonia are most satisfied with the tax system and government, followed by Lithuanian firms, with Latvian firms being the most dissatisfied. Across all three countries, firms tend to be most satisfied with the State Revenue Service, with 66.8% of Estonian firms reporting that they are "satisfied" or "very satisfied". Dissatisfaction in Latvia is particularly high with government

Figure 17. Averages of firms' tolerance of tax evasion and bribery in 2010.



These questionnaire items use a 5-point scale to measure responses to the statement "tax evasion / bribery is tolerated behaviour": 1="completely disagree"; 2="disagree"; 3="neither agree nor disagree"; 4="agree"; and 5="completely agree".

tax policy (44.2% of Latvian firms are "very unsatisfied"), followed by government support to entrepreneurs (36.2% of Latvian firms are "very unsatisfied"). Strong dissatisfaction in Latvia with the tax system and the government is likely to be one of the main factors driving the large difference between the three countries in the size of their shadow economies.

Figure 17 summarises the degree of tolerance in each of the countries with higher scores indicating more tolerance. The overall pattern suggests that on average Latvian firms are the least tolerant of tax evasion and bribery, followed closely by Estonian firms, with Lithuanian firms appearing to be the most tolerant. This result may seem somewhat surprising given the relatively high levels of shadow activity and bribery in Latvia. The result provides the valuable insight that social norms are unlikely to explain differences in the size of the shadow economies across the three countries, and therefore reinforces that attitudes towards the tax system and government are key determinants of shadow activity in the Baltic States.

We use regression analysis to identify statistically significant determinants of firms' involvement in the shadow economy. Regression results are reported in Table 2. Model 1 includes most of the possible influential factors and dummy variables for Estonian and Lithuanian firms. Model 2 replaces country-level dummy variables with country-region dummy variables (with Kurzeme, Latvia, as the omitted category). Model 3 drops statistically insignificant determinants.

The country dummy variables indicate that the size of the shadow economy is smaller in Estonia and Lithuania relative to Latvia, after controlling for a range of factors. The country-region dummy variables confirm the previous casual observation that the level of shadow activity in Riga is higher than in other regions of Latvia. Tolerance towards tax evasion is positively associated with a firm's stated level of income/wage underreporting. As mentioned earlier, measures of tolerance serve the important role of control variables for possible understating of the extent of shadow activity (untruthful responses) due to the sensitivity of the topic.[13] The positive association suggests that such an understating effect is likely to be at play, and therefore controlling for the sensitivity of tax evasion (proxied by tolerance) is important in correctly identifying the influential factors and in making comparisons of the level of shadow activity.

The regression coefficients indicate that a firm's satisfaction with the tax system and the government is negatively associated with the firm's involvement in the shadow economy, i.e. dissatisfied firms engage in more shadow activity, satisfied firms engage in less. This result is consistent with the descriptive statistics and with previous research on tax evasion, and offers an explanation of why the size of the shadow economy is larger in Latvia than in Estonia and Lithuania; namely that Latvian firms engage in more shadow activity because they are more

[13] For example, consider two firms that underreport income/wages by 40% each, but the first operates in an environment in which tax evasion is considered highly unethical and is not tolerated, whereas the second operates in an environment in which tax evasion is relatively tolerated. The first firm might state that its estimate of underreporting is around 20% (a downward biased response due to the more unethical perception of tax evasion) whereas the second firm might answer honestly that underreporting is around 40%. This example illustrates that failure to control for the sensitivity of tax evasion (proxied here by tolerance) can lead to biased comparisons.

Table 2. Determinants of firms' involvement in shadow activities

	Model 1	Model 2	Model 3
Intercept	38.4***	36.6***	33.4***
	(4.48)	(3.86)	(7.99)
D_EE	-7.23***		
	(-3.66)		
D_LT	-11.3***		
	(-4.52)		
Tolerance_TaxEvasion	2.10***	1.95***	1.79***
	(2.95)	(2.71)	(3.36)
Satisfaction	-1.59**	-1.68**	-1.76***
	(-2.12)	(-2.11)	(-2.88)
ln(FirmAge)	-2.98*	-3.46**	-3.12***
	(-1.83)	(-2.12)	(-2.90)
ln(Employees)	-0.65	-0.04	
	(-0.35)	(-0.02)	
ln(Wages)	-0.21	-0.57	
	(-0.15)	(-0.37)	
AverageWage	0.00	0.00	
	(-0.41)	(-0.35)	
ChangeInProfit	0.01	0.01	
	(1.26)	(1.31)	
EO1	-0.07	-0.28	
	(-0.07)	(-0.31)	
EO2	-0.50	-0.53	
	(-0.60)	(-0.61)	
EO3	1.39	1.24	
	(1.49)	(1.31)	
D_Wholesale	0.56	-0.54	-0.63
	(0.20)	(-0.18)	(-0.32)
D_Retail	2.04	1.50	1.43
	(0.74)	(0.54)	(0.72)
D_Services	1.15	0.68	0.27
	(0.52)	(0.30)	(0.16)
D_Construction	4.50	3.49	3.16
	(1.52)	(1.16)	(1.38)
D_OtherSector	-2.74	-3.23	-3.47
	(-0.83)	(-0.97)	(-1.31)
Country-region dummy variables	No	Yes	Yes
n	726	726	1,113
R-squared	0.09	0.12	0.12

This table reports coefficients from regressions of firms' unreported proportion of production in 2010 (dependent variable; see Section 2 for details of calculation) on various determinants of shadow activity. *D_EE* and *D_ LT* are dummy variables for Estonian and Lithuanian firms, respectively (Latvian firms are the omitted category). *Tolerance_TaxEvasion* is the firm's response to question 5, with higher scores indicating more tolerance. *Satisfaction* is the first principal component of the firm's responses to questions 1-4, with higher scores indicating higher satisfaction with the country's tax system and government. *ln(FirmAge)*, *ln(Employees)* and *ln(Wages)* are the natural logarithms of the firm's age in years, its number of employees and the total amount it pays in wages. *AverageWage* is the average monthly salary in EUR paid by the firm. *ChangeInProfit* is the firm's percentage change in net sales profit from 2009 to 2010. *EO1*, *EO2* and *EO3* are measures of entrepreneurial orientation in the dimensions of innovativeness, risk-taking and pro-activeness, and are constructed as principal components of responses to questions 16-20. *D_Wholesale* to *D_OtherSector* are sector dummy variables with manufacturing as the omitted category. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels. T-statistics are reported in parentheses.

dissatisfied with the tax system and the government. Analysing each of the four measures of satisfaction separately we find that shadow activity is most strongly related to dissatisfaction with business legislation, followed by the State Revenue Service, government tax policy, and finally government support for entrepreneurs.

Another strong determinant of involvement in the shadow economy is firm age, with younger firms engaging in more shadow activity than older firms. This effect dominates relations between firm size and shadow activity. A possible explanation for the relation is that young firms entering a market made up of established competitors use tax evasion as a means of being competitive in their early stages. The regression results also provide weak evidence that after controlling for other factors, firms in the construction sector and firms that have a pro-active entrepreneurial orientation tend to engage in more shadow activity. There is no evidence of an association between shadow activity and other dimensions of entrepreneurial orientation, the average wage paid by a firm or a firm's change in profits (or employees or turnover).

3.4. Entrepreneurs' opinions

The last section of the questionnaire elicits entrepreneurs' opinions about the reasons for tax evasion. This is done using an open question in which entrepreneurs are asked to provide the three main reasons for tax evasion, in order of importance. The answers are classified into ten themes summarised in Table 3. Not surprisingly, 'taxes are too high' is mentioned as the main reason for tax evasion in all three countries, with 334 (out of 591) respondents in Latvia mentioning this as one of the three main reasons for tax evasion and 255 (out of 334) mentioning this as the most important reason. Interestingly, unacceptable/inflexible tax system/policy (see the theme 'amount of taxes and policies' in Table 3) is highlighted as an important reason for tax evasion in Latvia, but seems to be much less important in Estonia and Lithuania.

Similarly, entrepreneurs' low level of trust in the government (both in general and in the way that government spends taxes), is emphasised as a major concern for entrepreneurs in Latvia, but not in Lithuania or Estonia. The same holds true regarding the support entrepreneurs expect from the government: as much as one fifth of all respondents in Latvia mention lack of state support as one of the main reasons for tax evasion (see the 'government support' theme). As highlighted previously, entrepreneurs' satisfaction with the business environment, including the level of trust in the government and satisfaction with the tax system, are factors that directly influence the level of tax evasion. The opinions of entrepreneurs concur with the previous results, which suggest that the substantially larger shadow economy in Latvia compared to neighbouring countries is largely the result of a higher level of dissatisfaction and distrust towards the Latvian government and the tax system.

Table 3. Entrepreneurs' opinions about why entrepreneurs (in Estonia, Latvia and Lithuania) evade taxes.

Theme	Specific reason for tax evasion	EE	LV	LT
FINANCIAL RESONS, COMPETITION	To stay in competition (includes to get advantage)	43 (33)	103 (50)	42 (15)
	To increase profitability and personal benefits	112 (86)	33 (10)	51 (30)
	Difficult financial situation (includes: high expenses/costs, low income/ turnover/profit, low market price)	92 (77)	108 (58)	67 (43)
'CULTURAL' REASONS	Traditions in society of avoiding taxes (cultural bias)	3 (1)	42 (8)	41 (28)
	Low ethics/morality of entrepreneurs	8 (5)	30 (8)	30 (13)
	Stupidity/low education level of entrepreneurs	7 (5)	8 (5)	0 (0)
IGNORANCE	Entrepreneurs simply don't want to pay taxes	3 (3)	18 (3)	0 (0)
CONTROL	Weak legal enforcement	11 (6)	53 (16)	69 (45)
AMOUNT OF TAXES AND POLICIES	Taxes are too high	215 (207)	334 (255)	282 (128)
	Unacceptable/inflexible tax system/policy	17 (10)	114 (49)	20 (5)
TRUST	Entrepreneurs do not trust government	4 (3)	77 (21)	13 (6)
	Ridiculous government spending of collected tax money	3 (2)	115 (43)	36 (19)
CORRUPTION	High level of corruption	0 (0)	31 (7)	17 (5)
ENVIRONMENT	Crisis (includes uncertainty)	20 (15)	19 (7)	14 (9)
	Low labour productivity	1 (1)	2 (0)	0 (0)
	Unfair competition	3 (2)	44 (9)	0 (0)
	Expensive materials (electricity, raw materials)	1 (0)	2 (0)	0 (0)
GOVERNMENT SUPPORT	Lack of support/financing from the government	3 (2)	111 (25)	40 (20)
INTERNAL REASONS	Bad leadership skills within a company	6 (4)	6 (3)	0 (0)

Numbers not in parentheses indicate the number of respondents in each country that listed the specific reason among the top three reasons for tax evasion. Numbers in parentheses indicate the number of respondents in each country that listed the specific reason as the top reason for tax evasion.

Turning to financial reasons for tax evasion, a considerably larger number of Latvian entrepreneurs state that one of the reasons for evading taxes is simply to stay in business, (103 in Latvia versus 43 in Estonia and 42 in Lithuania). Interestingly, increasing profits and gaining personal benefits is a more important reason for tax evasion among Estonian entrepreneurs (112 versus 33 in Latvia and 51 in Lithuania).

Examining the 'cultural reasons' for tax evasion, traditions in society of avoiding taxes and low standards of ethics and morals are mentioned as relatively common reasons for tax evasion in Lithuania and Latvia, but much less so in Estonia. A similar trend holds for cor-

ruption. Unfair competition in the 'environment' theme is emphasised by entrepreneurs in Latvia as a reason for tax evasion but not in Estonia or Lithuania.

4. Conclusions

Our main findings are as follows. The size of the shadow economy in Latvia (38.1% of GDP in 2010) is close to double that of the neighbouring countries of Estonia (19.4%) and Lithuania (18.8%). The proportion of economic activity 'in the shadow' has increased from 2009 to 2010 in Latvia (by 1.5 percentage points) and Lithuania (by 0.8 percentage points), but decreased in Estonia (by 0.8 percentage points). Firms that are dissatisfied with the tax system or the government tend to engage in more shadow activity, consistent with previous research on tax evasion. This result, together with the finding that of the three countries Latvian firms are most dissatisfied with the tax system and the government, offers an explanation of why the size of the shadow economy is significantly larger in Latvia than in Estonia and Lithuania. We also find that younger firms engage in proportionally more shadow activity than older firms, consistent with anecdotal evidence that tax evasion is used by firms to gain a competitive edge, and that having an edge is important in entering an established market. Firms in the construction sector tend to engage in more shadow activity than firms in other sectors.

A number of themes are noted in entrepreneurs' responses to why firms evade taxes and operate in the shadow economy, including: (i) the perception that taxes are too high; (ii) low level of trust in government and the way taxes are spent; (iii) to increase competitive advantage and stay in business; and (iv) tax evasion is a widespread cultural norm.

The findings of this study have a number of policy implications. First, the relatively large size of the shadow economies in the Baltic States, and their different expansion/contraction trends, cause significant error in official estimates of GDP and its rates of change, because although statistical bureaus in each of the countries attempt to include some shadow production in GDP estimates they do not capture the full extent. Not only is GDP used in key policy ratios such as government deficit to GDP, debt to GDP, but also its rate of change is used as a key indicator of economic performance and therefore guides policy decisions. When the shadow economy is expanding (as in Latvia and Lithuania) official GDP growth rates underestimate true economic growth and when the shadow economy is contracting (as in Estonia) official GDP growth rates overstate true economic growth. At a minimum, policy makers need to be aware of these biases in official statistics, but ideally statistical bureaus would implement more rigorous methods to estimate and incorporate shadow production in official statistics.

Second, our results suggest that to reduce the size of the shadow economies in the Baltic States by encouraging voluntary compliance, a key factor that needs to be addressed is the high level of dissatisfaction with the tax system and with government. Addressing this issue could involve action such as making tax policy more stable (less frequent changes in procedures and tax rates), and increasing the transparency with which taxes are spent.

Finally, our estimates of the size of the shadow economies suggest that there is significant scope for all three governments to increase their revenues by bringing production 'out of the shadows'. Investment in programmes aimed at reducing the size of the shadow economies could be rather profitable for the Baltic governments, because even a small influence on entrepreneurial behaviour could result in significant revenue increases.

References

Aidis, R., and M. Van Praag (2007) "Illegal entrepreneurship experience: Does it make a difference for business performance and motivation?", *Journal of Business Venturing* 22(2), pp. 283-310.

Baumol, W. (1990) "Entrepreneurship: Productive, unproductive and destructive", *Journal of Political Economy* 98, pp. 893-921.

Fairlie, R. (2002) "Drug dealing and legitimate self-employment", *Journal of Labour Economics* 20(3), pp. 538-567.

Gerxhani, K. (2007) "'Did you pay your taxes?' How (not) to conduct tax evasion surveys in transition countries", *Social Indicators Research* 80, pp. 555-581.

Hanousek, J., and F. Palda (2004) "Quality of government services and the civic duty to pay taxes in the Czech and Slovak Republics, and other transition countries", *Kyklos* 57(2), pp.237-252.

Kazemier, B., and R. van Eck (1992) "Survey investigations of the hidden economy", *Journal of Economic Psychology* 13, pp. 569-587.

Lechner, C., and M. Dowling, (2002) "Firm networks: External relationships as sources for the growth and competitiveness of entrepreneurial firms", *Entrepreneurship and Regional Development* 15, pp. 1-26.

Lumpkin, G., and G. Dess (1996) "Clarifying the entrepreneurial orientation construct and linking it to performance", *Academy of Management Review* 21(1), pp. 135-172.

Miller, D. (1983) "The correlates of entrepreneurship in three types of firms", *Management Science* 29, pp. 770–791.

Sauka, A. (2008) "Productive, unproductive and destructive entrepreneurship: A theoretical and empirical exploration", Frankfurt am Main: Peter Lang GmbH.

Schneider, F., A. Buehn, and C.E. Montenegro (2010) "Shadow economies all over the world: New estimates for 162 countries from 1999 to 2007", World Bank Policy Research Working Paper 5356.

Warren, E. (2003) "Constructive and destructive deviance in organizations", *Academy of Management Review* 28(4), pp. 622–631.