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# Explaining the informal economy in Western Europe: beyond a rational economic actor perspective

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## Abstract

### Purpose
The dominant theorisation of the informal economy views participants as rational economic actors operating in the informal economy when the expected benefits exceed the perceived costs of being caught and punished. Recently, an alternative theory has emerged which views participants as social actors operating in the informal economy due to their lack of vertical trust (in governments) and horizontal trust (in others). The aim of this paper is to evaluate these competing theorisations.

### Methodology
To do so, data are reported from special Eurobarometer surveys conducted in 2007, 2013 and 2019 respectively in eight West European countries (Austria, Belgium, France, Germany, Ireland, Luxembourg, Netherlands and the United Kingdom).

### Findings
Using probit regression analysis, the finding is that increasing the expected likelihood of being caught and level of punishment had a weak significant impact on the likelihood of participating in the informal economy in 2007, and no significant impact in 2013 and 2019. However, greater vertical and horizontal trust is significantly associated with a lower level of participation in the informal economy in all three time periods.

### Practical Implications

The outcome is a call for a policy to shift away from increasing the expected level of punishment and likelihood of being caught, and towards improving vertical and horizontal trust. How this can be achieved is explored.

**Originality/value**
Evidence is provided in a Western European context to support a shift away from a rational economic actor to a social actor approach when explaining and tackling the informal economy.

**Keywords**: informal sector; tax compliance; public policy; Western Europe.
**JEL codes**: H26, J46, K34, O17

## Introduction

The informal economy remains a persistent feature of the global economy (ILO 2018; OECD, 2017; World Bank, 2019). Defined as paid activities not declared to the authorities for the purpose of evading tax and social security contributions and/or labour laws (OECD, 2017; Williams, 2019; Williams and Krasniqi, 2017; Williams et al., 2017a; World Bank, 2019), 61 per cent of workers globally have their main employment in the informal economy (ILO, 2018) and eight out of ten enterprises globally operate in the informal economy (ILO, 2020). Although more prevalent in lower-income countries (ILO, 2018), it persists in advanced economies. In Europe, it is estimated as equivalent to 15.8 per cent of GDP (Williams and Schneider, 2016) and 11.6 per cent of all labour input in the private sector is in informal economy (Williams et al., 2017b). This has negative consequences. Informal workers have poorer working conditions (Williams and Horodnic, 2019), purchasers lack legal recourse and insurance cover (OECD, 2017), formal enterprises suffer unfair competition (OECD, 2017; World Bank, 2019) and informal enterprises lack legal protection and have poor access to capital to grow (Loayza, 2018). More widely, governments lose tax revenue and regulatory control over working conditions (ILO, 2018; World Bank, 2019). Therefore, addressing the informal economy has risen to the top of policy agendas across supra-national institutions (ILO, 2015; European Commission, 2016; OECD, 2017; World Bank, 2019) and national governments (Williams, 2019).

To explain the informal economy, the dominant theory for some five decades has conceptualised participants as rational economic actors operating in the informal economy when the benefits outweigh the costs (Allingham and Sandmo, 1972). Recently, nevertheless, this rational economic actor view has been questioned because many do not operate in the informal economy when the benefits exceed the costs (Alm et al., 2012; Kirchler, 2007; Williams et al., 2015). The outcome has been a social actor theory explaining participation in the informal economy to result from a lack of vertical trust in government (Alm et al., 2010; Torgler, 2007) and horizontal trust in others (Hallsworth et al., 2017; Lefebvre et al., 2015). The aim of this paper is to evaluate these competing theorisations.

To achieve this, the next section reviews the dominant rational economic actor and emergent social actor theories and the concomitant discussion about whether they are mutually exclusive or not. The third section then introduces the data and methodology to evaluate these theories, namely a probit regression analysis of Eurobarometer surveys conducted in 2007, 2013 and 2019, comprising in each case some 8,000 interviews in Western Europe, selected for analysis as a counterweight to the fact that the vast majority of scholarship so far on the informal economy has been on emerging and transition economies. The findings are reported in the fourth section. Revealing no association between participation in the informal economy and the costs of being caught and punished, but a significant positive association between engagement in the informal economy and vertical and horizontal trust, the fifth and final section then draws

conclusions and discusses the implications for theory and policy, along with the limitations of the study and future research required.

## Explaining participation in the informal economy: a literature review

A cursory glance at the extensive literature explaining engagement in the informal economy reveals two theoretical perspectives. Here, each is reviewed in turn along with the scholarship discussing whether they are mutually exclusive or not.

### *Theorising participants as rational economic actors*

Most scholarship on explaining and tackling the informal economy is founded upon a view of participants as rational economic actors who weigh up the benefits of participating against the costs of doing so and participate if the benefits outweigh the costs. This has its roots in the utilitarian theory of crime (Bentham, 1788) which views crime as occurring when the benefits outweigh the calculated costs, namely the likelihood of being caught and penalised. This theory of crime was re-popularised during the late 1960s by Becker (1968) who argued that acting lawfully would become a rational choice if governments increased the probability of detection and sanctions for criminal acts. This was then applied a few years later to the field of tax non-compliance by Allingham and Sandmo (1972), who argued that taxes are evaded when the benefits exceed the expected costs and thus that there is a need to change the cost/benefit ratio. The result was a call to deter engagement by increasing the expected risk of being caught and sanctions.

This was subsequently widely adopted by governments. A 2017 survey of representatives of 28 national governments in Europe found that these governments ranked penalties as the most important and effective policy measure for tackling the informal economy followed by improving the probability of being caught (Williams, 2019). Nevertheless, the evidence to support this is mixed. Some studies identify that raising the probability of being caught and/or punishments prevents participation in the informal economy (Kluge and Libman, 2017; Mas'ud et al., 2015), with most finding that increasing the probability of being caught is more effective than higher sanctions (Williams and Horodnic, 2017a,b). However, others reveal that increasing the probability of being caught and penalties has no effect on participation (Dularif et al., 2019; Hartl et al., 2015) and yet others that it leads to higher participation due to the breakdown in the social contract between the state and its citizens (Kirchler et al., 2014; Mohdali et al., 2014; Murphy, 2005, 2008). Therefore, to evaluate this rational economic actor approach, the following hypothesis can be tested:

> *Rational economic actor hypothesis* (H1): higher perceived punishments and risks of being caught decrease the likelihood of participation in the informal economy, ceteris paribus.
>
> *H1a:* higher perceived punishments decrease the likelihood of participation in the informal economy, ceteris paribus.
>
> *H1b:* higher perceived risks of being caught decrease the likelihood of participation in the informal economy, ceteris paribus.

### *Theorising participants as social actors*

The critique of the rational economic actor approach was expressed by its founders in their seminal paper establishing this approach. They state, "This is a very simple theory, and it may perhaps be criticized for giving too little attention to nonpecuniary factors in the taxpayer's decision on whether or not to evade taxes" (Allingham and Sandmo, 1972: 326). The

subsequent finding has been that many do not participate in the informal economy even when the benefits exceed the costs (Alm et al., 2010; Kirchler, 2007; Murphy, 2008). To explain this, a social actor approach has emerged (Williams et al., 2015).

Grounded in a variant of institutional theory in which institutions are viewed as the rules of the game prescribing acceptable behaviour (Helmke and Levistky, 2004; North, 1990), engagement in the informal economy is explained to result from the gap between the prescribed rules of the game in the laws and regulations (the formal institutions) and the socially shared unwritten rules expressed in citizens' norms, values and beliefs (the informal institutions). The size of the gap reflects the level of vertical trust, measured when studying the informal economy using the level of tax morale (i.e. the intrinsic motivation to pay taxes). The larger the gap, the lower is tax morale and the greater is participation in the informal economy (Alm et al., 2010; Torgler, 2007, 2011). This has been shown in studies of specific European nations (Williams et al., 2016; Windebank and Horodnic, 2017), European regions (Williams and Horodnic, 2017b) and Europe as a whole (Williams and Horodnic, 2017a; Williams et al., 2015).

Recently, social actor theory has been further advanced by contending that participation is also associated with the level of horizontal trust, by which is meant the degree of trust in others not to operate in the informal economy (Fellner et al., 2013). Participation in the informal economy is asserted to be greater when others are perceived as likely to engage in the informal economy. Nevertheless, the evidence that participation is conditional on the behaviour of others derives largely from laboratory experiments (Hallsworth et al., 2017; Lefebvre et al., 2015; Traxler, 2010). Hence, to evaluate this social actor theory, the following hypothesis can be tested:

> *Social actor hypothesis* (H2): higher levels of vertical and horizontal trust decrease the likelihood of participation in the informal economy, ceteris paribus.
> *H2a*: higher levels of vertical trust decrease the likelihood of participation in the informal economy, ceteris paribus.
> *H2b*: higher levels of horizontal trust decrease the likelihood of participation in the informal economy, ceteris paribus.

*Mutually exclusive or inclusive theories*

Most scholars adopt either rational economic actor or social actor theory. Recently, nevertheless, some have asked whether these explanations might be combined. This has resulted in two approaches.

A first "responsive regulation" approach has combined them by conceptualising a regulatory pyramid with measures to improve vertical (and horizontal) trust used first, and deterrents used last (Braithwaite, 2002, 2009; Job et al., 2007). A second "slippery slope" approach combines them by arguing that both the deterrence measures of the rational economic actor approach and the social actor measures of improving vertical and horizontal trust should be used concurrently (Kogler *et al.*, 2013; Khurana and Diwan, 2014). Based on largely laboratory experiments, using both approaches concurrently (rather than consecutively) is identified as most effective (Kogler et al., 2013; Williams and Horodnic, 2017a).

Nevertheless, there may be interaction effects when combining the approaches. Increasing the sanctions and risk of detection may produce different outcomes at different levels of vertical trust. If vertical trust is high, it may breakdown trust between the state and the population and increase participation in the informal economy (Kirchler et al., 2014), but if vertical trust is already low, it might not. Until now, there is little understanding of these interactions. In consequence, the following hypothesis can be evaluated:

*Moderating effects of vertical trust hypothesis* (H3): the effects of higher perceived punishments and risks of being caught on the likelihood of participation in the informal economy will vary by the level of vertical trust, ceteris paribus.

*H3a:* the effects of higher perceived punishments on the likelihood of participation in the informal economy will vary by the level of vertical trust, ceteris paribus.

*H3b:* the effects of higher perceived risks of being caught on the likelihood of participation in the informal economy will vary by the level of vertical trust, ceteris paribus.

*Moderating effects of horizontal trust hypothesis* (H4): the effects of higher perceived punishments and risks of being caught on the likelihood of participation in the informal economy will vary by the level of horizontal trust, ceteris paribus.

*H4a:* the effects of higher perceived punishments on the likelihood of participation in the informal economy will vary by the level of horizontal trust, ceteris paribus.

*H4b:* the effects of higher perceived risks of being caught on the likelihood of participation in the informal economy will vary by the level of horizontal trust, ceteris paribus.

## Methodology

### *Data*

To evaluate these hypotheses, data is reported from eight West European countries (Austria, Belgium, France, Germany, Ireland, Luxembourg, Netherlands and the United Kingdom) for the years 2007, 2013 and 2019, from special Eurobarometer surveys 67.3, 79.2 and 92.1 respectively. A multi-stage random (probability) sampling methodology was used, which ensured that on the issues of gender, age, region and locality size, both the national and each level of the sample is representative in proportion to its population size. All interviews were conducted in the national language with adults aged 15 years and older.

### *Variables*

The dependent variable is a dummy variable with value 1 for respondents answering "yes" to the 2007 survey question of "Did you yourself carry out any undeclared activities in the last 12 months for which you were paid in money or in kind?" and to the 2013 and 2019 surveys question of "Apart from a regular employment, have you yourself carried out any undeclared paid activities in the last 12 months?", and value 0 otherwise.

To evaluate the theories, four explanatory variables are used. First, the association between the perceived punishments and engagement in the informal economy uses a dummy variable describing the punishments expected with value 0 for normal tax or social security contributions due and value 1 for normal tax or social security contributions due, plus a fine or prison. Second, the association between the risks of being caught and participation in the formal economy used a dummy variable with value 0 for a very small or fairly small risk of being caught and value 1 for a fairly high or very high risk.

Third, the relationship between participation in the informal economy and vertical trust uses tax morale as a proxy measure of vertical trust (Alm and Torgler, 2006). Participants rate the acceptability of six types of informal economic activity using a 10-point Likert scale (where 1 means absolutely unacceptable and 10 means absolutely acceptable), namely: an individual is hired by a household and s/he does not declare the payment received to the tax or social security authorities even though it should be declared; a firm is hired by a household and it does not declare the payment received to the tax or social security authorities; a firm is hired by another firm and it does not declare its activities to the tax or social security authorities; a firm

hires an individual and all or a part of the wages paid to him/her are not officially declared; someone receives welfare payments without entitlement (not available in the 2019 survey), and someone evades taxes by not declaring or only partially declaring their income. For each respondent, an aggregate tax morale index was constructed by collating and equally weighting their responses to these six (five in 2019) questions. The lower the value of the index, the higher is their tax morale. The Cronbach's Alpha coefficient of the scale, which reveals a good internal consistency of the scale (Kline, 2000), is 0.8439 in 2007, 0.8576 in 2013 and 0.8703 in 2019.

Fourth and finally, the association between participation in the informal economy and horizontal trust uses the survey question "Do you personally know any people who work without declaring their income or part of their income to tax or social security institutions?", akin to previous studies (Horodnic and Williams, 2020), with a dummy variable where value 1 is for those who know someone participating in the informal economy and 0 otherwise.

Meanwhile, and in line with past studies evaluating participation in the informal economy (Williams and Horodnic, 2016, 2017a,b), the control variables selected are:

- Gender: A dummy variable with value 0 for females and 1 for males;
- Age: A continuous variable indicating the exact age of a respondent;
- Employment status: a categorical variable grouping respondent by their employment status with value 1 for self-employed, value 2 for employed, and value 3 for not working;
- People 15+ years in own household: a categorical variable for people 15+ years in respondent`s household (including the respondent) with value 1 for one person, value 2 for two persons, value 3 for 3 persons or more;
- Children: a dummy variable for the presence of children up to 14 years old in the household with value 0 for individuals with no children and value 1 for those having children;
- Difficulties paying bills: a categorical variable for the difficulties in paying bills (used by Eurobarometer surveys as a proxy for household income) with value 1 for having difficulties most of the time, value 2 for occasionally, and value 3 for almost never/never, and
- Area: a categorical variable for the area where the respondent lives with value 1 for rural area or village, value 2 for small or middle-sized town, and value 3 for large town.

*Analytical methods*

Probit regression analysis is used for testing hypotheses about the relationship between a categorical dependent variable and one or more categorical or continuous independent variables (Greene, 2018). Therefore, using STATA software for estimation of the models, it is here used. The maximum likelihood method is used to estimate the least squares function. The log-likelihood function for probit is

$$lnL = \sum_{j \in S} \omega_j ln\phi(x_j\beta) + \sum_{j \notin S} \omega_j ln\{1 - \phi(x_j\beta\}$$

where $\phi$ is the standard cumulative normal and $\omega_j$ denotes the optional weights. lnL is maximized. Using probit analysis, the following model is adopted:

$$\Pr(y_j \neq 0 | x_j) = \phi(x_j\beta)$$

The dependent variable of the model ($y_j$) is binary, which represents participation in the informal economy, x represents the explanatory variables including the control variables, which are expected punishment, risk of being caught, level of tax morale, level of horizontal trust, gender, age, employment status, people 15+ years in own household, children, difficulties

paying bills (only available for 2013 and 2019 survey), and area (see Table 1 for a description of the variables). Moreover, the interaction term is used for investigating moderating effects. The only differences are that interaction variables are created (see Table 3 below).

## Findings

Table 1 reveals that in 2007, 5.5 per cent of the citizens surveyed in the eight West European countries reported participating in the informal economy in the prior 12 months, 4.3 per cent in 2013 and 3.8 per cent in 2019. Therefore, the share of citizens participating in the informal economy has declined.

Those not participating in the informal economy are much more likely to perceive the punishment as higher than those participating in the informal economy in all three time periods. They are also more likely to view the risk of being caught as higher than those participating in the informal economy in each time period. Those participating in the informal economy have a lower mean tax morale than those not participating in 2007, 2013 and 2019, and a much lower level of horizontal trust than those not participating across all three time periods, although horizontal trust improved over the 2007 to 2019 period both for those participating and not participating in the informal economy.

INSERT TABLE 1 ABOUT HERE

Turning to who participates in the informal economy, the finding is that men are more likely than women to do so both in 2007, 2013 and 2019, as are younger people. Analyzing the employment status of participants in the informal economy, the proportion in formal employment has remained relatively constant at 42 per cent, 39 per cent and 40 per cent in 2007, 2013 and 2019 respectively, whilst the proportion self-employed has fallen from 12 per cent in 2007 to 10 per cent in 2013 and 2019, and the proportion not working has risen from 46 per cent in 2007 to 51 per cent in 2013 and 50 per cent in 2019. Those living in households with three or more adults are more likely to engage in the informal economy and those living in two-adult households less likely in all three time periods. There is an increase in 2019 in the share of informal economy participants who have children, although there is little difference between those working in the informal economy and not doing so in terms of having children. Few differences exist between rural and urban areas. Those who have difficulties most of the time in paying bills are more likely to engage in the informal economy and those who almost never or never have difficulties are less likely to do so. However, between 2013 and 2019, there is an increase in the proportion of informal workers who almost never or never have difficulties in paying the household bills and a decline in the proportion who have difficulties most of the time. This intimates that participation in the informal economy has become less confined over time to poorer populations in Western Europe.

To evaluate whether these descriptive findings are valid when other variables are introduced and held constant, Table 2 reports probit estimates of the likelihood of participating in the informal economy in Western Europe in these three time periods. Examining who participates in the informal economy, the finding is that men were significantly more likely than women in 2007 and 2013 but not in 2019, although younger people are significantly more likely over all three time periods. Those not working and in formal employment are both significantly less likely to participate in the informal economy than the self-employed in 2007, 2013 and 2019. Although two-adult households were significantly less likely than single person households to participate than single person households in 2007 and 2013, this was no longer the case in 2019, whilst those with children were not significantly less likely to engage in the informal economy in 2007 but were in 2013 and 2019, albeit to a weaker extent. Although those

living in larger urban areas were significantly less likely to participate in 2007, this tendency disappeared in 2013 but re-emerged in 2019. Finally, those who almost never/never have difficulties paying bills, and those from time to time having difficulties, are significantly less likely to participate in the informal economy than those having difficulties most of the time in both 2013 and 2019.

INSERT TABLE 2 ABOUT HERE

Evaluating the hypotheses, although in 2007, the greater the perceived punishment, the significantly less likely were citizens to participate, the significance of this association disappeared in 2013 and 2019. Similarly, although participation was significantly lower the higher the expected risk of being caught in 2007, this significance again disappeared in 2013 and 2019. As such, although the rational economic actor hypotheses H1a and H1 were confirmed in 2007, this was not the case in 2013 and 2019.

However, a strong significant association is identified between participation in the informal economy and vertical trust in all three time periods. The greater the level of vertical trust, measured by tax morale, the lower is the likelihood of participation in the informal economy (confirming hypothesis H2a). Similarly, the greater the trust in others, the significantly lower is the likelihood of participating in the informal economy (confirming hypothesis H2b).

To analyse whether vertical and horizontal trust moderate the effects and effectiveness of penalties and risk of detection, the impact of the level of punishment on the likelihood of participation does not vary by the level of vertical trust (refuting H3a). Neither does the effects of the level of punishment on the likelihood of participation significantly vary by the level of horizontal trust (refuting H4a). However, the impact of the perceived risk of being caught on the likelihood of participation does vary by the level of tax morale, but only in 2013. It does not significantly vary in 2007 and 2019. The lower the vertical trust, the more likely is the risk of being caught likely to influence participation. Similarly, the impact of the perceived risk of being caught on the likelihood of participation varies by the level of horizontal trust but only weakly in 2007 (partially confirming H4b). It does not significantly vary in 2013 and 2019. The lower the level of horizontal trust, the more likely is the risk of being caught to influence participation in the informal economy in 2007.

## Discussion and Conclusions

Reporting data from the 2007, 2013 and 2019 special Eurobarometer surveys, the finding is that increasing the expected risk of being caught and level of punishment had a weak significant impact on the likelihood of participating in the informal economy in 2007, and no significant impact on participation in 2013 and 2019. However, greater vertical and horizontal trust is significantly associated with a lower level of participation in the informal economy in all three time periods, and there are some significant interaction effects. Table 3 summarises the findings. Here, the theoretical and policy implications are considered.

INSERT TABLE 3 ABOUT HERE

Theoretically, this paper advances knowledge in three respects. Firstly, although some weak evidence exists in 2007 to support the conventional rational economic actor theorisation, there was no evidence in 2013 and 2019 that increasing the punishments and risks of being caught reduces participation. Secondly, it reveals support for the social actor approach in all three time periods and the need to extend this theory to recognise the role of horizontal as well vertical

trust in reducing participation. Until now, largely laboratory experiments have shown the relevance of horizontal trust. This study reveals this is also valid in lived practice. Thirdly, it has been revealed that increasing the perceived risk of being caught might be effective for those with lower vertical and horizontal trust, although the association is weak and only relevant in some time periods. Overall, therefore, this paper provides evidence to support the view that participants in the informal economy are more social actors engaging in such activity when there is low vertical and horizontal trust rather than rational economic actors who participate in such activity when the expected benefits outweigh the perceived costs.

Turning to the policy implications, this paper reveals the need to shift beyond increasing the punishments and risks of being caught and towards building vertical and horizontal trust. This will require a significant change in policy approach. How, therefore, can this be achieved? To enhance vertical trust, there is a need to align the laws and regulations of formal institutions with the norms, beliefs and values of informal institutions (Helmke and Levitsky, 2004; North 1990). To align them, either the informal and/or the formal institutions can be changed. To change norms, values and beliefs regarding the acceptability of informal work, education and awareness raising initiatives are required, such as "your taxes paid for this" billboards on ambulances and fire engines, in hospitals, and on public facilities. The population groups to target, as shown, are younger age groups, the self-employed, people with no children, those living in rural areas and villages, and with difficulties paying the bills most of the time. Vertical trust can also be improved by changing the formal institutions. As previous studies reveal, participation in the informal economy decreases when there is procedural fairness, with citizens believing they pay their fair share (Molero and Pujol, 2012), procedural justice, with citizens believing that the state treats them respectfully and impartially (Kogler et al., 2013; Murphy, 2005), and redistributive justice, with citizens believing that they receive the public goods they deserve (Kogler et al., 2013).

To enhance horizontal trust, meanwhile, there is a need for state authorities to stop publicising statistics on the sizeable magnitude of the informal economy. This is deleterious to horizontal trust. Instead, messages should emphasise the high levels of compliance. Previous research reveals such messages are most effective when tailored to the targeted recipient by including data on their occupation, industry and/or local area (Hallsworth et al., 2017).

This paper, nevertheless, has its limitations. It only examines Western Europe. There is therefore a need for caution when extrapolating these findings to other global regions and countries. For example, the perception of the level of penalties and risk of being caught may differ across global regions and countries. Whether the findings are valid in other contexts requires testing. Moreover, due to the data set limitations, this study has used a proxy indicator for household income, namely the frequency with which the household has witnessed financial difficulties. It has also used two proxy indicators for vertical and horizontal trust that could be extended in future studies. A limitation of this study is that the specific formal institutions (e.g. judiciary, politicians, tax administrations) in which verical trust is lacking have not been identified, and other forms of horizontal trust beyond generalized trust not investigated. These issues could be evaluated in future studies.

In sum, if the outcome of this paper is that these theorizations of participation in the informal economy, and the interplay between them, are evaluated in other global regions, then one of the intentions of this paper will have been fulfilled. If West European governments recognize the need to move beyond increasing the level of punishments and risk of being caught, and towards building vertical and horizontal trust, then the other more practice-oriented intention of this paper will have been also fulfilled.

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Table 1. Descriptive statistics of those participating in the informal economy in Western Europe, 2007-2019

| | Participating in informal economy | | | Not participating in informal economy | | |
|---|---|---|---|---|---|---|
| | 2007 | 2013 | 2019 | 2007 | 2013 | 2019 |
| All surveyed (%) | 5.5 | 4.3 | 3.8 | 94.5 | 95.7 | 96.2 |
| Perceived punishment (%) | | | | | | |
| Tax or social security contributions due | 28 | 28 | 32 | 17 | 22 | 20 |
| Tax or social security contributions + fine or prison | 72 | 72 | 68 | 83 | 78 | 80 |
| Risk of being caught (%) | | | | | | |
| Very small/fairly small | 76 | 73 | 69 | 63 | 58 | 56 |
| Fairly high/very high | 24 | 27 | 31 | 37 | 42 | 44 |
| Tax morale – vertical trust (mean) | 3.71 | 3.71 | 4.05 | 2.32 | 2.25 | 2.43 |
| Know anyone who works undeclared - horizontal trust (%) | | | | | | |
| Yes | 88 | 85 | 80 | 43 | 32 | 33 |
| No | 12 | 15 | 20 | 57 | 68 | 67 |
| Gender (%) | | | | | | |
| Female | 38 | 42 | 47 | 55 | 52 | 52 |
| Male | 62 | 53 | 53 | 45 | 48 | 48 |
| Age (mean) | 36 | 36 | 39 | 48 | 49 | 52 |
| Occupation (%) | | | | | | |
| Self-Employed | 12 | 10 | 10 | 5 | 6 | 6 |
| Employed | 42 | 39 | 40 | 46 | 45 | 43 |
| Not working | 46 | 51 | 50 | 49 | 49 | 51 |
| People 15+ years in own household | | | | | | |
| One | 25 | 31 | 27 | 25 | 26 | 27 |
| Two | 41 | 39 | 40 | 51 | 51 | 53 |
| Three and More | 34 | 30 | 33 | 24 | 23 | 20 |
| Children (%) | | | | | | |
| No children | 93 | 96 | 72 | 94 | 95 | 76 |
| Having children | 7 | 4 | 28 | 6 | 5 | 24 |
| Area (%) | | | | | | |
| Rural area or village | 44 | 37 | 36 | 38 | 35 | 34 |
| Small or middle-sized town | 35 | 39 | 40 | 37 | 40 | 39 |
| Large town | 21 | 24 | 24 | 25 | 25 | 27 |
| Difficulties paying bills (%) | | | | | | |
| Most of the time | - | 18 | 12 | - | 8 | 5 |
| From time to tome | - | 33 | 26 | - | 24 | 17 |
| Almost never/never | - | 49 | 62 | - | 68 | 78 |

*Source:* 2019 Eurobarometer 92.1 survey, 2013 Eurobarometer 79.2 survey and 2007 Eurobarometer 67.3 survey

Table 2. Probit estimates of the propensity to participate in the informal economy in Western Europe, 2007, 2013 and 2019

| | 2007 | 2013 | 2019 |
|---|---|---|---|
| | β (Robust se) | β (Robust se) | β (Robust se) |
| Expected punishment (Tax or social security contributions due) | | | |
| + fine or prison | -0.337* (0.203) | -0.0398 (0.206) | -0.214 (0.186) |
| Risk of being caught (Very small/fairly small) | | | |
| Fairly high/very high | -0.443** (0.213) | 0.138 (0.179) | -0.102 (0.152) |
| Vertical Trust | 0.132*** (0.0330) | 0.234*** (0.0391) | 0.115*** (0.0314) |
| Horizontal Trust | 0.871*** (0.158) | 1.060*** (0.162) | 0.811*** (0.147) |
| Gender (Female) | | | |
| Male | 0.260*** (0.0612) | 0.164** (0.0692) | 0.0843 (0.0649) |
| Age (exact age) | -0.0180*** (0.00191) | -0.0203*** (0.00209) | -0.0196*** (0.00208) |
| Occupation (Self-employed) | | | |
| Employed | -0.439*** (0.105) | -0.322*** (0.119) | -0.429*** (0.117) |
| Not working | -0.192* (0.107) | -0.0495 (0.118) | -0.242** (0.117) |
| People 15+ years in own household (One) | | | |
| Two | -0.195** (0.0763) | -0.195** (0.0814) | -0.0146 (0.0813) |
| Three and more | -0.116 (0.0829) | -0.154* (0.0922) | 0.0663 (0.0897) |
| Children (No children) | | | |
| Having children | -0.0525 (0.116) | -0.342** (0.167) | -0.142* (0.0787) |
| Area (Rural area or village) | | | |
| Small or middle-sized town | -0.0766 (0.0689) | -0.0502 (0.0772) | -0.0449 (0.0752) |
| Large town | -0.202** (0.0791) | -0.101 (0.0879) | -0.141* (0.0851) |
| Difficulties paying bills (Most of the time) | | | |
| From time to time | | -0.184* (0.107) | -0.286** (0.126) |
| Almost never/ never | | -0.368*** (0.102) | -0.401*** (0.116) |
| *Interactions* | | | |
| Punishment x Vertical Trust | 0.0534 (0.0367) | 0.00632 (0.0416) | 0.00878 (0.0342) |
| Detection x Vertical Trust | 0.0321 (0.0391) | -0.0788** (0.0376) | -0.0115 (0.0298) |
| Punishment x Horizontal Trust | -0.116 (0.171) | -0.0139 (0.173) | 0.00763 (0.159) |
| Detection x Horizontal Trust | 0.323* (0.166) | -0.0861 (0.158) | -0.0505 (0.146) |
| Constant | -1.176*** (0.238) | -1.530*** (0.268) | -0.773*** (0.266) |
| N | 6475 | 6495 | 6758 |
| Pseudo $R^2$ | 0.2274 | 0.2745 | 0.2165 |
| Log pseudolikelihood | -1065.136 | -835.1518 | -858.3822 |
| $\chi^2$ | 388.05 | 432.34 | 352.29 |
| p> | 0.0000 | 0.0000 | 0.0000 |

*Source*: author calculations from 2019 Eurobarometer 92.1 survey, 2013 Eurobarometer 79.2 survey and 2007 Eurobarometer 67.3 survey

Notes: Significant at *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. All coefficients are compared to the benchmark category, shown in brackets. When multiple imputation techniques are used (ten imputations were simulated through a system of chained equations for every missing value) for addressing the missing responses, the same variables are significantly associated. Therefore, we use no imputation to minimize bias.

Table 3. Summary findings of hypotheses

| Hypothesis | 2007 | 2013 | 2019 |
|---|---|---|---|
| *Rational economic actor hypothesis* (H1): | | | |
| *H1a:* higher perceived punishments | Accept | Reject | Reject |
| *H1b:* higher perceived risks of being caught | Accept | Reject | Reject |
| *Social actor hypothesis* (H2): | | | |
| *H2a*: higher levels of vertical trust. | Accept | Accept | Accept |
| *H2b*: higher levels of horizontal trust | Accept | Accept | Accept |
| *Moderating effects of vertical trust hypothesis* (H3): | | | |
| *H3a:* effects of higher perceived punishments on participation vary by vertical trust | Reject | Reject | Reject |
| *H3b:* effects of higher perceived risks of being caught on participation vary by vertical trust | Reject | Accept | Reject |
| *Moderating effects of horizontal trust hypothesis* (H4): | | | |
| *H4a:* effects of higher perceived punishments on participation vary by horizontal trust | Reject | Reject | Reject |
| *H4b:* effects of higher perceived risks of being caught on participation vary by horizontal trust | Accept | Reject | Reject |