

Saying & Doing – Two separate things?

A study in how taxpayers' behavior is affected by
tax morale.

Abstract

The subject of tax morale and tax compliance has become one of increasing attention from an economist's point of view. Tax evasion amongst private people is a crime that is estimated to cost the government around 22 billion SEK every year. Plenty economists research the determinants of tax morale in hope of finding ways to increase the actual level of tax compliance. This thesis questions the sometimes taken for granted linkage between attitude and behavior. The purpose of the thesis is to examine whether tax morale affects the taxpayer's actual behavior and directly answer the question: "*Does high tax morale implicate increased actual amount of tax paid?*"

This thesis differ from previous research in the way that the dependent variable is here measured as an average of the total paid tax in each municipality in Sweden and is thereby supposed to be a more accurate measure of actual behavior. Using fixed effects regressions with Swedish municipality data over four years during the period 2001 – 2006, we fail to reject the null hypothesis and cannot draw any conclusion regarding the response of tax morale on taxpayers' behavior. Whether this insignificance is due to the hardship of avoiding tax payments is controlled for in a secondary model which neither receives any significant results. The findings suggest that further research in the area of attitude and actual behavior is needed.

Key words: tax morale; fixed effects; tax evasion

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1. Introduction

1.1 Context and background

Tax evasion amongst *private people* in Sweden is estimated by The Swedish Tax Agency (henceforward SKV) to 22 billion Swedish *kronor* (henceforward SEK) which equals 5 percent of the actual tax levied on private people (SKV Rapport 2008:1). Tax evasion refers to the illegal minimization of tax payments (Braithwaite and Wenzel 2008, p. 306).¹

14 percent of the population report that they would withhold income from taxation if possible, and they regard black payments as acceptable (SKV Rapport 2007:3). This constitutes a dilemma for the government. Increasing the tax rate would make up for the loss of evasion but almost certainly raise the discontent of the public opinion towards the government. In order to investigate compliance, government, institutions and economists have researched the origins of tax morale. What determines attitudes towards taxation?

Economists have for a long period of time attempt to answer the question of *why do not individuals comply?* The deterrence model, initial developed by Becker (1968) has in the past highly influenced the research on tax compliance. Empirical evidence, however, indicate that this model consistently overestimates the tax evasion ratio (Andreoni, Erard and Feinstein 1998). These findings have switched the attention away from why people do not comply into why people actually pay their taxes. There is however major difficulties regarding the computation of tax evasion, whether it is macro-, micro based or both. Besides the difficulty of calculating the size of the errors that occur, it is also, in many ways difficult to determine what constitutes tax evasion. In turn, this makes estimations of tax evasion determinants complicated.

The subject of tax morale and tax compliance has become one of increasing attention from an economist's point of view. Plenty of research has investigated the determinants of tax morale in hope of finding what influences actual amount of tax paid. But should this relation be treated as a certainty? Does high tax morale necessarily mean an increased amount of tax paid and vice versa? Or may individuals act against their own attitude towards tax due to external factors? We will argue that too little research has been made concerning this subject.

¹ *Tax evasion* and *tax non-compliance* are in this setting used as substitutes. Further, it is common to distinct between *tax evasion* and *tax avoidance* where the former refers to an illegal minimization of tax payments, and the latter to a legal minimization (Braithwaite and Wenzel 2008, p. 306). We will therefore separate treat them separately as well.

1.2 Statement of purpose

In this thesis we aim at investigating the linkage between tax morale and actual behavior, hence, give an answer to the question: “*Does high tax morale implicate increased actual amount of tax paid?*”

The purpose of the thesis is to examine whether tax morale affects actual taxing behavior. It is our aspiration that this thesis will be a complement and aid the research revolving around the area of tax compliance. Moreover, it is our hope that this thesis also will be a reminder that attitude and behavior are two different things and that the relationship between them needs to be more thoroughly investigated.

1.3 Structure

In section 2, an overview of the literature in the tax compliance area is reported. It concludes with the hypothesis we aim to investigate, as well as a motivation. The method, including a description of the variables in the model, some econometric consideration and the model itself is presented in section 3. The data and sample, as well as descriptive statistics are explained in section 4. The results and the following annotations are presented and discussed in section 5. Section 6 discuss and summarizes the thesis. The appendix is displayed in the end.

2. Literature overview

The empirical- and theoretical research about tax compliance and tax evasion is exhaustive with vast contributions; extensions of earlier findings and models as well as some contradictions. For that reason, we will primarily present the most prominent literature and findings as well as comprehensive review studies conducted by leading authorities in the subject.²

2.1 Economics of deterrence

“Tax evasion is defined as an illegal act of commission or omission that reduces or prevents tax liability that would otherwise be incurred”

(Braithwaite and Wenzel 2008, p. 306).

A pioneer within the research of crime was Gary S. Becker who was awarded the Nobel Memorial Prize in Economic Sciences in 1992, inter alia for his contribution “Crime and Punishment” (Becker 1968), where he states that criminal actions including tax evasion and other

² For an excellent literature review, please see Andreoni, Erard and Feinstein (1998), Slemrod (2007) and Braithwaite and Wenzel (2008, pp. 304-334).

non-violation crimes can be reduced (as well as increased) by variation in the variables p , probability of getting caught and f , the magnitude of the punishment. This is due to the belief that individuals make rational decisions, calculating if the benefit of committing a crime outweighs the cost. This is often referred to as the economic model of crime or the deterrence model, which relies on the assumption of rational agents who are seeking to maximize their utility.

An elaboration of Becker's (1968) theory was performed by Allingham and Sandmo (1972) where they investigate individual's deterrents on underreporting taxable income, tax evasion. They assume that an individual can either declare his total income or underreport some of it. The decision of whether or not to withhold income, X , depends on the expected payoff. Further, the payoff depends on the actual income, W , the tax rate Ω , the probability of getting caught, p , and in which case one has to pay the accurate tax as well as facing a cost in form of a penalty rate, π , which exceeds Ω . Like the scenario described by Becker, the individual faces a first-order condition where he/she is about to maximize utility, U , by choosing the level of declared income, X . Among their findings it is worth mentioning that 1) there is a positive correlation between reported income X and the penalty rate, π . 2) There is a positive correlation between the probability of detection, p , and X . Hence, an increase in penalty rate and/or audit will enforce compliance. This is, in accordance with Becker, since individuals make rational calculations and compare the potential benefit against the potential cost. 3) Variation in the tax rate, Ω , has an ambiguous effect on withholding income. They find that the effect depends on absolute risk aversion, in particular the pace at which it is declining assuming that π is constant.

2.2 Why do people pay taxes?

The question of *why do people evade taxes* has been reformulated into *why do people actually pay their taxes?* Based on the standard economic model developed by Allingham and Sandmo (1972), taxpayers should evade taxes by a larger extent than they actually do. The model predicts a higher level of non-compliance and cheating than observed in the real world. Andreoni, Erard and Feinstein (1998) thoroughly describe the most prominent findings on individuals' income tax compliance. The authors expand the Allingham and Sandmo model by changing the assumption that the probability of audit is constant into making it a function of the reported income. By doing so, the unambiguous effects of probability of detection and fear of punishment on tax compliance becomes more ambiguous, or rather, more complex to investigate. Further, they examine the question why most individuals are honest when reporting their income. One possible explanation given is the limited opportunity to cheat. Studies have shown that people

with a greater opportunity (e.g. income received in form of cash) to withhold income evade taxes to a greater extent than people with less opportunity. Alm, McClelland and Schulze (1992) claims that individuals over-estimate the probability of audit and that it results in a higher level of compliance than *necessary*. However, Andreoni, Erard and Feinstein (1998) also explain the observed level of compliance with concepts like morality, social behavior and fairness. These variables extend the standard economic-of-crime model that predicts that individuals only follow rules and pay their accurate tax due to the fear of a penalty and probability of getting caught.

Umashanker Trivedi, Shehata and Lynn (2003) further explore this linkage where they test whether personal and situational factors affect tax compliance. Their findings suggest that taxpayers respond to the behavior of other taxpayers, a peer reporting behavior. Subsequently, they suggest that compliance should be encouraged with not only punishment but also with an information system concerning the actual degree of compliance in order to motivate taxpayers. What the authors do not investigate is the possible effects of negative reciprocity. An information system could lead to an opposite effect than that suggested by Umashanker Trivedi, Shehata and Lynn (2003). Fehr and Gächter (2000) claim that people act in a reciprocal manner, in contrast to the standard economic theory, which describes individuals as self-interested agents. They find that individuals positively respond and reward a cooperative behavior, called positive reciprocity. On the other hand, when people do not cooperate, reciprocal types act in a revenging manner, even at a cost where rational self-interested individuals, in contrast, would not do. Ostrom (2000) describes these kinds of individuals as *conditional cooperators* and *willing punishers*. Frey and Torgler (2007) address the importance of conditional cooperators when it comes to tax compliance. They find a significant positive relationship between perceived tax evasion of others, and tax morale. Further, when treating tax morale as the dependent variable, it was also shown that institutional quality affected the individual's tax morale. This is consistent with other empirical findings where tax evasion and attitudes towards taxes is correlated with corruption and trust to the government (Torgler 2005 and Slemrod 2007). It is also said to be a matter of fairness (Andreoni, Erard and Feinstein 1998). La Porta et al. (1999) finds that the level of tax compliance is higher in countries with less corruption.

Whether tax evasion depends on income class is ambiguous. The statement “The poor evade and the rich avoid” is a quote sprung from studies where it was shown that individuals within low-income classes tend to evade more than individuals in the higher income classes. However, it is likely to suspect the high compliance rate among the high-income groups to be overestimated (Slemrod 2007). The distinction between evaders and non-evaders is problematic but what seems to be consistent is that people aged 65 + evade less than the younger population

and further, that women have a higher compliance rate than men (Slemrod 2007). Finally, Slemrod (2008) concludes that demographic variables affect tax evasion ambiguously.

2.3 Swedish literature

A great majority of the above reviewed literature is research from the US. One reason for this is due to the extensive work performed by the Internal Revenue Service, IRS, which has enabled a lot of research, with US data. However, SKV is considered to be among the prime tax agencies in the world regarding the provision of national surveys. The results from Swedish surveys do not differ remarkably from those conducted in the US.

Wärneryd and Walerud (1982) conducted a survey in order to explain tax evasion. With a sample of 426 Swedish males, they found that variables like age, and attitudes towards taxes and tax crimes had an impact on tax evasion, they were both negatively correlated with tax evasion. Thus, the younger and people with lower attitudes than average tended to explain tax evasion and black payments significantly.

A more recent study made by SKV (SKV Rapport 2005:1) claims that factors like norms and morality explain compliance and has a greater impact than enforcement, tax rates and economic incentives. It does not neglect the importance of punishment and audit, but argues that such of enforcement rather support norms than work as deterrence. Further, the report states that norms like reciprocity are one the most significant factors to help explain individuals' behavior. That is, individuals act like other people in their surroundings. However, this kind of behavior relies on the willingness to punish violators of the rule, which is why the trust in SKV is also said to be another important factor to explain compliance. This is in line with previous research from the US. However, the Swedes do not consider SKV to perform a satisfactory work when it comes to reduce and fight tax evasion. Moreover, around 60 percent of the population considers tax evasion to be a severe problem in society. Withholding income is regarded as more severe than receiving black payments. The perhaps most striking finding is that people believe factors like "too high taxes" and "people in prominent positions evade" to be the most important causes for tax evasion (SKV Rapport 2007:3). One should add that those factors are only *believed* by the Swedes to cause tax evasion.

A comprehensive study by Wahlund (1991) examines the effects on economic behavior as a result of the income tax changes in Sweden 1982. Further, the study looks at factors that can explain tax evasion. The results rely on Swedish data solely and can be considered as a prominent contribution regarding Swedes economic behavior, attitudes towards taxes and tax evasion as well

as the factors explaining it. It also contains a well-performed research overview, including both national and international findings.³

Wahlund (1991) created a model with tax evasion as the dependent variable. The variable is computed from survey questions like “admitted tax evasion”, “admitted illegal deduction” and “admitted black payments” and is considered to represent *actual* behavior. Moreover, in the model, attitudes towards crime are expected to have a negative impact on tax evasion i.e. stricter attitude implies less tax evasion. This, reasons Wahlund, is because committing a crime is more “morally costly”, for an individual with a strict attitude, than for a person with a more lax attitude (Wahlund, 1991, p. 109). The hypothesis receives significant support. Moreover, receiving black payments and withholding income was the most common way to evade taxes (Wahlund 1991, p. 182). Other important findings are consistent with earlier research; inter alia, that the opportunity to evade, young age and self-employment correlates positively with tax evasion.

2.4 Social norms

Van der Weele (2009) claims that the deterrence model is insufficient; it cannot by itself explain compliance since it does not consider social interactions between individuals. He argues that compliance is motivated through social norms and moral values and that these motives can be encouraged as well as discouraged by policies affecting the beliefs of other taxpayers. Other findings indicate similar results; morality and social norms can partly be described as substitutes for enforcement since they influence and encourage a certain behavior (Polinsky, Shavell and Shavell 2008).

Social norms can be defined as an individual’s behavior that is affected by the judgment of others (Lindbeck 2008). Further, social norms must be shared by others, and are not outcome-orientated, in contrast to rational actions (Elster 1989). It is common to divide social norms into two groups; one affected by external incentives (“I have to pay my taxes”), the other by internal incentives (“I would like to pay my taxes”) (Polinsky, Shavell and Shavell 2008). The former refers to individual behavior affected by others, in particular others’ disapproval/approval of a certain behavior. The individual tries to behave in accordance with the general accepted rules and suffer from shame when he/she behaves in a manner that is not appreciated by others. The other way around, the individual feel pride when the behavior is appreciated and accepted by others

³ For example; Vogel (1970) contributed to the national, as well as, international research, where he tested and found support that tax morale depends on ideological orientation, knowledge, experience, own resources, stipulated exchange and the supply on illegal means; through their effect on aspirations and illegal opportunities (Vogel 1970, p. 20).

(Lindbeck 2008). The latter refers to personal incentives, whether a person feel pride or guilt over their own behavior, based on personal references (Polinsky, Shavell and Shavell 2008). Tax morale is said to be an internal incentive (Braithwaite and Wenzel 2008, p. 310).

Attitudes towards a certain behavior is said to be an important factor when analyzing social norms (Lindbeck 2008). If attitudes towards e.g. tax evasion are lax, evading tax would not been seen as a shameful act. From this point of view, one could explain the relatively high respond to audit not only by the possibility of punishment, but also that tax payers may respond to audit because they would feel embarrassed, with shame, if getting caught (Lindbeck, Nyberg and Weibull 1999). However, whether attitudes actually affect individuals' behavior is not sufficiently examined. A few studies in Sweden, regarding attitudes and actual absence from work due to illness, show that actual absence is affected by the attitudes towards that behavior. (Lindbeck 2008). However, the feeling of shame or guilt when evading taxes has showed to be one of the most consistent and significant factors when explaining tax evasion (Braithwaite and Wenzel 2008, p. 310).

The extended deterrence model, where social norms are treated more equally to economic incentives has been used more frequently over the last ten years. Östling (2009) found that changes in income affect an individual's moral values when testing if changes in moral values depend on changes in prices of immoral goods and in income. The results show that consumers' moral attitude towards an immoral product decreases as the income and consumption of that goods increases, hence the product is seen as less immoral.

The relationship between social tax norms and tax evasion is examined by Edlund and Åberg (2002). They find that countries with high taxes tend to have slightly lower tax morale. However, Ellingsen (2002) responds to their findings and question if it is accurate to assume that the tax level is completely independent of tax morale. Ellingsen (2002) argues that it is possible to assume that tax morale is high in countries with good institutions and a large public sectors and hence, countries with high taxes. Therefore, he argues, one can expect a higher tax rate in countries with high tax morale. Further, Edlund and Åberg could not find any support that social tax norms affect tax evasion. In this setting, tax evasion was measured as the shadow economy. Finally, they conclude that social tax norms do not influence the shadow economy and argues, in contrast to others, that an individual's moral values cannot help to explain tax behavior. Ellingsen (2002) criticized these results on the basis of methodological problems. Further, Torgler (2005) reveals findings that support a (negative) relationship between tax morale and tax evasion, including studies that investigate the correlation between the shadow economy and tax morale.

2.5 Tax morale

The research on the effect of tax moral on tax evasion has increased over the past years. It was found that people who use a high degree of moral reasoning in their decision-making had less intention to evade. (Kaplan, Newberry and Reckers 1997).⁴ Further, there seems to be a negative correlation between tax morale and the shadow economy (Torgler and Schneider 2009).

The determinants that seem to affect tax morale is factors like well-working institutions, the legitimacy and quality of institutions and other factors related to the trust to the government (Alm and Torgler 2006). This is in line with previous research that suggests that fairness and reciprocity matters, if the government behaves in a good manner, so will the citizen do. Moreover, cultural differences and religion may affect tax moral, in addition to the tax burden and the tax system (Torgler and Schneider 2007, and Torgler et al. 2008). However, the subject needs further attention. The results vary and, more important, how does one measure *tax evasion* and *tax morale*?

In conclusion, the literature on tax evasion and what affects it, is extensive. To explain tax compliance, the deterrence model has been well used among researchers and scientists. However, the fear of sanction is not the only explaining factor since it suggests contradicting findings on the deterrence effect. Factors like trust in government, and social norms are also considered to play a significant role. Today, social incentives are treated more equally to economic incentives.

2.6 Contribution of this study

Estimating tax evasion is complicated. Andreoni, Erard and Feinstein (1998, p. 836) discuss the measurement problems and conclude:

“The most reliable information about noncompliance is based on actual tax return information that has been thoroughly examined by auditors.”

Nevertheless, some of the literature described above, measure *tax evasion* from survey questions.

Torgler (2003, pp. 258-259) tests whether individuals with lower tax morale underreport income and/or overstate deductions to a greater extent than individual with a higher degree of tax morale. Tax evasion is measured by the questions:

⁴ The authors refer a study where it is claimed that the relationship between moral reasoning and behavior depends on the extent to which the individual uses moral reasoning when making decisions. We find this to be a reasonable assumption.

1. Within the past five years or so, do you think you might have overstated any deductions or expenses – like medical, charitable or business deductions, and so forth – even by just a small amount?

1. Definitely have not 2. Probably have not 3. Probably have 4. Definitely have

and,

2. Within the past five years or so, do you think you might have left some reportable income off your federal tax return – even, just a minor amount?

1. Definitely have not 2. Probably have not 3. Probably have 4. Definitely have

Torgler (2003) puts a relevant hypothesis since he indirectly attempts to answer the question if there is there a relationship between tax morale and actual behavior. He finds significant support for the hypothesis. The remaining question is whether the measurement of tax evasion responds to actual behavior. Surveys contribute with important socio-demographic information but self-report answers may lead to measurement errors (Andreoni, Erard and Feinstein 1998), especially in the case of tax evasion. It is possible that an individual consider it never justifiable to cheat on taxes, but underreport income anyway. One should also assess the possibility that an individual consider the tax evasion of others as a terrible act, but rationalize its own evading behavior.

The potential pitfalls with survey results are shortly discussed above. Hence, one may recognize a gap in the literature regarding the effect of tax morale on *actual* tax evasion. For these reason, it is relevant to examine the relationship between tax morale and actual behavior. Governments around the world spend much resource on increasing the tax compliance level. One example of this is the tax reform in Sweden in the beginning of 1990 (Malmer 1995, p. 226). One aim of the reform was to induce an increase in the tax morale of the population. What if a higher level of tax morale does not lead to a lower level of actual tax evasion? Moreover, if there is a negative relationship, as the literature suggest, how significant is the effect?

This thesis contributes with a new and more accurate measurement of actual behavior. Instead of using survey questions to measure tax evasion, the dependent variable measures the average total paid tax in each municipality in Sweden. Together with an extensive dataset from SKV, tax morale is measured as a municipality average in the years of 2001, 2002, 2004 and 2006. The panel data set enables the control of municipality specific factors and the purpose of the thesis is to examine whether tax morale affects the taxpayers' actual behavior.

Hypothesis

To carry out the purpose of this thesis, the following hypothesis will be examined:

H₁: Tax morale has a positive effect on taxpayers' behavior.

3. Methodology

The effect of tax morale on actual paid tax is tested by a panel data set consisting of Swedish municipalities between the time period 2001-2002, 2004 and 2006 ($T=4$). The data is divided into municipalities in order to create a panel data set where the average tax morale in municipality i , is matched with the actual paid tax in that municipality. This setting is not possible at the individual level due to information restrictions.⁵ More important, we find it reasonable to believe the population in certain municipalities to historically have a higher (or lower) level of tax morale for unobserved local reasons. The economic intuition behind this assumption refers primary to *local policies*. There are differences across municipalities regarding governing and wealth. Consider if the local government does not tend to distribute their assets as well or efficiently as neighboring municipalities. Then there are strong reasons to believe that the trust for the authority differs among municipalities and, hence, the tax morale may differ as well due to the local circumstances. Further, one must take demographical aspects into account. Small or scarcely populated municipalities might prove to have a deviating degree of tax morale than their larger populated neighbors. For instance, small regions might be more influenced by peer reporting behavior than other larger regions. Thus, when small regions commence an evading behavior, the behavior receives acceptance in a greater extent than it would have in a large region. Social norms are believed to have a more significant effect on the individual's behavior in smaller municipalities, which causes the intrinsic motivation to pay taxes to vary between municipalities. Lastly, these unobserved factors are most likely constant over a five-year period but, as argued, likely to vary across municipalities. By using a fixed effect model, all time-invariant differences between municipalities are controlled for. Hence, the model is estimated with fixed effect in order to deal with potential omitted variables bias in the coefficients β_1 of the key explanatory variable, *Tax morale*.

The dependent variable, *TotTax*, is described in section 3.1. The key explanatory variable, *TaxMor*, is described in section 3.2. *TaxRate* is used as a control variable, together with the unemployment rate, *Unemp*. Further, year dummy variables are included to control for year specific factors. All control variables are described in section 3.3.

⁵ The total paid tax at the individual level is public information. However, the surveys carried out by SKV from where tax moral is measured, do not report personal identity number.

3.1 Dependent variable

Measurements of tax evasion are difficult. Computations based on macro methods are subject to assumptions regarding international relations. Calculations on micro level are vulnerable because there are grey areas for what constitutes tax evasion and what group to assign the potential evasion. Deductible expenses are one area where it might not be entirely clear whether a certain action constitutes a felony or not or if it should be assigned to the private person conducting it or the company from where it was deducted.

As discussed above, tax evasion measured from questionnaires and surveys are subject to measurement error. For example, in Wärneryd and Walerud (1982, p. 193), tax evasion was measured with the survey question:

“It can often be read in the newspapers that many people do not report all their incomes or make too large deductions in their income tax returns. Did you ever make a deduction for an expense you have not had or fail to report an income?”

We recognize two problems with the question in order to define tax evasion: 1) The question completely relies on the respondent's honesty. According to Andreoni, Erard and Feinstein (1998), almost 80 percent of the respondents in an IRS-commissioned national survey claim that they have not withhold any income from reporting or made any illegal deductions. That is not consistent with the national statistics, which estimate 40 percent of the households to underreport income. 2) The introduction sentence in the question may lead to a bias answer. This, if one assume that people act and react to other people's behavior.

There are, in conclusion, difficulties in appreciating the actual tax evasion. Further, due to unclear boundaries of what constitutes evasion and how to measure it, there are ways for a private person to pay more or less in tax within the boundaries of what is legal or at least within the boundaries of the grey area. In addition, there might also exist an element of private tax planning. A reluctance or benevolence towards taxes might actually induce higher or lower amount of tax paid. If the hypothesis that high tax rates means increased reluctance of paying taxes this could either lead to the withholding of income on capital i.e. tax evasion. It could also potentially lead to unwillingness to sell of capital in order to avoid taxation. The same reasoning could be applied to other forms of taxes, inter alia, decreased pension savings in order to avoid pension taxes and not committing to a membership in church due to church taxation.

To conclude, there are many factors that play a part in what in the end constitutes the final tax and there are many variables that affect the actual amount paid. Tax evasion is a flawed measure either way one appreciates it and to properly assess the effect that tax morale have on tax paying behavior it should be measured on actual tax return information (Andreoni, Erard and Feinstein 1998). Moreover, the purpose of this thesis is to examine the taxpayers' actual behavior, which is somewhat different from tax evasion. Tax evasion refers to the illegal minimization of tax payments (Braithwaite and Wenzel 2008, p. 306) whereas the dependent variable includes every type of tax payment outcome. It corresponds to the actual amount paid and does not adequately reflect tax evasion.

Therefore, the variable *TotTax* serves as the dependent variable and it represents the average amount of total tax paid in every municipality in Sweden at each time period t . The variable includes state and municipal income tax on earned-income, state income tax on capital income, wealth tax, property tax, national pension, church- and burial charges, taxes on business activities and deductions for tax reductions and other taxes. It is measured in thousands of SEK.

In addition, we will run a regression where the dependent variable only includes state income tax on capital income, called *TaxCap*. This is due to the fact that the variable *TotTax* includes all variants of private taxes and that the opportunity to evade differs between types of taxes. For example, if the total income for an individual emanates from one employer and that employer reports the accurate income to the tax agency, then there is almost no opportunity for that individual to withhold income from taxation. Further, research suggests that the opportunity to evade plays a significant role in tax evasion (Andreoni, Erard and Feinstein 1998). Since a great majority of the Swedes' earned income is directly reported to SKV, the variable *TotTax* may be insensitive to variation. That is, if there is only an opportunity to withhold income from e.g. capital and that the state income tax on capital income is a small share of the total tax then changes in tax morale will slightly affect variations in the total tax paid.

State income tax on capital income can be considered to include a greater opportunity of evasion than tax on earned income, and by adding this additional dependent variable we examine if there are any differences of tax morale on different kinds of taxes, and if there are, we hope to avoid a potential insensitiveness. The state income tax rate on capital income is 30 percent and is levied on a capital income surplus that exceeds 100 SEK (SKV 2010). The variable is measured in thousands of SEK and represents the average total capital tax paid in each municipality i at each time period t .

3.2 Explanatory variable

Tax morale represents the willingness to pay taxes; the intrinsic motivation (Torgler and Schneider 2009). When measuring tax morale, a common data source used is the World Value Surveys, where the following question is frequently used: ⁶

Please tell me for each of the following statements whether you think it can always be justified, it can never be justified, or it falls somewhere in between: ...Cheating on taxes if you have the chance?

Researchers using own conducted surveys to measure tax morale, uses similar questions. To the extent of the research, it has not been found any significantly deviating questions to measure tax morale.

In this setting, tax morale is defined from survey questions carried out by SKV. Every other year, SKV performs a national postal survey with purpose to examine the Swedes' attitudes towards the taxation system, tax evasion and tax control.

The question used is as follows:

To what extent do you agree with the following statements if you use a scale from 1 to 5, where 1 equals "do not agree at all" and 5 equals "completely agree"?

1) If I had the opportunity, I would withhold income from taxation.

In the question, low values are recognized to represent high tax morale, and high values to symbolize a lower degree of tax morale. For the ease of the analysis, the scale has been reversed. That is, value 5= completely agree, obtains the value of 1, 4 become 2, 3=3, 2 becomes 4 and the value of 1=do not agree at all, obtains the value of 5. In this setting, a higher value responds to a higher level of tax morale, which may be considered more logical.

A drawback with the question is that it only treats attitudes towards withholding income. According to Wahlund (1991, p.182) receiving black payments and withholding income is the most common way to evade taxes. Thus, it would be preferable to include a question regarding the attitudes towards black payments. SKV provides a question:

2) It is OK for people to work black.

Unfortunately, that question is only put in the two latest surveys (SKV Rapport 2005:7 and SKV Rapport 2007:3, not available in SKV Rapport 2001:4 and SKV Rapport 2003:2). For the ease of the analysis, we chose to leave that influence out. If question 2) were to be included, it

⁶ For example, see Frey and Torgler (2007) or Edlund and Åberg (2002).

would be more intricate to look at changes in tax morale over time, since it is likely that a person considers it morally acceptable to work black/receive black payments, but consider it to be immoral to withhold income from taxation. In general, Swedes have a laxer attitude towards “working black” than towards tax evasion (SKV Rapport 2007:3).⁷

Lastly, question 1) does not solve with the attitudes towards over-deductions. Despite all this, we assess question 1) as good measurements of tax morale since it is almost identical to tax morale questions used by others.⁸ Moreover, an advantage of this question is that it is specific, and do not include an explanation for the statement which could lead to a biased answer, e.g. “If I had the opportunity, I would withhold income from taxation, *because everyone else is doing so*.” A question formulated in such a way does not respond to pure tax morale since it involves an explanation for the behavior. It could be the case that some individuals regard tax evasion morally acceptable when everyone else evades, but would consider it morally wrong in other settings. Since we solely examine whether tax morale affect the taxpayer’s behavior and not at factors that affect tax morale, question 1) is an accurate measurement in this setting. The variable *TaxMor* is measured as the average value of the score 1-5 and corresponds to the intrinsic motivation to pay taxes. It represents the overall tax morale in each municipality i at each time period t .

3.2 Control variables

Tax rate

The variable *TaxRate* is the municipal tax rate that varies unsystematically over municipalities. The tax rate is set within the municipality and may most likely change in a time-inconstant way. Consider the case where municipality i for some local reasons will face greater expenditures the forthcoming years and, therefore raises the municipality tax rate whereas other municipality tax rates stay constant/decreases for some local reasons. Since the municipality tax rate is the income tax rate that all individuals are obliged to disburse and hence, strongly affect the total paid tax in each municipality, it should therefore be controlled for. However, when net income surpasses a certain level (367.6 thousands SEK in 2009), a national tax rate of additional 20 percent is levied. There is one additional stage above this level (526.2 thousands SEK in 2009) where the income recipient needs to disburse another 5 percentage points in national tax on income i.e. 25 percent

⁷ Tax evasion was defined by the question: “For my own concern, it is Ok that people work black if they have a opportunity of doing so” (pp.34 in SKV 2007) In this setting SKV makes a distinction between working black and tax evasion.

⁸ For example, see Frey and Torgler (2007), Edlund and Åberg (2002) and Wahlund(1991, p 136).

(SKV 2009). Nevertheless, we expect the share of individuals in each municipality who face the national tax rate to change in a slow pace and to further vary systematically over municipalities. The municipality and time fixed effect gets that on average. Thus, there are logic reasons to control for the municipality tax rate solely. The variable *TaxRate* is measured in percent and corresponds to the municipality tax rate in each municipality i at each time period t .

Unemployment rate

Whether the unemployment rate change in a constant way over municipalities, or if there are reasons to believe that the changes are time-inconstant is ambiguous. However, due to local policies set by the municipality as well as local market conditions there are reasons to believe that the unemployment rate varies unsystematically over municipalities, at least to some extent. Furthermore, it is reasonable to expect that the unemployment rate affects the total paid tax in a negative way. The underlying reasoning is simple; the unemployed do not receive any income, the total paid tax in the municipality involves tax on income and gets affected by variations in the share of unemployed inhabitants. With respect to these assumptions, unemployment rate should be controlled for.

The variable *Unemp* represents the yearly rate of unemployment in each municipality i at each time period t . Unemployment is defined as actively employment seeking without employment that may immediately enter the work sector and does not engage in a work sector political program. The unemployment rate is measured in percent.

The unobserved municipality effect, a_i

a_i is a part of the composite error term and captures all the factors that are unobserved and time-constant, often referred to as the unobserved fixed effect. It does not change over time and includes all the unobserved factors that affect y_{it} , the total tax paid. The main advantage of using a fixed effect model is that a_i is allowed to correlate with the explanatory variables; in particular, we allow a_i to correlate with the key explanatory variable, *TaxMor*. This is valuable in this setting since one can expect unobserved factors that correlate with tax morale like age, education, trust to government and other factors that affect *TotTax* to be constant during the five year period, 2001-2006. A further remark is that all factors that affect *TotTax* are assumed to affect *TaxCap* in the same way and by the same amount. Therefore, we will following make no distinction between *TotTax* and *TaxCap* in the matter of factors that affects them.

The recognized factors that most likely affect our dependent variable are the municipality tax rate, the national tax rate, income, capital, wealth, age, education, sector of employment/share

inhabitants self employed and unemployment rate. As discussed in Section 2, factors like the probability of audit and trust to the government is also said to affect tax evasion, and hence one can expect them to affect the average paid tax as well.

Whether all these factors can be considered to be time-constant is a matter of discussion. Firstly, we argue for that the average age and educational level within each municipality is constant over time, at least during a five year period. This, since we find no logical reasons for the average age and educational level in one municipality to suddenly increase/decrease in a different pace compared to corresponding municipalities. Moreover, trust to the government and similar attitudes are often slow to change (Wooldridge 2009, p. 457).

Regarding capital and wealth, and the share of self employees; it is presumed that these factors are constant across municipalities, the differences are generic. The distribution of wealth and self employment is most likely constant over a five year period and is therefore captured by the municipality fixed effect.

The national tax rate does not change notably, what does change is the set level of income which decide whether one have to pay the additional national tax. All the municipalities will always face the same national tax levels and the effect is therefore captured by the time fixed effect, which will be describe more in depth in Section 3.3.

When it comes to the income level, the constant assumption becomes more difficult to make. Income does in general increase over time, at least at a nominal pace. Local variations are often due to the local work market. Consider the case where a large industry employs a majority of the inhabitants, a setback in this industry will lead to layoffs and in turn, this will have tremendous negative effects on income through the increased unemployment rate. Thus, the effect of income over time on the dependent variable will be captured by the unemployment rate variable in a fixed effect estimation. This is why the income level will not be present in the model. Adding an income variable would lead to decreased explanatory value in the unemployment variable.

Year dummies

To allow for differences in actual paid tax between years, year dummies for each of the years 2001, 2002, 2004 and 2006 are included in the model. In this way, the year dummies control for aggregate trends in the dependent variable. By not including year dummies, an increase/decrease in actual paid tax would be attributed the regressors.

3.3 Econometric considerations

The advantage of a panel data set is that it enables you to control for time-invariant variables you cannot observe or measure (Wooldridge 2009, p. 471).

Since our existing dataset is constructed as a panel data set, it enables an estimation of the return of tax morale on total tax paid by using a fixed effects estimation. A fixed effects estimation uses a transformation to remove the unobserved fixed effect prior to estimation. This is also why time-constant explanatory variables are removed in such estimation.

Consider the following general model:

$$(1.1) \quad Y_{it} = \beta_1 X_{it} + \alpha_i + \mu_{it}$$

and let $\alpha_i = \beta_0 + \beta_2 Z_i$ where Z is the unobserved, time-invariant entity characteristic, then

α_i ($i=1 \dots n$) is the unknown intercept for each entity (entity-specific intercepts).

Y_{it} is the dependent variable (DV) where i = entity and t = time.

X_{it} represents one independent variable (IV),

β_1 is the coefficient for that IV, which is the same for all entities.

μ_{it} is the error term, also known as the idiosyncratic error

By adding time effects to the entity effects model one estimates a *time and entity fixed effects regression model*:

$$(1.2) \quad Y_{it} = \beta_0 + \beta_1 X_{1,it} + \dots + \beta_k X_{k,it} + \gamma_2 E_2 + \dots + \gamma_n E_n + \delta_2 T_2 + \dots + \delta_t T_t + \mu_{it} \text{ [eq.3]}$$

Where

Y_{it} is the dependent variable (DV) where i = entity and t = time.

$X_{k,it}$ represents independent variables (IV),

β_k is the coefficient for the IVs,

μ_{it} is the error term

E_n is the entity n . Since they are binary (dummies) you have $n-1$ entities included in the model.

γ_n is the coefficient for the binary regressors(entities).

T_t is time as binary variable (dummy), which results in $t-1$ time periods.

δ_t is the coefficient for the binary time regressors.

Motivation of Fixed Effects instead of Random Effects

The advantage with fixed effects is that it allows for arbitrary correlation between α_i and the regressors (Wooldridge 2009, p. 493). Random effects rely on the assumption that α_i is uncorrelated with all independent variables. This implies that in order to assess unbiased coefficients in a random effects regression the unit fixed effect must be uncorrelated with all the explanatory variables. This is a strong assumption which in most cases makes the fixed effects model more robust. Nevertheless, it is common to apply both fixed and random effects and then perform a Hausman test in order to test for statistical significant differences in the coefficients on the explanatory variables that change over time. The Hausman test investigates whether the unique errors (α_i) are correlated with the regressors, the null hypothesis is they are not. The test suggests the use of random effects unless the Hausman test rejects the null. When performing a Hausman test, we could reject the null hypothesis at the five percent level of significance (Prob>chi2= 0.0279).⁹ Hence, the result indicates that the preferred model is fixed effect since the assumption of random effects; $\text{Cov}(x_{kit}, \alpha_i) = 0$ is violated.

Nevertheless, we performed a Breusch-Pagan Lagrange multiplier (LM) test in which the null hypothesis is that the variance across entities is zero i.e. no significant difference across units. The test rejects the null at any conventional level of significance (Prob > chi2 = 0.0000) in favor for random effects.¹⁰ The result implies that there are significant differences across entities, municipalities in this setting and indicates, in contrast to the Hausman test, that there are random effects present. Nevertheless, the proper estimation for this panel data set is fixed effects. The main reason behind the conclusion relies on the assumption that distinguishes fixed effects from random effects; whether the unobserved effect α_i is correlated with the explanatory variables, hence if it is random or fixed. If there are strong reasons to believe that $\text{Cov}(x_{kit}, \alpha_i) = 0$, then the random effect model is preferable. Random effects are present if, and only if, the municipality-level effect α_i is uncorrelated with tax morale (and other explanatory variables) in all time periods and the unobserved municipality specific effect is randomly drawn. However, it is a very strong assumption to make and the situation is quite rare (Wooldridge 2009, p.493). In conclusion, due to fixed effects' greater robustness and the indications from the tests, this is the estimation chosen for the model.

⁹ See Appendix A1 for the complete test results

¹⁰ See Appendix A2 for the complete test results.

Time-fixed effects

There is reason to believe that when running a fixed effect regression over several years there is a secular increase/decrease in the dependent variable that may be controlled for by including year dummy variables. Omitting these could lead to bias in the control variables where the aggregate increase/decrease would be attributed to the explanatory variables. Consider the example where the levels for national tax rate increases/decreases; this will certainly affect the amount of paid tax. However, the changes will affect each municipality with the same magnitude, holding the levels of income constant. When including time-fixed effects, then any changes in the total paid tax in each municipality during the years of 2001, 2002, 2004 and 2006 must be due to other influences than those omitted factors that change over the time periods but are the same across municipalities.

In order to test whether year dummy variables should be included in the model, a joint significant test may be conducted in order to test the null hypothesis that the dummies for all years are equal to 0. If one fails to reject the null, it implies that time fixed effects are unnecessary. When running the test, the null hypothesis was rejected at any conventional levels of significance in both models ($\text{Prob} > F = 0.0000$) and thus year dummy variables are jointly significant and should be included in the models, i.e. the model needs to allow for aggregate effects.¹¹

Log-linear functions

The use of taking some variables in the natural logarithm form has some advantages, first of it narrows the range of the variables. This leads to more robustness towards outliers. Furthermore when the dependent variable consists of large integer values, using $\log(y)$ more closely satisfy the classic linear model assumptions than using the level of the dependent variable (Wooldridge 2009, p. 191). In applied work, there are some general unwritten rules for taking logs. This is the case when the variable is a positive monetary amount. For this reason and the reasons mentioned above, the variable *TotTax* is taken the logarithmic form. When it comes to unemployment- and tax rate, the level of the variable is used. This is for the ease of interpretation. Since unemployment and tax rate are measured in percentage, using the log of unemployment or tax rate would mean that the coefficient would correspond to the percentage change and not the percentage point change. The key explanatory variable *TaxMor* appears in its original form, the level form.

¹¹ See Appendix A3 for the complete test results.

Lastly, since we are using the logarithms for the dependent variable, but the level form for all explanatory variables, the accurate estimation of the independent variables are:

$$\% \Delta \hat{y} = 100 * [\exp(\hat{\beta}_k \Delta X_k) - 1]$$

Heteroskedasticity

When the unique errors are not identically distributed i.e. when the variance of unique errors conditional on the regressors and a_i , changes over the observations, there is a presence of heteroskedasticity. This means that a crucial assumption (1.3) of the fixed effect estimation is violated, namely:

$$(1.3) \quad \text{Var}(u_{it} \mid \mathbf{X}_i, a_i) = \text{Var}(u_{it}) = \sigma_u^2, \text{ for all } t = 1, \dots, T$$

This assumption may be tested for by using a modified Wald test for group wise heteroskedasticity. The null suggest presence of homoskedasticity. The tests rejects the null (Prob>chi2= 0.0000) in both models and provide evidence of the presence of heteroskedasticity.¹² There are many ways of directing this situation, the most elementary being using robust standard errors. Before doing this, it may also be adequate to test for serial correlation.

Serial Correlation

Whereas the discussion of heteroskedasticity in the error process focus on the notion that disturbances are identically distributed over the observations, one may also investigate whether disturbances are independently distributed (Baum 2006, p. 154). The disturbance process show signs of *serial correlation* or *autocorrelation* when correlations arise in time series. A fixed effects estimator of the β_j demands that the idiosyncratic errors are serially uncorrelated to be the best linear unbiased estimator. The assumption states that:

$$(1.4) \quad \text{For all } t \neq s, \text{ the idiosyncratic errors are uncorrelated (conditional on all explanatory variables and } a_i): \quad \text{Cov}(u_{it}, u_{is} \mid \mathbf{X}_i, a_i) = 0$$

Testing for serial correlation may be conducted in a number of ways. A Lagrangian-Multiplier test for serial correlation has been used for this purpose. The null is no serial correlation. Above we

¹² See Appendix A4 for the complete test results.

fail to reject the null (Prob>F= 0.2684 for the main model, and Prob>F= 0.3744 for the secondary) and cannot conclude that the dataset have first-order autocorrelation.¹³

3.4 The model

Derived from the econometric considerations; both models will be used to analyze the collected panel data. It will be two fixed effects estimation including year dummy variables. The models will be appreciated with robust standard errors due to the present heteroskedasticity in the dataset. Furthermore, the dependent variable will be estimated with a logarithmic function.

The following main regression model has been constructed:

$$TotTax_{it} = \theta_t + \beta_1 TaxMor_{it} + \beta_2 TaxRate_{it} + \beta_3 Unemp_{it} + \delta_2 T2 + \dots + \delta_t Tt + a_i + u_{it} \quad (Model\ 1)$$

where the dependent variable $TotTax_{it}$ is an average of the total paid tax in municipality i in year t . θ_t denotes different year intercepts and a_i is the unobserved municipality effect. a_i captures all the factors that are unobserved and time-constant, let us call it the unobserved municipality fixed effect. It does not change over time and includes all the unobserved constant factors that affect $TotTax_{it}$.

The year dummy variables are $t=1, \dots, T$, where $T=4$ and where $t=1$ corresponds to 2001, $t=2$ to 2002, $t=4$ to 2004 and $t=6$ corresponds to 2006. The variable $T1 = 2001$ will be dropped in the regression due to it serving as a base year.

The secondary model has the following form:

$$CapTax_{it} = \theta_t + \beta_1 TaxMor_{it} + \beta_3 Unemp_{it} + \delta_2 T2 + \dots + \delta_t Tt + a_i + u_{it} \quad (Model\ 2)$$

The control variable chosen for this particular model is the unemployment rate. Both models include n different intercepts, one for each municipality.

The advantage of using a fixed effect model in this setting is that a_i controls for all the unobserved municipality specific factors that differ between municipalities but are constant over time within each municipality. The time binary variables control for all omitted variables that change over time and affect the actual paid tax but are the same across municipalities (Stock and Watson 2003, p. 207).

¹³ See Appendix A5 for the complete test results.

4. Data and sample

The model is estimated using a panel data set hosted by SKV and Statistics Sweden (henceforward SCB). The former has contributed with data considering individuals' tax morale, the latter with municipality specific data. The two institutions were chosen since they are the primary providers of Swedish statistics.

The data set includes observations at the municipality level regarding average total paid tax, average tax morale, tax rate and unemployment rate for the time periods 2001, 2002, 2004 and 2006 ($T=4$). The time period was chosen due to the fact that data on tax morale was only available during these periods. In addition, the data set encompasses the response rate at each municipality.

4.1 Sample selection and data gathering

Tax morale and the response rate

Tax morale is measured from a national survey performed by SKV, regarding the Swedes attitudes towards the taxation system, tax evasion and the institution itself. The data in the model emanates from four of their surveys conducted in the years of 2001, 2002, 2004 and 2006 (SKV Rapport 2001:4, SKV Rapport 2003:2, SKV Rapport 2005:7 and SKV Rapport 2007:3 respectively).¹⁴ The target population compose Swedish citizens aged 18-74. In each year, the sample consists of 3000 citizens. The response rate for each year equals 63-, 62-, 64- and 54 percent respectively. In 2006, that equals a random 0.025 percent sample of the Swedish population aged 18-74 (6 379 415 individuals).

There are 290 municipalities in Sweden today. However, Knivsta municipality gained independence in 2003. Moreover, the response rate varies between municipalities and years. The observed trend is that small municipalities with a population $< 10\,000$ are underrepresented. However, the trend is most likely random. For these reasons, the response rate of each municipality and each year was computed. That is, the number of individuals in municipality i who answered the question: "*If I had the opportunity, I would withhold income from taxation.*" was

¹⁴ The reports present the results from respective survey. The underlying data files were kindly given to us by Henrik Franzon, statistician at SCB, Solna. Please contact the authors for further information.

divided with the number of individuals aged 15+ living in that municipality (SCB 2009a).¹⁵ All municipalities that fall below a response rate of 0.02 percent are not regarded as representative and are excluded from the model.¹⁶ This results with a total number of $N = 664$ observations.¹⁷

Tax morale is measured as the average tax morale in municipality i , at time t , i.e. the average tax morale in that municipality in the years of 2001, 2002, 2004 and 2006.¹⁸

Average total paid tax

Data on the dependent variable *TotTax* was extracted from SCB's webpage (SCB 2009b). Given options, SCB enables the visitor to compute a specific set of data. By choosing the option "*Taxes (number of persons, mean value and total sum) by municipality, sort of tax, sex, age and income class. Year 2000-2008*" and then sorting the data by final tax in thousands of SEK as an average of all individuals aged 20+ and categorize it after municipalities for each year, the variable *TotTax* was computed. The average measure corresponds to an average of all people in respective municipality, including those who have not paid their actual tax. The target population consists of all, by the authorities registered, individuals liable to tax at each year (Sköld 2009 and Svartengren 2009). The dependent variable is thereby supposed to represent the actual paid tax in municipality i , at each t , measured as an average to enable a comparison between the municipalities.

State income tax on capital income

Data on the secondary dependent variable *TaxCap* is extracted from SCB's webpage (SCB 2009b), in the same order as the variable *TotTax*. By choosing the option "*Taxes (number of persons, mean value and total sum) by municipality, sort of tax, sex, age and income class. Year 2000-2008*" and then sorting the data by *State income tax on capital income* instead of *Final tax* we received the average total tax on capital income in each municipality in the years of 2001, 2002, 2004 and 2006.

The control variables

The variable *TaxRate* is the municipal tax rate that varies over municipalities. The average municipal tax rate is close to 31.5 percent with the lowest being 27.15 percent and highest being

¹⁵ The target population in the survey by SKV is aged 18-74. Due to the limited data options at SCB, the age interval 15+, was the best fitting alternative. However, a population aged 15+ exceeds a population aged 18-74, hence the response rate is rather underestimated than overestimated, which is a less problematic fault.

¹⁶ The 0.02 percent limit is set by guidance of the surveys conducted by SKV.

¹⁷ See Appendix B1 for descriptive statistics regarding the response rate and its distribution.

¹⁸ Each individual's response (1-5) to the question was summed up and then divided with the number of respondents.

34.24percent.¹⁹ The data is extracted from SCB and is collected for the years 2001, 2002, 2004 and 2006 (SCB 2009c).

The variable *Unemp* represents the yearly rate of unemployment over a year per municipality. Unemployment is defined as employment seeking without employment that is actively seeking and may immediately enter the work sector and does not engage in a work sector political program. Unemployment is measured in units of percentage. The data is extracted from the Swedish employment office and is collected for the years 2001, 2002, 2004 and 2006 (Arbetsförmedlingen 2009).

4.2 Descriptive statistics

Table 1, at the following page presents the descriptive statistics for the data sample.

¹⁹ Please see Table 1 at p. 25 for descriptive statistics.

Table 1. Descriptive statistics

Variable		Mean	Min/Max	Standard Deviation	Observations
<i>TofTax</i>	Overall	67.20553	46.2/260	14.94905	N= 1158
	Between		49.975 /211.5	14.05528	n = 290
	Within		35.10553/115.7055	5.277236	T= 3.9931
<i>TofTax_log</i>	Overall	4.190326	3.83298/5.560682	.1747255	N= 1158
	Between		3.908983/5.344143	.1604594	n = 290
	Within		4.035802/4.406865	.0713226	T= 3.9931
<i>CapTax</i>	Overall	3.845769	1/82.6	3.800179	N= 1158
	Between		1.425/51.225	3.326561	n = 290
	Within		-17.87923/35.22077	1.844183	T= 3.9931
<i>CapTax_log</i>	Overall	1.175214	0/4.41401	.5257467	N= 1158
	Between		.2984806/3.866904	.425367	n = 290
	Within		.3819758/2.340412	.3107671	T= 3.9931
<i>TaxMor</i>	Overall	3.862	1/5	.9064889	N= 1006
	Between		1/5	.6225328	n = 289
	Within		.8619717/6.236972	.7089121	T= 3.48097
<i>TaxRate</i>	Overall	31.51775	27.15/34.24	1.168236	N= 1158
	Between		28.3775/33.465	1.033657	n = 290
	Within		29.77275/33.32275	.5452299	T= 3.9931
<i>Muni</i>	Overall	1375.941	114/2584	717.116	N= 1160
	Between		114/2584	718.046	n = 290
	Within		1375.941/1375.941	0	T=4

Table 1 Continued

Variable		Mean	Min/Max	Standard Deviation	Observations
<i>Unemp</i>	Overall	3.449386	.9157855/8.485821	1.16123	N= 1158
	Between		1.329934/7.451631	1.05304	n = 290
	Within		1.625908/5.052507	.4903437	T= 3.98276
<i>ResRate</i>	Overall	.0002394	0/-.0014779	.0001562	N= 1160
	Between		0/-.0006497	.0000822	n = 290
	Within		-.000222/-.0010677	.000133	T= 4
<i>Year</i>	Overall	3.25	1/6	1.921115	N= 1160
	Between		3.25/3.25	0	n = 290
	Within		1/6	1.921115	T= 4
<i>Year2001</i>	Overall	.25	0/1	.4331995	N= 1160
	Between		.25/-.25	0	n = 290
	Within		0/1	.4331995	T= 4
<i>Year2002</i>	Overall	.25	0/1	.4331995	N= 1160
	Between		.25/-.25	0	n = 290
	Within		0/1	.4331995	T= 4
<i>Year2004</i>	Overall	.25	0/1	.4331995	N= 1160
	Between		.25/-.25	0	n = 290
	Within		0/1	.4331995	T= 4
<i>Year2006</i>	Overall	.25	0/1	.4331995	N= 1160
	Between		.25/-.25	0	n = 290
	Within		0/1	.4331995	T= 4

Notes to *Table 1*. *Within* corresponds to descriptive statistics within the panels, where the within-group index $t = \text{time}$. All time-invariant variables will receive a within standard deviation of zero and will be dropped, or swept away from the model. This relies on the conditional settings of the fixed effect model; the regressors must vary over time within each unit. Thus, all variable with a low within standard deviation will not be well identified. The alternative *between* corresponds to descriptive statistics between units, in this case municipalities. When estimation a *time* fixed effect model a further requirement is that the regressors must have some variation over units within each time period (Baum 2006, p. 223).

Given this, the within standard deviation on the group identifier *Muni* (municipality) will always be zero, since *Muni* does not vary over time. Furthermore, the year dummy variables receives a between standard deviation of zero, due to the fact that they do not vary between municipalities.

When looking at the key explanatory variable *TaxMor*, the most important factor to consider is the within standard deviation. A low value (close to zero) corresponds that the effect of that variable will be hard to estimate due to the fact that it does not change that much over time. In *Table 1* however, it is clear that the tax morale vary over time (Within St. Dev. = .7089121) and the coefficient will be identified. Further, *Table 1* present evidence of variation of tax morale over municipalities at each time period (Between St. Dev: = .6225328). Ergo, the independent variable *TaxMor* will be identified in the time fixed effect model.

TofTax, *TaxMor*, *TaxRate* and *Unemp* are not observed at each single time period and do receive an average T. This is partly due to the fact that Knivsta municipality was observed first in 2004, but still included in the total numbers of municipalities, n , in all time periods. Hence, there is no information and observation on *TofTax*, *TaxMor*, *TaxRate* and *Unemp* for Knivsta during 2001 and 2002. Further, the tax morale is not observed in every municipality at each time period. However, when running the regression, the option “if ResRate > 0.002” excludes those unobserved municipalities. This results with a final $N=664$ in the model.

5. Results and discussion

Table 2. Results from Model 1

<i>Variable</i>	<i>TotTax_log</i>	<i>Robust St. E.</i>
Øt	3.626177***	(.0877748)
TaxMor	-.0014444	(.0014804)
TaxRate	.017739***	(.0027852)
Unemp	-.0088345***	(.0025771)
Year2002	-.0221164***	(.0023616)
Year2004	.075191***	(.0034868)
Year2006	.1366814 ***	(.0035195)
R-sq: within = 0.9379		
N= 664		
Prob> F = 0.000		
Rho = .98501739		

Notes to *Table 2*. The table displays the estimates of the model parameters when the regression is run with *TotTax* as the dependent variable. ***, **, * indicates parameter significance at the 1%, 5%, 10% level, respectively. Robust standard errors are presented in parentheses.

Does tax morale have an effect on the tax paid?

The coefficient on the key explanatory variable *TaxMor* is negative and insignificant. It implies that if the average level of tax morale in a municipality increases by one unit (on 1-5 scale), the total paid tax in that municipality would decrease with 0.14 percent.²⁰ This result contradicts previous research regarding the effect of tax morale on tax evasion. An explanation for the negative coefficient could be reverse causality; it is not low tax morale that is causing high tax payments, but high tax payments that are causing a low degree of tax morale. Further, there is a possibility that the coefficient on *TaxMor* suffers from omitted variable bias. If an unobserved factor in the idiosyncratic error term is negatively correlated with tax morale it causes a

²⁰ $\% \Delta \widehat{\text{TotTax}} = 100 * [\exp(-.0014444) - 1] = -0.14\%$

downward bias and this could be another explanation for the negative sign. By adding more control variables to the model, we expect the coefficient on *TaxMor* to take a higher value. Nevertheless, a one unit increase in tax morale, that is for example from 3 to 4 on the 1-5 scale, is everything but trivial. The effect on total paid tax is, in comparison, rather trivial (- 0.14 percent). Thus, the total paid tax is quite unaffected by changes in tax morale. More important however, the coefficient is insignificant. Hence, we fail to reject the null that *TaxMor* has no effect on *TotTax* after controlling for the tax rate, the unemployment rate and year specific factors. With a significant result, one can conclude that the coefficient is significant different from zero, and has a partial effect on the dependent variable. In this case however, one cannot draw any conclusions. It is not correct to conclude that tax morale has no partial effect on the actual paid tax since one do not approve the null hypothesis to be true, one just fail to reject the null at any conventional levels of significance.

The standard error on *TaxMor* is quite large compared to the estimate. This could be due to low variation over time or/and across units. Even though the within standard deviation is distinct from zero, the change over time might not be satisfactory enough. An individual's tax morale may change in a slow pace and hence be hard to estimate with any precision. Moreover, it could be the case that tax morale does not differ that much across municipalities. It would be another situation if the units were countries, where the respective government affects the tax morale in each country, tax system and so forth. Even though the tax burden differs between municipalities in Sweden, and that local policies affect each municipalities in different ways, it might just not be enough of disparities between factors that affect tax morale in the various municipalities. Further, to change the entity from municipalities to individuals would perhaps produce more precise estimates since it is more likely that the variation in tax morale among individuals is greater than the variation across municipalities. A setting like that could enable a better examination of the relationship between tax morale and taxpayers' behavior.

Regarding respondents within municipalities and years, the average tax morale value could be misleading due to too few respondents within a municipality summing up to an average. This error should however be corrected when using a response rate of 0.02 percent as a discriminating value. However, in certain small municipalities this problem might still exist. Consider a municipality with a population of 10 000; the minimum response rate implies that the respondents within the municipality a certain year must be at least 2. When two individuals sum up an average for an entire population the value might be misleading and, the variation within and across municipalities might be reduced due to the average measurement.

Lastly, a larger sample size could correct for a potential lack of variation over time and across municipalities (Wooldridge 2009, p. 461).

Annotations on the control variables

All the other coefficients are individually significant at the one percentage level. The constant term θ_i is of modest interest for the analysis. The fact that the coefficient of tax rate receives a significant positive sign is what one would expect. That the municipality tax rate highly affects the total tax paid is only logic since the dependent variable consists of tax on income, which in turn depends on the actual tax rate. The coefficient indicates that if the tax rate increases by one unit (one percentage point), the total tax paid will increase with 1.79 percent.²¹ Moreover, the coefficient on the unemployment rate is positive, which is what we expected. That is, if the unemployment rate in municipality i increase by one unit (one percentage point), the total tax paid in that municipality decrease by 0.88 percent.²² This result appears as the most logical reasoning; a higher unemployment rate, holding everything else constant, would most likely lead to a decrease in income in that municipality and thus less tax revenues. Whether an effect of 0.88 percent on actual tax paid is non-trivial is ambiguous.

The time binary variables are not of modest interest for the analysis. However, they are all significant at the one percent level. The coefficient on *Year2002* indicates that the total paid tax was 2.19 percent²³ lower in 2002 than in the base year 2001, independent of any changes in tax morale and the other control variables. Most probably, the reason for these results is variations in income. To refer to a previous example; it could be the case that the national tax levels were higher that year which in turn results in a less number of people who face the national tax and thus, less total paid tax.

Annotations on the model

When estimating an unobserved effects model, the goodness-of-fit measure becomes more difficult to compute. It is common to report the R-square based on the within transformation (Wooldridge 2009, pp. 483-484). The result above displays a R-square from the within transformation of 0.9379. Hence, 93.79 percent of the time variation in the dependent variable, *TotTax*, is explained by the time variation in the independent variables.

²¹ $\% \Delta \widehat{\text{TotTax}} = 100 * [\exp(.017739) - 1] = 1.79\%$

²² $\% \Delta \widehat{\text{TotTax}} = 100 * [\exp(-.0088345) - 1] = -0.88\%$

²³ $\% \Delta \widehat{\text{TotTax}} = 100 * [\exp(-.0221164) - 1] = -2.19\%$

The null hypothesis that the constant terms are equal across units is rejected at any conventional level of significance (Prob>F=0.000). Hence, there are significant municipality level effects. A pooled ordinary least square regression should most likely compute inconsistent estimates.

Table 3. Results from Model 2

<i>Variable</i>	<i>CapTax_log</i>	<i>Robust St. E.</i>
Øt	1.077288***	(.0959712)
TaxMor	-.0132537	(.0138074)
Unemp	.0237467	(.0270085)
Year2002	-.1608***	(.0222198)
Year2004	-.0804565**	(0330771)
Year2006	.538366***	(.0227679)
R-sq: within = 0.7694		
N= 664		
Prob> F = 0.000		
Rho = 0.81619458		

Notes to Table 3: The table displays the estimates of the model parameters when the regression is run with *CapTax* as the dependent variable. ***, **, * indicates parameter significance at the 1%, 5%, 10% level, respectively. Standard errors are presented in parentheses.

Does the variable CapTax provide different results?

The results from Model 2, when using *CapTax* as the dependent variable, do not change remarkably. The coefficient on *TaxMor* is still negative and insignificant. We expected changes in tax morale to affect variations in *CapTax* more than variations in *TotTax*. It was assumed that the variable *CapTax* included a greater opportunity to evade taxes and that this could lead to a more accurate examination of the response of tax paid on tax morale. Due to the insignificant results, we cannot draw any conclusions whether *CapTax* is more sensitive to variations in *TaxMor* than

TotTax. The most possible explanations for the insignificant result are still the same as in *Model 1*, discussed above.

The coefficient on *Unemp* is still positive but has become insignificant. The most logic explanation is that the unemployment rate does not *directly* affect the amount of capital tax paid. It is more likely to observe a significant effect if the unemployment rate were lagged, since the consequences of unemployment on capital probably do not come into effect instantly.

Lastly, the coefficients are all still jointly significant but the R-square has decreased. 76.94 percent of the time variation in capital tax is explained by the time variation in the regressors. Hence, a larger amount of the time variation in the dependent variable is left unexplained in *Model 2* compared to *Model 1*. We assumed that the factors that affect *TotTax*, affects *CapTax* in the same way and by the same amount. This might not be entirely accurate, which could be an explanation for the lower R-square in *Model 2*.

Further remarks

Other explanations for the non-significant results could be due to that the degree of the Swedish population that actually deviates from the levied tax is quite low. This might be due to the hardship of avoiding paying levied tax. However, we tried to control for that in the secondary model by only including national tax on capital income. When using averaged values, the reason of insignificant values could be due to an insufficient database. Even though the total number of observations used in the estimation is N=664 this might be insufficient. Solving this problem would imply adding additional years and increasing the number of respondents within each municipality.

Would collecting additional data solve all our problems? It would probably increase the validity of the model. In the case where one would still receive insignificant results even with additional data, the statement that tax morale does not have an impact on tax paying behavior would be more credible. However, to be certain the collected data must be exhaustive and representative for each municipality. Another approach would be to drop the fixed effect model and use the cross sectional variation in tax morale and run a regular ordinary least square regression. In such a setting, we would have to control for all the factors that may influence the tax paid in a municipality; like the average income, the tax rate, the share of people in each tax bracket, wealth, property value, share of people in respective sector of employment, unemployment, age, education, local industry characteristics, population density etc. To avoid a potential omitted variable bias in variable of tax morale, we would also have to find measurements for factors that are likely to correlate with tax morale. The literature suggest that

such factors are well-working institutions, the legitimacy and quality of institutions and other factors related to the trust to the government (Alm and Torgler 2006).

Our initial attempt were to examine the effect of tax moral on tax paid by a cross sectional analysis. But due to the hardship of obtaining data on all relevant variables that needs to be controlled for, we abandoned that attempt for a fixed effect estimation which controls for all the unobserved factors that affects taxes paid but are roughly constant within each municipality over a five year period. A fixed effect model appeared as the most reasonable and optimal choice for the extent of this thesis.

6. Conclusion and future research

The purpose of the thesis was to examine whether tax morale affects taxpayers' *actual* behavior. We find this important to examine since the tax compliance literature sometimes takes the relationship between attitudes and behavior for granted. This thesis differ from previous research in the way that the dependent variable is here measured as an average of the total paid tax in each municipality in Sweden and is thereby supposed to be a more accurate measure of actual behavior.

In order to fulfill the purpose, a fixed effect model on municipalities in Sweden was used to answer the question if an increase in the tax morale implies a higher amount of tax paid. The hypothesis that tax morale has a (positive) effect the taxpayers' behavior was tested against the null hypothesis that there is no effect. This thesis fails to reject the null on any conventional levels of significance. Thus, we find no significant results with data on all of Sweden's municipalities reaching over a five year period. The extent of the purpose was to contribute to current research, which was achieved even though not as strongly as initially intended. Even though no reliable conclusions were possible to draw, the findings should not be disregarded fully, because they do provide intriguing paths to additional research.

To our knowledge, there has not yet been a satisfactory examination of a possible discrepancy between attitude and behavior in the area of tax compliance. Finding reliable results would be a significant contribution in the tax compliance field of economics. What if tax morale does not affect the taxpayers' behavior or at least that the effect is trivial? This would imply that discussions in determinants of tax morale would be inane (or, at least secondary) when aiming to raise compliance. However, the previous research suggest that there is a positive effect of tax morale on tax compliance, which appears as the most rational and believable relationship. Nevertheless, one should always strive to find better and more reliable measurements, especially

in the area of tax evasion, which is a difficult phenomenon to estimate. We do not assess variables on tax evasion computed from survey questions as representative. We therefore suggest further research to develop better measurements for tax evasion in order to be able to draw any conclusions about taxpayers' *actual* behavior.

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Appendix

A1. Hausman test

Hausman-test for choosing between fixed or random effect regressions.

---- Coefficients ----				
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fixed	random	Difference	S.E.
TaxMor	-.0006406	-.0049828	.0043422	.001975
b = consistent under Ho and Ha; obtained from xtreg				
B = inconsistent under Ha, efficient under Ho; obtained from xtreg				
Test: Ho: difference in coefficients not systematic				
chi2(1) = (b-B)'[(V_b-V_B)^(-1)](b-B)				
= 4.83				
Prob>chi2 = 0.0279				

A2. Breusch-Pagan LM test

Breusch and Pagan Lagrangian multiplier test for random effects:		
TotTax_log[Muni,t] = Xb + u[Muni] + e[Muni,t]		
Estimated results:		
	Var	sd = sqrt(Var)
TotTax_~g	.0286023	.1691222
e	.0004083	.0202057
u	.0179218	.1338723
Test: Var(u) = 0		
	chi2(1) =	419.37
	Prob > chi2 =	0.0000

A3. Time fixed effect

Test for joint significance, to see if the dummies for all years are equal to 0, if they are then no time fixed effects are needed.

Model 1

```
. testparm _IYear*  
  
( 1)  _IYear_2 = 0  
( 2)  _IYear_4 = 0  
( 3)  _IYear_6 = 0  
  
      F( 3, 711) = 1519.11  
      Prob > F = 0.0000
```

Model 2

```
. testparm _IYear*  
  
( 1)  _IYear_2 = 0  
( 2)  _IYear_4 = 0  
( 3)  _IYear_6 = 0  
  
      F( 3, 711) = 627.51  
      Prob > F = 0.0000
```

A4. Test for group wise heteroskedasticity

Model 1

```
Modified Wald test for groupwise heteroskedasticity  
in fixed effect regression model  
H0: sigma(i)^2 = sigma^2 for all i  
chi2 (277) = 4.3e+32  
Prob>chi2 = 0.0000
```

Model 2

```
Modified Wald test for groupwise heteroskedasticity  
in fixed effect regression model  
H0: sigma(i)^2 = sigma^2 for all i  
chi2 (277) = 4496.04  
Prob>chi2 = 0.0000
```

A5. LM-test for serial correlation

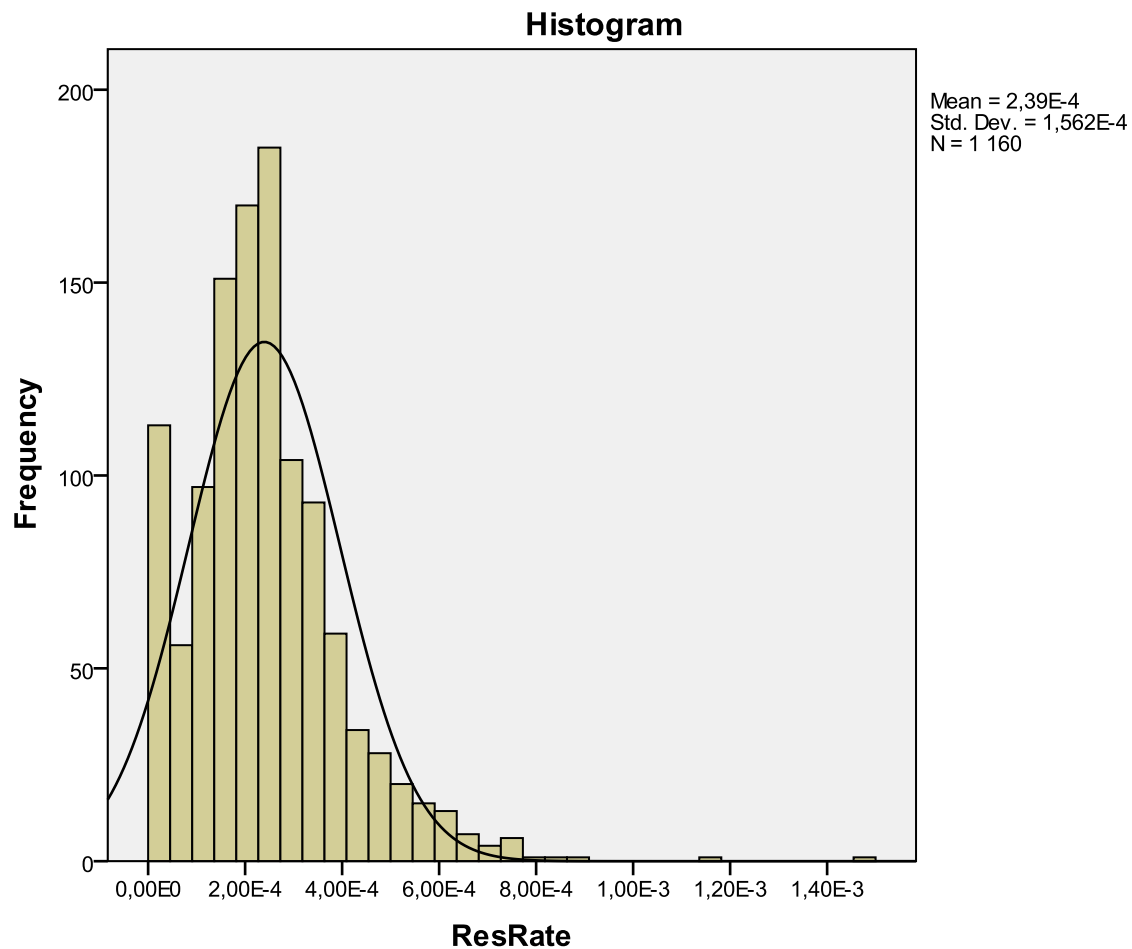
Model 1

Wooldridge test for autocorrelation in panel data			
H0: no first-order autocorrelation			
F(	1,	6665)	= 1.225
	Prob > F =		0.2684

Model 2

Wooldridge test for autocorrelation in panel data			
H0: no first-order autocorrelation			
F(	1,	6665)	= 1.021
	Prob > F =		0.3744

B1. Choosing the response rate



The response rate is calculated from the dataset collected from SKV. For every municipality the response rate has been derived from number of respondents through total amount of inhabitants in corresponding location.

The minimum response rate is set in order to achieve a level of representativeness without being over selective causing the dataset to be minimized. The chosen minimum response rate is set to 0.02 percent. This excludes 496 observations of the total 1160 which leaves the dataset with 664 municipalities. As seen from the distribution graph this cut-off point is reasonable. It cuts the distribution line at its steepest point.