THE DETERMINANTS OF TAX EVASION:
EXPERIMENTS WITH TURKISH SUBJECTS

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Supervisors: Prof. D. Pyle and Prof. S. Pudney

To my parents, Aktan and Sener Saruc

To my best friend, Berna Pars

Acknowledgements

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Abstract

This thesis explores the results of a series of tax experiments that were undertaken with various groups of people in Turkey in 1998. The experiments are described and their resulting data reported, following which conclusions and implications are reviewed.

In total 268 individuals successfully completed the experiments. The objective of the experiments was to gather information with which to test the effect of certain variables upon (i) the decision to evade income taxes and (ii) the amount of income tax to evade both in absolute terms and as a proportion of income.

Unlike most previous experiments in this field we have included participants other than students as part of sample. Also, we conducted all but one of the experiments outside of the classroom/laboratory environment in order to improve the reliability of the study. In order to encourage participants to take the experiments seriously, financial prizes were given to the highest net income achievers.

Our results indicate a very strong positive effect of tax rates upon both the decision to evade income tax and upon the degree (the proportion of income evaded) and absolute amount as well, once individuals have decided to evade. However, the expected fine has a significant deterrent effect on both the decision to evade taxes and the amount of taxes evaded. The effect of income was positive upon the decision to evade and upon the absolute amount of evasion but negative upon the proportion of income evaded. A large fine with a small probability of detection was not found to be more effective in deterring the occurrence of evasion than a small fine with a high probability of detection, but it was more effective in reducing the degree of evasion amongst evaders. We found that student subjects are more compliant than non-student (when the same experimental methodology is applied). However, student *evaders* did not behave substantially differently from employed people of the same age. While an increase in fines had the expected deterrent effect, an increase in audit rate increased the probability of evasion; this latter finding may be explained by the 'spite' or the 'crowding out' effects. The effect of tax ethics was positive and significant on tax compliance. Finally, we found that young people in general evade more often and evade a larger amount of income.

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1.1 BACKGROUND

Criticism of taxes and resistance to them has a long history. Although Benjamin Franklin once said 'in this world nothing is certain but death and taxes',[1] it seems that taxes are not inevitable for some. Tax evasion is as old as taxes and it probably can be considered as the second oldest profession in the world. It is known that Plato was writing about tax evasion as early as two thousand five hundreds years ago. Nevertheless, tax evasion only started to receive attention from researchers in the last 25 years. Tax evasion is a long-standing, universal problem which transcends national boundaries. It takes place in developed as well as developing countries, in virtually all societies and cultures. The problem of tax evasion seems to be growing in America. The Internal Revenue Service (IRS) in the United States indicated that the nominal tax gap (the difference between taxes owed and taxes paid) increased from \$22.7 billion in 1973 to \$95.3 billion in 1992.[2] However, this increase in the tax gap may be the result of significant increases in tax liabilities during that period, as the proportion of tax owed was the same, 17.3%, in both years (Andreoni, Erard and Feinstein, 1998).

In the United Kingdom, the Inland Revenue has estimated that 7.5% of Britain's gross national product (GNP) is being evaded each year (the proportion of income not declared). There have been a number of studies, which have attempted to measure the size of the unrecorded economy in Turkey. The term unrecorded economy is considered to involve all those economic activities which are not included in the calculation of GNP of Turkey for one reason or another (e.g. illegal activities such as drug trafficking, or legal activities such

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[1] Cited by Kinsey (1986).

[2] The US Internal Revenue Service (1990, 1996) reported by Andreoni *et al.*, (1998).

as do it yourself, etc.). So this term covers tax evasion and more. The findings of studies in Turkey differ enormously. Estimates of the unrecorded economy fluctuate between 1% and 138% of Turkey's GNP (Aydemir, 1995). Even researchers using a similar approach for the same year find very different results. For example, while Derdiyok (1993a), using the monetary approach, estimates the size of the black economy as 27% of GNP for the year 1984, Hakioglu (1987)[3] estimates it to be 138%. The emergence of very different findings questions the reliability of the measurements. Because of the nature of tax evasion many conventional methods and measurements are very difficult to apply. In order to get an opinion on the extent of the black economy in Turkey, we will look at the IRS audits. However, we need to keep in mind that this only gives a rough idea of the size of the black economy, since audits are not perfect in detecting evasion, and more importantly audits may depend on the source of income, amount of income and may be the result of information from local knowledge, informers and press reports (Kazici, 1993). For example, IRS audits are carried out generally amongst individuals who are thought to be tax evaders in the first place and therefore who do not constitute a random sample of income taxpayers[4]. The Turkish IRS does not want the selection criteria for audits to become public knowledge, since it might affect tax compliance adversely. Another disadvantage of using audits to measure the size of the black economy has been highlighted by Kirbas (1995). Some audit results are appealed to the courts by taxpayers, and the majority of the results (75.1% according to a study by Engin, Saracoglu and Donmez,

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[3] Unpublished study reported by Ozsoylu (1996).

[4] The only random sample of taxpayers is the one generated by IRS in the USA, which comes from the Taxpayer Compliance Measurement programme (TCMP).

2000) of the appeals are in favour of the taxpayers. To be accurate, it is necessary to take the court decisions into account. However, obtaining all the court decisions corresponding to the year concerned is not easy, and it is possible that the courts themselves can make mistakes.

In Turkey, IRS statistics show that between 1985 and 1996 there were 786,612 audits and approximately 759 trillion Turkish Lira (TL) of taxable income had been examined. It was found that 351 trillion TL of income had been underreported. So, during that period for each TL100, approximately TL46 had not been reported. In 1995, alone 42% and in 1996 about 27% of the income were not reported (see Table 1.1).

Table 1.1 Tax Audits in Turkey between 1985 and 1996

Years	Number of Audited taxpayers	The Amount of Audited Reported Income (Million TL)	The Amount of Income Found to be Unreported (Million TL)	Unreported Income as Percentage of Audited Income
1985	66,681	299,635	294,347	98
1986	66,550	1,157,303	1,498,317	129
1987	80,264	2,949,622	764,390	26
1988	51,495	3,092,821	953,239	31
1989	47,225	4,286,513	1,933,445	45
1990	108,574	9,969,065	6,257,503	63
1991	78,803	13,754,810	6,875,621	50
1992	59,378	22,180,601	13,217,781	60
1993	68,954	35,897,016	12,906,860	36
1994	48,056	120,145,918	135,755,351	113
1995	56,096	169,827,303	71,167,159	42
1996	54,536	375,262,112	99,724,529	27

There are many articles (Sayar, 1987; Koyuturk, 1991; Kazici, 1993; Karakoc, 1995; Ozsoylu, 1996; Altinok, 1996; Ak, 1998; Saygilioglu, 1990; Kilicdaroglu, 1999 and Kizilot, 2000), discussing these IRS statistics. However, very few of them try to explain

the causes of the very large up and down movements in the data. It is indicated that in the

years that the underreported income was found to be very high (e.g. 1985, 1986, and 1993)

the tax inspectors audited mainly some specific taxes, which have very large bases (taxable

value), but small tax rates such as fiscal stamp tax or banking and insurance transaction tax

(Saygilioglu, 1990). It is also argued that the motivation of tax inspectors has also changed

in different years, which may explain the reason for inconsistent findings of the percentage

of underreported income in audited income (Saygilioglu, 1990). In order to find more

specific reasons for the large fluctuation in audit results according to years, interviews were

conducted (either personal or by phone) with some of the tax inspectors, public finance

bureaucrats, district treasures and heads of institutions of tax inspectors[5]. The conclusions

were; first, audits are not random but depend on complaints, information from informants,

etc. Thus depending on whether this information is correct or not yearly audit results

fluctuate significantly. Secondly, from time to time tax inspectors have to move from one

city to another as a result of appointments. During these times the motivation of tax

inspectors can diminish and thus affect the audit results. Moreover, tax inspectors have

also other duties apart from audits of tax declarations such as tax rebate, inspections of

other tax officials and auditing spending procedure of some of budget expenditure. In

some years authorities give more importance to these other duties of inspectors and this can

decrease either quantity or quality of tax audits or both. Thirdly, in some years inspections

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[5] Personal interviews: with the Deputy General Director of Revenues (between 1981-1991) and the General Directory of State Accounts (between 1992-1996) 2 hours on 16 October 2000 and total 2 hours on 17-18 October 2000, with the Head of Revenue Controllers in Izmir Region (current) 1 hour on 13 October 2000, with two Tax Auditors (current) in Izmir 2 hours on 13 October 2000, with District of Denizli Treasurer (current) 2 hours on 9 October 2000, with a Lawyer of General Directory of Revenues (retired 1999) several times. Phone interviews: with different Tax Inspectors in Ankara on 26 September 2000, 2 October 2000, 5 October 2000, with the Head of Institutions of Tax Auditors on 5 October 2000.

are concentrated more in one sector of industry than others. In the years when self-employed professional people or sectors such as textiles, liquid fuel and wholesalers in fruit and vegetables are audited, the percentage of unreported income in audited income is found to be very high. As a result of the mentioned interviews, we were able to find more specific reason for inconsistent findings of audit results. In 1985 Turkey introduced 'VAT application'. Because of this new tax there was some confusion and resistance to the tax by taxpayers. Therefore audit findings in 1985 and 1986 resulted in large amount of unreported income. Moreover, in April 1994, as part of the government's measures to reduce the fiscal deficit, a one-off tax was introduced, which was based on 1993 income and assets, and payable in 1994 in order to increase tax revenues from existing taxpayers. This one-off tax contributes to feelings of unfair taxation amongst taxpayers. It is possible that for this reason there was a significant increase in the amount of income found to be unreported in 1994. The reason for the extremely large number of audits in 1990 had a political explanation: there was an election for the local governments in 1989 and thus in this year taxpayers were not audited extensively and authorities gave more importance to the other duties of inspectors (such as auditing the spending procedure of budget expenditure). However, after the election was held the tax inspection duty of inspectors was given more importance and thus there was a significant increase in the number of audits in 1990.

Another estimate for the amount of evasion in Turkey is given by the World Bank (1988). According to this, about half of the income in the early 1980s was unreported and 85% of taxpayers report themselves to be in the lowest income bracket.

In this thesis, we concentrate on the Individual Income Tax (IIT). Figure 1.1 reports the share of government revenues coming from different sources for the year 1997 which indicate the significance of IIT in Turkey.

Figure 1.1 Tax revenue by source in 1997
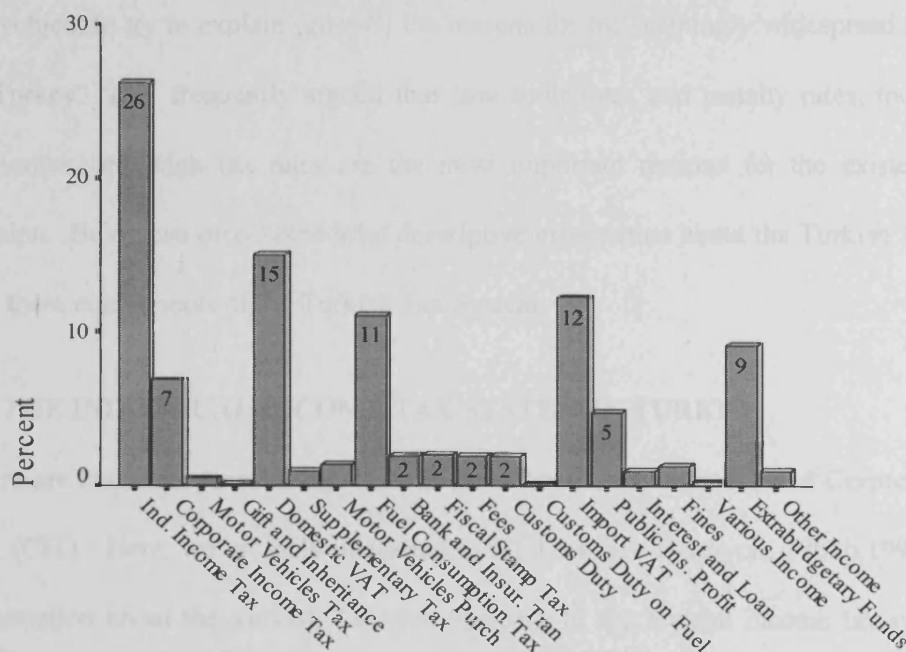
IIT Revenue accounted for 26.2% of fiscal revenue in Turkey in 1997. It is thus the single most important source of tax revenue (the full name and the exact percentage of the each source is presented in the same order as Figure 1.1 in the footnote below)[6]. Moreover, the share of IIT Revenue in total revenues is increasing (i.e. 23.8% in 1995 and 25.2% in 1996).

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[6] Individual Income Tax 26.2%; Corporate Income Tax 6.9%; Motor Vehicles Tax 0.5%; Gift and Inheritance Tax 0.1%; Domestic Value Added Tax 15%; Supplementary Tax 1%; Motor Vehicles Purchase Tax 1.4%; Fuel Consumption Tax 11.1%; Banking and Insurance Transaction Tax 2%; Fiscal Stamp Tax 2.1%; Fees 2%; Customs Duty 2%; Customs Duty on Fuel 0.2%; Import Value Added Tax 12.2%; Public Institutions' Profits 4.8%; Interest and Loan 1%; Fines 1.3%; Various Income 0.3%; Extra-budgetary Funds 8.9%; Other Income 1%.

Although the subject of tax evasion has received widespread attention in the press and other media, and amongst some academics, to the best of our knowledge there have been no empirical studies, not even by the IRS, in order to find the factors that affect income tax evasion in Turkey. Nevertheless, many articles and some books have been written about the subject to try to explain (guess?) the reasons for the seemingly widespread tax evasion in Turkey. It is frequently argued that low audit rates and penalty rates, too many tax amnesties, and high tax rates are the most important reasons for the existence of tax evasion. Below we offer some brief descriptive information about the Turkish Tax System and these components of the Turkish Tax System.

1.2 THE INDIVIDUAL INCOME TAX SYSTEM IN TURKEY

There are two main taxes in the Turkish direct taxation system: IIT and Corporate Income Tax (CIT). Here, we are only interested in IIT Law (see Derdiyok; 1993b,1999 for more information about the Turkish Taxation System). In the Turkish income tax system there are 7 tax brackets. The tax rate in the lowest bracket is 25% and the tax rate for the highest income bracket is 55%. The part of the income which is within the first bracket is taxed at 25%, any remaining income up to the third bracket limit is taxed by 30% and so on (see Table 1.2). There is no minimum income level below which you are exempt from income taxes. This can contribute to a feeling of inequity and may lead to a larger amount of evasion amongst individuals (Kirbas, 1995).

Table 1.2 – The personal income tax rates, (1997)

Tax Brackets (million TL)	Tax rate
Up to 500	25%
500 – 1,000	30%
1,000 - 2,000	35%
2,000 - 4,000	40%
4,000 - 8,000	45%
8,000 - 16,000	50%
16,000 - and more	55%

Income, taxpayers can be categorised into two main groups: real income taxpayers and lump-sum taxpayers. Lump-sum taxpayers in general consist of small merchants and artisans who have not enough education and knowledge to keep books and records in order to enable normal taxation. The Council of Ministries determines annually maximum gross revenue and profits to be eligible for lump-sum taxes. These taxpayers' liabilities are calculated on an estimation basis by tax authorities for each type of business, and taxpayers simply pay this amount at the end of the year (there are about one million lump-sum taxpayers). The real taxpayers in general have to keep accounting records (except those who earn income only from movable capital or wages). Income Tax Law defines income as 'the net amount of profits and earnings obtained by persons in a calendar year.' Furthermore, the law classifies income in seven categories; (i) income from commercial activities, (ii) income from agriculture, (iii) income from professionals, (iv) wages and salaries, (v) income from capital investments, (vi) income from immovable assets and rights, (vii) other income and earnings. The law explains that persons who obtain any of these types of income are subject to IIT. Although there are a few exceptions, income and losses from the above categories are calculated together. There is no distinction between

Turkish citizens and foreigners with respect to taxation. Residents are taxed on income generated within Turkey and in foreign countries. However, taxpayers whose customary place of abode is not in Turkey are subject to limited tax liabilities and they are subject to tax only on income obtained in Turkey. Apart from the individuals on temporary assignments (e.g. those who are in Turkey for specific business, education purposes, etc.), persons who spent more than six continuous months in a calendar year in Turkey are considered as residents and taxed on their worldwide income.

Although the Turkish Income Tax System has mainly utilised the grouping of income and annual declaration approach, the withholding method is also used. Withholding taxes can be thought as an advance payment for the tax due. Those required to withhold taxes (e.g. public administration and institutions, public commercial concerns and other incorporations, commercial companies and business partnership, etc.) and those payments subject to withholding (e.g. wages and salaries, professional fees, and rentals) are given in detail in the Income Tax Law. As a principle income obtained from all sources in a year have to be declared to the tax offices during March of the following year. However, tax declarations are not filed for the following income; (i) for the earnings and revenues that remain within the exclusion limits, (ii) for the revenues obtained from some of the capital earnings (e.g. interest on deposits and dividends on shares and stock).

The Turkish Income Tax System has an auto-control mechanism, which is called the living standard basis. According to this taxpayers who are self-employed professionals (such as doctors, dentists, lawyers, etc.) and people who are involved with commercial activities have to declare a minimum income, which is set every year by the Council of Ministries. So, even if these taxpayers have losses rather than profit from their activities, they still have to declare a legal minimum income and have to pay taxes on it. This practice seems

to be contrary to the fairness of taxation (Erginay, 1990 and Aksoy, 1996). It is perfectly possible that persons who are involved with commercial activities such as shop-owners may end up with losses at the end of a calendar year. The same thing is possible for an architect or, say for, a dentist. On the other hand, it has been widely reported in the press that many successful self-employed business people evade taxes by declaring their income just above this threshold. Moreover, a study by Merzi (1993) compared actual income tax paid by self-employed professionals and business people (merchants, etc.) in 1990 with total income tax they would have to pay, if they had just declared legal minimum requirements. The difference was very small. So, Merzi concluded that the overwhelming majority of these types of taxpayers declared an income just above the legal minimum limit. Sengul (1997) also argues that the 'living standard basis' increases the amount of evasion, since people only declare an amount of income just above the minimum limit. Further, he argues that levying taxes according to the 'living standard basis' rather than declared income causes people to think that the minimum legal income is the fair amount to declare even if they earn much more than this.

In order to create a controversial interest between the buyer and seller, the 'Tax Rebate to salary /wage workers' was introduced in 1984. This application was first of its kind in the world and aimed to be a control mechanism at the retail stage (Pakdemirli, 1992). However, the application of the tax rebate was not a total success. Some goods and services are not subject to the tax rebate, which increases the tax losses in these areas. Ocakcioglu (1992) indicates that there are economic, sociological and psychological causes of Value Added Tax (VAT) losses (and thus income tax losses) especially during the retail

stage. He indicates that there is no research on this subject in Turkey[7], but gives some of

his basic observations as reasons of customers not requesting any documents from sellers.

Economic benefits of both buyers and sellers may increase, if documents are not prepared.

Ocakcioglu (1992) observes that the agreement for non-documentation between the seller

and the buyer takes place in several ways such as convincing or forcing of the buyer by the

seller. Sometimes, the seller offers some reduction in the price in order to induce the buyer

not to ask for any documents. In this case, if the buyer is not subject to VAT, his/her

economic benefit will be larger and thus accepts the offer. When the buyer is subject to

VAT, he/she will calculate the benefit of price reduction and tax rebates. In general, the

tax rebate is only some proportion of VAT paid, so again the buyer is likely to accept the

offer[8]. However, sometimes the seller may try to induce the buyer not to ask for an invoice

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[7] In 1996, I have carried out a plot research in Adana, one of the largest cities in Turkey. For two months I have carried out my and my parents' shopping from different small shops (greengrocer, off-license, book-shops, etc.) rather than few available chain-markets. I have also visited different restaurants, cafes, and bars. I have shopped from more than 200 businesses. After the shopping completed if the landlord (worker, sale assistant, etc.) had not presented an invoice or a receipt (which was about 85% of the time), I asked the reason for not giving a receipt. The most popular given reason were the broken cash register machine, the finished receipt paper, no electric supply, etc. (according to the law in these cases the owner should always give a handwritten invoice and the law requires a penalty if there is not spare invoice papers in the shop). However, after making clear that I am not a tax inspector (the same procedure is used by tax inspectors; looking like a customer they buy something and if the owner fails to give an invoice, they have the authority to issue high fines) but a student who is interested in the subject only for academic reasons; most of them changed their answers: many indicated that if they would have gave receipts for every transaction, they could not stay in business, since none of their competitors were issuing receipts either (many of which were very enthusiastic about the subject, so conversations lasted around half an hour on average). Just before I left the shops, to their surprise once again, I asked for an invoice but in many cases could not get one (most of the time, I have been told that they would keep track of my shopping and then give one big amounted receipt rather than many small ones). On the whole asking for a receipt was very stressful experience for me, because the owner's behaviours immediately become very unfriendly. Therefore, I can understand the people who do not ask for a receipt, especially when their loved ones (girl friend, wife, etc.) with them, since this kind of behaviour of the owner offend the person more in Turkish culture if the person's loved ones witness the incidence.

[8] We have to note that there is a fine for not issuing a document, so the perceived probability of a fine would affect the seller's decision to make an offer of non-documentation.

by indicating that the price is without VAT, if an invoice is requested then the seller has to pay VAT. This way of conducting a sale, without an invoice, is common in shops where price determining factors such as labels do not exist. Moreover, Frantz (2000) points out that 'Almost everything for sale in Turkey has two prices: a sticker price, for goods sold with an invoice or receipt, and a much lower price, if the buyer pays cash.' (p.7). In Turkey, there is a 'bargaining' tradition. In order to reduce the price, the customer will indicate that he/she will not ask for a receipt and request a discount. Ocakcioglu also indicates that factors like being bored, trying to prevent stress, shyness, politeness and tolerance affect non-documentations. When a customer asks for a receipt in general it causes tension, so the customer does not insist on the subject. Moreover, the culture of politeness and tolerance is different in Turkey than in most other Western countries. Therefore, breaches of law or regulations will not attract strong reaction amongst the citizens in Turkey. On the other hand, individualism is a powerful feeling. Some buyers do not ask for invoices, since they think this would affect the taxpayer adversely who is considered to be a relative or friend. 'For example, it is very difficult to demand any documents from the family doctor or lawyer, the local grocer and auto-repairmen.' (Ocakcioglu, 1992, p.92). Ocakcioglu guesses that the VAT and income tax losses that emerge from not preparing sale documents constitute at least 25-30% within the total commodities and services traded. With the development of bigger enterprises and chain stores the extent of non-documentations will diminish significantly in Turkey. A country where many economic activities take place in small and medium size businesses is likely to experience a large amount of evasion. In Turkey, small and medium sized businesses are about 98% of the total businesses. They have a share of 45% of total employment and 27% of total investment.

When we analyse the Turkish Income Tax, we see that majority of the income tax is obtained from wages (by withholding). According to Merzi (1993) 55-60% of total income tax revenue is obtained from wages, while only 24-30% is obtained on income from commercial activities and from self-employed professionals. However, he notes that commercial activities and self-employed professional people contribute more to the GNP than wage earners. Therefore, he indicates that the majority of people who receive commercial and professional income do not declare it truthfully. They issue invoices only up to the limit of legal minimum income that has to be declared (Sengul, 1997). Most of the expenditure made by taxpayers on self-employed professionals' services (such as expenditure on doctors, dentist, and spending for medicine) cannot be deducted from declared income under the Turkish Tax System. Therefore, taxpayers do not see any reason to ask for an invoice when they use these services. This provides a good opportunity for self-employed professional people to evade taxes. On the other hand, people who use these services ask for a VAT reduction and indicate that they will not demand an invoice (Kizilot, 1998). Ocakcioglu (1992) indicated that '... it is difficult to say that even a significant part of the sales receipt required to be issued, are really being issued.' (p.73). Heper (2000) notes recent IRS statistics which indicate that self-employed business people such as lawyers, doctors, contractors and jewellers, who live in the big cities of Turkey; Istanbul, Ankara and Izmir declare less income to the tax authority than an ordinary worker earns. Manufacturers who produce shoes, leather and furniture declare income which is lower than minimum wage of around £95 a month. An article by Frantz (2000) also indicates that professionals, such as lawyers, doctors, dentists, engineers, etc. report very low incomes, since the majority of their payments are made in cash;

'Based on income reported to the government, the best-paid professionals in Turkey are notaries, who stamp official documents. Last year, the average income declared by the country's 576 notaries was about $53, 000, more than 10 times the reported earning of lawyers and doctors, nearly 30 times as high as dentists. Even artists said they were paid more than engineers, lawyers, doctors and dentists.
Obviously, nobody believes the figures, sensing that they reflect the fact that notaries must provide a receipt for every transaction, just as artists must provide provenance and valuation of their works. Other self-employed people routinely accept cash without an invoice or shift payments to offshore bank accounts. (Frantz, 2000, p.7).

Kizilot (1998) directs attention to the declared income of the most famous artists (mostly singers) in Turkey. They have earned billions of TL worth of income over the last years, but have declared only a very small amount of it. This can be thought of as an example of how large tax evasion is in Turkey. On the other hand, for the people who obtain only wages, there is no opportunity to evade taxes, since taxes are withheld before they receive their income. Nevertheless, it is common for wage earners to have cash in hand from second jobs (Kirbas, 1995). Bila (2000) notes that it is not a secret any more that wage earners work in second jobs at nights and weekends in order to earn living.

As we know, one of the most important characteristics of the tax system should be its simplicity. In general, the tax law should be reasonably clear and understandable by taxpayers. Moreover, the tax system in the country should not be changed too often, making it more difficult for the taxpayers to follow the system. However, when we analyse the Turkish Tax System, we find very high complexity with lots of exemptions that make it difficult to follow even for tax experts, accountants and the tax inspectors. There have been a lot of changes in the Turkish Tax Laws over the last few years, for example, there were ninety major legislative tax law changes done during the period from 24.11.1980 to 18.4.1983 (Derdiyok, 1993b). It has been argued that the frequent changes and the

complexity of the tax system contribute to the huge amount of tax evasion in Turkey

(Aydemir, 1995). As a result of the complex tax system, the taxpayers' burden in the form

of compliance costs has considerable increased, both in the sense of the need to employ an

accountant or giving more time to comply to the tax laws. Another problem in the Turkish

Tax System is that the accountants' occupation has recently been organised as a certified

job. However, to become an accountant still may not require good qualifications or the

knowledge of the tax system. Furthermore, it is usually argued that there is an implicit

agreement between the taxpayer and the accountant to evade taxes. If the accountant does

not reduce his/her customer's tax burden either legally or illegally it is very difficult for the

accountant to work in the tax sector. This may make it almost impossible for an honest

accountant to stay in business.

1.2.1 Audit Rates

The actual audit rate in Turkey fluctuates between 3 and 5%, which is considered to be

very low by some authors (Edizdogan and Tas, 1993; Aydemir, 1995; Kirbas, 1995;

Ozsoylu, 1996; and Aktan, 1997). However, the audit rate in Turkey is much higher than

the USA's audit rate, which has recently begun to increase, reaching 1.7% in 1995

(Andreoni *et al.,* 1998). Nevertheless, it may be erroneous to compare countries, since

norms, cultures and tax ethics are possibly different. For example, Tanzi (1969) argues

that in the Mediterranean countries, such as Italy and France, tax evasion is not generally

considered as immoral behaviour, and therefore, evasion is widespread, whereas in

Sweden, Germany and England tax evasion involves social stigma, so it is less common.

An important explanation for the relatively high compliance amongst USA taxpayers, even

though the audit rate is low, has been the dramatic increase in information reporting

(Andreoni *et al.*, 1998). While about 340 million documents were received by the IRS during the 1965 fiscal year, over a billion documents were received in 1990[9]. It has been estimated that about three-quarters of all income that should be reported on tax declarations is subject to information reporting[10]. On the other hand, in Turkey one million income taxpayers pay their taxes as lump sums[11], which reduces the amount of information available to the tax authority.

The prescription period, which determines the maximum time lapse between the date of an offence (evasion) and an audit or any subsequent fine, is set at 5 years in the Turkish tax system. Considering the prescription periods in private and criminal law which are 10 and 20 years respectively, it could be said that the short prescription period for tax law makes successful evasion easier. However, increasing the length of prescription will increase compliance costs, which may have an effect on the amount of tax evasion, since a longer prescription time will require the taxpayer to keep tax connected documents, bills, etc. for a longer period of time.

The lack of efficiency of audits to detect evasion, inadequate training of tax inspectors and the lack of computer access within the tax authorities, were all indicated as factors which contribute to the evasion (Edizdogan and Tas, 1993; Aydemir, 1995; Kirbas, 1995; and Aslan, 1997).

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[9] Internal Revenue Service (1966,1991).

[10] Andreoni *et al.*, (1998) computed this statistic from the information presented in Table A-54 of Internal Revenue Service (1988).

[11] Kirbas (1995).

1.2.2 Penalties

There are different types of penalties for different types of tax evasion in Turkey. The fine for the most serious tax evasion is 3 times the evaded tax and/or imprisonment for a period ranging from 3 months to 3 years. However, imprisonment is hardly used, and there seems to be an implicit agreement between judges that tax evasion is a financial crime, which should bring a financial penalty. Only a very few extreme cases lead to imprisonment each year (Kirbas, 1995).

Moreover, the application of the fine is usually postponed for years through appeals. There is also a high chance that a tax amnesty will be granted during the appeal which may provide the opportunity for the taxpayer to pay only the amount evaded and not the fine and the interest on the unpaid taxes.

1.2.3 Amnesties

An amnesty brings a chance for the taxpayer to pay previously unpaid taxes without penalties that would normally be paid if the tax authority had discovered the evasion. The effect of tax amnesties upon the extent of tax evasion is ambiguous. In the short term the tax amnesty can bring more tax revenue, but the effect in the long term may be adverse. An economic theory of tax amnesty is explained in the following chapter. Briefly it shows that the overall effect of tax amnesties on tax revenues is uncertain (Alm and Beck, 1990). Tax amnesties in Turkey are considered to have important effects for encouraging the individual to evade taxes (Aydemir, 1995). After 1960, tax amnesties were used in order to solve the problems of disagreements between the tax courts and the tax administration (Ozsoylu 1996). However, it was argued that the main reasons for tax amnesties in Turkey were technical and economic factors (Yumusak, 1997). The tax authority was unable to

detect and collect the taxes, so amnesties were used to increase the tax collections. However, it seems that amnesties have not helped to solve the problems in the long term. Instead, Turkish taxpayers have been tempted to evade in the hope of benefiting from a future amnesty (Aydemir, 1995). Between 1974 and 1992 the tax authorities unveiled no fewer than eight tax amnesties, i.e. about one amnesty every two years.

1.3 DEFINITION OF TERMS

At this point, we define precisely the meaning of the terms used in the rest of the thesis in order to, eliminate any possible confusion. The terms tax evasion, tax avoidance, non-compliance and black economy are sometimes used almost interchangeably in the literature. However, at times different authors mean different things by the same term, and some of the authors use one of these terms when another might be more appropriate. Pyle (1989) and Cowell (1990) draw attention to this fairly general confusion and attempt to clarify the meaning of the terms. First, we need to distinguish tax evasion from tax avoidance. In legal terms, evasion means reducing one's tax liability by illegal means (e.g. underreporting income), while avoidance is reducing the tax burden by legal means. Thus, evasion is an illegal and risky activity, which can bring about penalties if evaders get caught. On the other hand, avoidance is perfectly legal and not risky. Avoidance could be using loopholes in the tax law to reduce one's tax liability or becoming involved more in economic activities which are exempt from tax, or taxed less than other activities. A specific example of avoidance, drawn from the Turkish Income Tax Law, would be income obtained from schools, nurseries (kindergartens), sports facilities (establishments) and students' accommodation (with a minimum 50 bed capacity). According to Turkish income tax law, the income obtained from these facilities is exempt from income tax for 5

years (10 years in priority development areas) from the date of the start of operation of the

establishments. So, a person who starts a business of this type would avoid taxes for some

period, and he/she is behaving perfectly legitimately in doing so. Tax avoidance may be

deliberately encouraged by government or may be contrary to the government's goals.

Thus, a heavy tax on cigarettes reduces consumption, so the effect of avoidance is

beneficial. On the other hand, income tax encourages people to do their own work (e.g.

painting, decorating and car repairs) which may not be efficient from an economic view

point, since their DIY productivity is generally low and thus, probably the effect is not

desired by policy makers. Tax avoidance can be a substitute for or complement to tax

evasion and *vice versa*. Substitution occurs when a taxpayer switches his/her activity from

one to another activity as a result of an increasing cost of the one activity compared to the

other. Complementarity takes place when a justifiable expenditure (avoidance) is over-

claimed (evasion). Sometimes the boundary between tax avoidance and evasion is not

clear. In their joint analysis of the evasion-avoidance activity, Cross and Shaw

(1981,1982) use the term *'tax aversion'* to refer to both kind of activities.

In most countries the definition of evasion means all activities directed towards not paying

taxes according to laws or paying less than is due by acting outside of the law. So, this

definition includes both intentional, unintentional and non-activities in reducing the tax

burden. Thus it covers not only cheating willingly but also non-compliance by means of

not knowing the law, misinterpreting it, genuine mistakes in calculating income taxes and

not declaring some part of income because of negligence (forgetting extra earnings or

failing to keep necessary records required by the tax law). Lewis (1982) makes two major

distinctions in tax evasion between evasion by commission and omission and that between

intentional and unintentional evasion. Thus evasion by commission involves a taxpayer

taking some action in reducing the tax burden, such as over-claming expenses. Evasion by omission basically involves a taxpayer not doing what he/she is required to do; an example would be not reporting some income. The distinction between intentional and unintentional evasion is whether the taxpayer intends to cheat on his/her taxes or the taxpayer mistakenly declares less than the real income because of ignorance about the law or simple errors in calculation. Is this distinction important? We believe the answer to the question should be 'yes' for an economist who wishes to analyse the factors underlying tax evasion. Whilst, both types of evasion have the consequence of reducing tax revenues, the underlying factors for each type of evasion as well as the characteristics of the evaders are probably very different. Therefore, previous studies in the tax evasion literature have been mainly interested in intentional non-compliance and have omitted unintentional evasion. Some authors in the literature use the term 'tax cheating' to refer to deliberate evasion. In this study, we also mean intentional tax cheating when we use the term tax evasion. However, we do not mean to imply that unintentional evasion involves very small amounts or that the underlying factors for the two kinds of evasion are completely different. Some policy factors may affect intentional as well as unintentional evasion. For example, increasing the expected fine probably also decreases unintentional evasion, since a taxpayer might increase his/her diligence in completing the tax forms and might become more aware of the tax law's requirements. However, as economists we assume that tax evasion is a risky and uncertain activity in which a rational individual would willingly become involved if the benefits outweighed the costs. Another point emerges from the above assumption that tax evasion is risky (i.e. an evader may or may not get away with it). If the probability of being caught is zero for a certain type of evasion, then the activity is not risky (it is more like avoidance for an economist, although it is still evasion, say for an accountant).

There is no generally accepted definition of non-compliance. Some authors use it when they mean intentional evasion, others argue that the term covers unintentional evasion as well.

The IRS in the USA commissioned a wide-ranging Panel and companion research projects from the United States National Academy of Sciences in 1989 in order to explore what is known about individuals' compliance with federal income tax declaration and how more can be learned about it. Panel researchers, who come from diverse disciplines, define the term 'compliance' with federal income tax reporting requirements as follows.

> 'Compliance ... means that the taxpayer files all required tax returns at the proper time and that the returns accurately report tax liability in accordance with the Internal Revenue Code, regulations, and court decisions applicable at the time the return is filed.
> When the taxpayer's return reports a tax liability less than the accurate amount, we use the term *underreporting*. Similarly, we use the term *overreporting* when the taxpayers reports a liability greater than required. Underreporting and overreporting are both forms of *noncompliance* as the panel uses the term.' (Roth, Scholz and Witte, 1989 p.21).

Long and Swingen (1991a) in commenting on this definition of the Panel's report state that it is a major departure from the previous definitions adopted by tax administrations and most social scientists. They argue that 'Forcing honest disagreements to fit into an analytical framework that views them as a decision over 'non-compliance' does fundamental violence to their nature and may produce answers with little validity for the real issues we seek to address.' (ibid, p.649).

We will not discuss this issue further (see Long and Swingen 1991a, and Wickerson 1994 for detailed discussions), but point out that the definition of what is being measured or analysed is a fundamental concern. In the literature of tax evasion what is being measured has not always been clear (see Pyle, 1989). Thus, there is not a generally accepted definition of the term non-compliance.

In this study we are mainly interested in deliberate (intentional) acts of evasion. So, when we use the term evasion, or non-compliance, we always mean tax cheating (willingly), unless otherwise stated. Another point we would like to make is that the terms 'honest' and 'dishonest', and 'evaders' and 'non-evaders' are frequently used in this thesis. However, by using these terms we do not mean to impose any moral judgements on the subjects who participated in the experiments.

1.4 OBJECTIVES OF THE STUDY

The main objective of the study is to investigate empirically the effect of the factors that are thought to have an influence on tax compliance. The factors examined in this study include both policy parameters such as the tax rate, the audit rate, the procedure of audit (i.e. non-random or random), the severity of punishment, public transfers, and economic factors such as the amount of real income. The effect of demographic variables such as age, gender and psychological variables such as tax ethics and perceived audit rate are also analysed in the study. Another purpose of the study is to find out whether students and members of the general public differ significantly in their compliance behaviour. Most of the previous experiments reported in the literature used student subjects. This would be problematic if students behaved differently from members of the general public in the experiments. In general, students have no actual taxpaying experience, whereas members of general public do. Therefore, conducting the experiments with members of general public would produce valuable information. We also conducted another experiment with students in order to analyse the effect of the classroom/laboratory environment. This is potentially important since the literature on tax evasion, experiments are carried out in a classroom/laboratory environment.

1.5 METHODOLOGY AND SIGNIFICANCE OF THE STUDY

Because of the nature of the subject, data is very difficult to obtain in Turkey as in most other countries. Although various attempts were made to get some data for the study from the tax authorities in Turkey, we were unable to obtain any data other than the total number of audits and the amount of income found undeclared. The IRS would not make individuals' audit results available for an academic study even though we assured them of anonymity and our willingness to leave out most of demographic variables (e.g. professions and location of audited taxpayers) from the study. Even if we had obtained IRS data, audits are not random, which poses a significant problem, because the people who are audited are thought to be evaders in the first place. This may produce misleading results.

In the literature of tax evasion mainly three types of methodology have been used. These are (i) survey work, (ii) regression studies, and (iii) experimental work. Each of the methods has advantages and disadvantages. These are highlighted in the appropriate sections of the relevant chapters. The overwhelming majority of regression studies have used information supplied by the US Internal Revenue Service, the data coming from the Taxpayer Compliance Measurement Program (TCMP). This consists of a very large random sample of individuals tax returns. There are important problems with TCMP data, however some consider it to be the best source of data on tax evasion (e.g. Andreoni *et al.,* 1998). Since we want to study Turkish taxpayers and are unable to obtain random tax audit data in Turkey, we have been left with the other two methods. These are the survey and experimental methodologies. Surveys on tax evasion generally take the form of questionnaires, which try to discover taxpayers' past evasion behaviour and what they think about the fairness of the tax system, etc. The simplest way to do that is to obtain responses to a statement, such as 'I never overclaim my deductions', and 'the benefit I obtain from

public goods is higher than the benefit I lose as a result of tax payment'. Conducting tax evasion surveys poses some additional difficulties. For example, would evaders respond to the questionnaire? If they did would they be truthful? Would individuals remember their past evasion behaviour? Although there are some ways to reduce these problems in surveys of socially disapproved behaviours such as tax evasion and other criminal activities (see Webley, Robben, Elffers and Hessing, 1991 for a discussion of the problems of survey studies in tax evasion and attempts to improve the quality of self-reports), on its own the survey method may be insufficient to analyse underlying factors causing tax evasion. Hessing, Elffers and Weigel (1988a) found that there was virtually zero correlation between respondents' self-reported tax evasion and officially documented behaviour.

This study mainly utilised the experimental approach but also used survey questions in order to measure tax ethics. The experimental approach also has disadvantages, one importantly being that subjects involved in the experiments may not behave as they would in real life. On the other hand, an important advantage is that the factors, which are thought to affect compliance, can be manipulated and controlled directly. These issues will be discussed in detail in Chapter 4.

The general design of the experiments in the tax evasion literature is similar. The experiments have been carried out usually with student subjects in a classroom/laboratory environment, who are given an experimental income and then have to decide how much of that income to report to the tax authority. They pay taxes on reported income only, however reported income is audited with some probability. If a subject is found to have declared less than their 'real' income, then he/she has to pay a fine. The process of declaring income and auditing continues for a certain number of times or rounds and at the end of the experiment subjects are paid according to their net income in the experiments.

During the experiment the effect of various policy parameters, such as the tax rate, fine rate and the probability of audit, etc. can be seen by changing these values in certain rounds.

Unlike most of the previous experiments, our study involves large numbers of participants: a total of 7 experiments, which involved 268 participants. The greater number of subjects will improve the statistical power, reliability and the generality of the findings. The experiments have been carried out using samples from different professions, as well as group of students.

In real life, people complete their tax declaration form wherever they want and can get help from others. In order to make the experiments closer to the actual tax assessment procedure, and also to protect privacy by giving participants the opportunity to complete their tax declaration forms wherever they prefer (e.g. offices, their own homes, etc.) 5 of the experiments were conducted over a longer time period. The tax forms were distributed to participants and after they had stated their declared income, the forms were collected the following day. The experiments continued in this manner for several days. The fifth experiment that was conducted with students carried out in a classroom/laboratory environment to replicate previous methodologies and compare the results obtained.

In the experiments, the values of variables have been chosen to be consistent with the actual policy parameters in Turkey. In the experiments, substantial prizes (either cash or goods) were given to participants, so that subjects would take the experiments seriously.

This thesis represents the only experimental research that has been carried out into tax evasion using Turkish subjects. There is some evidence that many countries with similar fiscal systems have very different tax compliance rates. Therefore, social, cultural and ethical differences may play an important role in explaining tax evasion. Although tax experiments are increasingly carried out in the USA, the UK and some other countries, an

experiment with Turkish subjects may give specific and valuable information about taxpayers in Turkey.

In the experiments, subjects had to decide only how much of their income to declare. This is a simplification of the real taxpaying experience. In real life taxpayers deduct their expenditure from income, add different types of income and losses and then declare their taxable income. In an experiment, it is possible to give some different types of income, and expenditure can also be included. We refrain from this in our experiments, since it would cause some unintentional evasion (as a result of calculation mistakes or by misunderstanding etc. see the study by Robben, Webley, Weigel, Warneryd, Kinsey, Hessing, Martin, Elffers, Wahlund, van Langenhove, Long and Scholz, 1990). In real life people can evade by overclaming expenditure, under declaring income or other ways. Evasion by overclaming expenditure could be incorporated into the experiments. Nevertheless, this would make the experiments again more complicated and might lead to unintentional mistakes. Webley *et al.*, (1991) argue that subjects in experiments should be able to evade in as many ways as they can in everyday life. However, Cowell (1991) points out that making experiments more complicated will make them very difficult to interpret in any useful way. Moreover, he notes that it is not possible to include every type of real life evasion in an experiment. Tax evasion is about breaking the law, and depending on the legal and social structure of the community, people will invent new types of evasion every time, if they can.

There is an important aspect in real life taxpaying, which is very difficult to mimic effectively in the experiments; 'social stigma' or 'shame' when the evader gets caught. There is also imprisonment risk for evaders when they get caught (although an imprisonment sentence is hardly ever applied under the Turkish Tax System). Therefore,

subjects may behave differently in experiments than they would behave in real life. However, considering problems with other approaches, we believe well conducted experiments are useful in generating sound data on the subject of tax evasion.

1.6 OUTLINE OF THE STUDY

Chapter 2 is the first of three literature review chapters. It covers models of tax evasion. Empirical findings of survey and regression work concerning the factors, which affect tax evasion are discussed in Chapter 3. Chapter 4 reviews findings of the previous experiments, with findings grouped under different factors, which are thought to affect tax evasion. Chapter 5 explains the experimental method used to collect the research data. Chapter 6 analyses econometrically how the parameters affect the decision to evade and the extent of evasion by evaders. Chapter 7 investigates the effect of the perceived audit rate on the likelihood and the amount of evasion using a tax evasion scenario. Subjects' tax ethics are analysed, and multiple response analysis of the reasons for tax evasion is also carried out in this chapter. Chapter 8 discusses the findings of this study.

CHAPTER 2

THEORETICAL MODELS

2.1   INTRODUCTION

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       2.2.1 The Basic Expected Utility Models
       2.2.2 Criticism and Extensions
              2.2.2.1 Mis-perception
              2.2.2.2 Preferences
              2.2.2.3 Endogenous labour supply
              2.2.2.4 Psychic costs and social customs
              2.2.2.5 Public goods and fairness
              2.2.2.6 Avoidance-evasion
              2.2.2.7 Tax amnesty
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2.3   OTHER APPROACHES
       2.3.1 Bounded Rationality
              2.3.1.1 Prospect theory
              2.3.1.2 Rules and heuristics
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              2.3.2.1 Vogel model
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2.4   CONCLUSION

2.1 INTRODUCTION

Allingham and Sandmo (1972) initiated the literature which examines individuals' income tax evasion decisions. They extended the study of Becker (1968) on law enforcement to taxation using risk theory. Following their seminal paper, there has been extensive study of the theory of the tax evasion decision. Tax evasion literature was subsequently developed by Yitzhaki (1974), Cowell (1985a,b), Bordignon (1993), Myles and Naylor (1996), Cullis and Lewis (1997) and others. The study of tax evasion has attracted interest from many different disciplines, such as sociology, psychology and anthropology, as well as economics.

Section 2.2 will summarise the expected utility models, explain their findings and limitations. Other models relevant to tax evasion behaviour are discussed in Section 2.3. In this section, we also explain bounded rationality theory, behavioural models and multiple selves. Section 2.4 is a conclusion section, which will summarise and end the chapter.

2.2 THE EXPECTED UTILITY FRAMEWORK

Tax evasion is a risky and illegal activity. In economic terms, taking risks in legitimate activity is not very different from taking risks in illegal activity. Therefore, it seems reasonable to employ analysis used in other fields of public economics to tax evasion. So, the standard economic model of tax evasion uses expected utility maximisation.

Expected utility models assume a particular form of deterrence theory[1], in which the probability of audit and severity of fine act as evasion control policy. Different alternatives are assessed by considering the likely consequences or outcomes. The utility of each outcome is evaluated and probabilities are attached to uncertain outcomes, leading to the expected utility of the alternatives. The individual chooses the alternative with the highest expected utility.[2]

Allingham and Sandmo's (A-S) model is quite simple. They assume that behaviour is affected by factors such as the tax rate, the penalties for tax evasion and the probability of detection. In each time period an individual has to decide how much income to declare to the tax authority. A-S derived results about the influence of tax rates, penalties and detection rates on tax evasion. Sub-section 2.2.1 will examine the basic expected utility models. The limitations of these basic models are summarised in sub-section 2.2.2. Later contributors have relaxed the basic models' assumptions and tried to make more realistic ones. They have examined the effect of labour supply, fairness, social norms, etc. on the amount of evasion. These models are also summarised in sub-section 2.2.2.

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[1] Deterrence theory analyses the impact of expected punishment on criminal behaviour. In general, it is assumed that the punishment may take three types: legal sanctions imply government-imposed punishment, social stigma is the punishment imposed by peer groups, and guilt feelings are the self-imposed punishments (see Grasmick and Scott, 1982 for more information). Tax evasion is thought to be one activity in which optimal conditions for deterrence are very likely to exist, since careful planning is likely to occur in deliberate tax evasion. 'In the sense that cost-benefit analyses are being accomplished with calculator literally in hand...' (Varma and Doob, 1998, p.168).

[2] For example, assume that the individual is thinking not to declare an amount of income which would reduce his/her tax payment by £100, and knows that the probability of audit is 10%. If the evader is caught, the evaded tax amount (£100) plus a fine of 50% of evaded tax (£50) has to be paid. The decision that the individual faces is whether to evade £100 in tax or not, (i) if the person decides not to evade, his/her current income will be I and (ii) if he/she decides to evade £100 in tax, there are two possible outcomes; I+£100 if the individual is not caught, and I-£50 if he/she is caught. So the expected utility of not evading is; U (I), and the expected utility of tax evasion is; .90[U(I+100)]+.10[U(I-50)]. For example, if I =£1000 and U(I)=ln (I), then the expected utility without evasion is U (1000)= 6.91 and the expected utility with evasion is .9 ln (1100)+.1 ln (950)=6.99. Therefore, the individual would evade.

2.2.1 The Basic Expected Utility Models

A-S's model (1972) adopts a one-period expected utility framework in order to analyse the tax evasion decision. Their approach combines both the literature on the economics of criminal activity (Becker, 1968) and the analysis of risk and uncertainty (Arrow, 1970). According to A-S, taxpayers can behave in two different ways: (i) they can declare their real income, or (ii) they can declare less than their real income. If the taxpayer chooses the second option, his/her payoff will be more than option 1, if the tax authorities do not carry out an investigation. If the tax authorities carry out an investigation and find that he/she evades tax, then he/she is worse off than under option 1. So the decision is a non-trivial one.

It is assumed that each taxpayer has a von Neumann-Morgenstern utility function and that he/she is a rational, amoral, risk-averse expected utility maximiser. It is also assumed that utility is a function only of income. Actual income, I, is exogenous. A constant tax rate, t, is imposed on declared income, X. The individual assumes that the tax authority will carry out an investigation with some probability, p. If the tax authority finds that the individual has evaded taxes then he/she pays tax on the undeclared amount, $I-X$, at a fine rate, f, which is greater than t.

The taxpayer chooses X in order to maximise his/her expected utility, EU, which can be written as

$$E[U] = (1-p)U(I-tX) + pU(I-tX-f(I-X))$$

It can be shown that the taxpayer will declare less than his actual income if the expected penalty, pf, is less than the regular income-tax rate, t.

An individual will become involved in tax evasion if

$$\frac{dE[U]}{dX}\bigg|_{X=I} < 0 \tag{2.1}$$

When we differentiate expected utility $E[U]$ with respect to declared income X we get:

$$\frac{dE[U]}{dX} = -t\ (1-p)U'[I - t\,X] - (t-f)pU'[I - t\,X - f\ (I-X)] = 0 \tag{2.2}$$

Then evaluating expected utility at $X=I$ we obtain:

$$\frac{dE[U]}{dX}\bigg|_{X=I} = -t(1-p)U'[I - t\,I] - (t-f)pU'[I - t\ I]$$

Inserting into (2.1) and simplifying gives:

$-t(1-p)-(t-f)p < 0$ or $pf < t$

which implies that the individual enters into tax evasion if the expected fine *(pf)* on undeclared income is less than the regular rate of income tax *(t)*. If detection is more likely and penalties are severe enough the taxpayer will be more compliant. The model shows that the penalty rate and the probability of detection are substitutes for each other. So, the tax authority can adjust *p* and *f* so that $pf \geq t$ in order to eliminate tax evasion altogether.

Figure 2.1 Compliance Curve
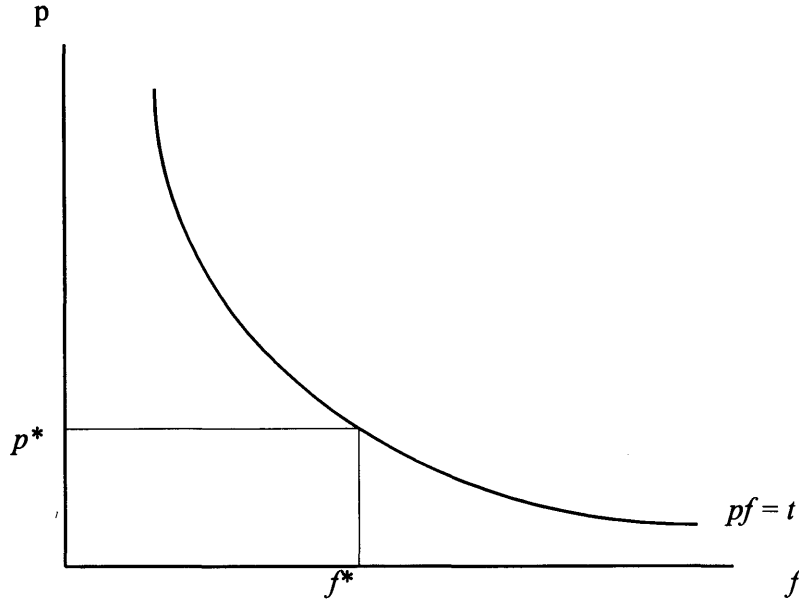
If the government's goal is to enforce complete tax compliance then it will set p and f in the area above and to the right of the $pf = t$ curve. In this area, nobody will evade and there will be complete compliance. Optimal values of p and f rely upon the value of t; if the tax rate is increased, government will need to set new values for p or f or both which are larger than previous ones.

An interior optimum can be assumed, $0 < X < I$, for simplicity. If we define $Y=I-tX$ and $Z=I-tX-f(I-X)$ then the first-order condition for an interior maximum can be written as

$$\frac{dE[U]}{dX} = -t(1-p)U'(Y) - (t-f)pU'(Z) = 0 \tag{2.3}$$

The second order-condition is

$$\frac{d^2E[U]}{dX^2} = D = t^2(1-p)U''(Y) + (t-f)^2 pU''(Z) < 0 \tag{2.4}$$

which is satisfied by the assumption that the utility function is concave.

A-S examine how reported income is affected by the parameters of the model, income (I),

the tax rate (t), the penalty rate (f), and the probability of detection (p). They use the

Arrow-Pratt measures of absolute and relative risk aversion (R_A and R_R) which are defined

as follows;

$$R_A(I) = -\frac{U''(I)}{U'(I)}, \quad R_R(I) = -\frac{U''(I)I}{U'(I)}$$

evaluated at $I = Y, Z$

A-S assume that absolute risk-aversion decreases with income (DARA)[3].

The comparative static results are as follows;

$$\frac{\partial X}{\partial I} = \frac{-1}{D}t(1-p)U'(Y)[R_A(Y) - (1-f)R_A(Z)] \tag{2.5}$$

$$= \frac{-t(1-p)U'(Y)}{D}[R_A(Y) - R_A(Z) + fR_A(Z)]$$

The sign of (2.5) depends on the value of f. If $f \geq 1$ then the derivative is unambiguously

positive which means that when actual income is increased, the taxpayer will report more

income to the tax authority. On the other hand, if $f < 1$ the sign of the expression cannot be

decided under the assumption of DARA. However, if we assume increasing absolute risk

aversion (IARA), the sign of the derivative is again unambiguously positive.

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[3] Decreasing absolute risk aversion (DARA) is characterised by $R_A(Z) = -\dfrac{U''(Z)}{U'(Z)} > R_A(Y) = -\dfrac{U''(Y)}{U'(Y)}$

for all $Z < Y$. The inequality implies that a risk averse individual is willing to take more risk if his/her wealth level increases. In the words of Arrow (1965) DARA indicates that 'the willingness to engage in small bets of fixed size increases with wealth, in the sense that the odds demanded diminish.' (p. 35). Similarly, $R_A(Y) < R_A(Z)$ for IARA and $R_A(Y) = R_A(Z)$ for CARA.

A-S also examine how the proportion of actual income reported differs according to actual income changes.

$$\frac{\partial(X/I)}{\partial I} = \frac{-1}{I^2}\frac{1}{D}t \ (1-p)U'(Y)[R_R(Y) - R_R(Z)] \tag{2.6}$$

The sign of (2.6) depends on the relative risk aversion, that is whether it is an increasing, constant or decreasing function of income (IRRA, CRRA or DRRA)[4]. If the coefficient of R_R is increasing (decreasing), the declaration rate rises (falls) with income. If there is CRRA, then the declaration rate is invariant to income.

How reported income is affected by the tax rate depends on the assumption about absolute risk-aversion, as can be seen below

$$\frac{\partial X}{\partial t} = \frac{1}{D}Xt\ (1-p)U'(Y)[R_A(Y) - R_A(Z)] + \frac{1}{D}[(1-p)U'(Y) + pU'(Z)] \tag{2.7}$$

The second term on the right hand is unambiguously negative under diminishing marginal utility. However, the first term can be positive, zero or negative depending respectively on whether absolute risk aversion is decreasing, constant or increasing. Under the plausible assumption of DARA, the overall result is ambiguous. The reason for this is that there are income and substitution effects. The substitution effect is negative since increasing the tax rate will make it more profitable for an individual to evade taxes. On the other hand, the income effect will reduce the individual's wealth and under the assumption of DARA this will decrease the amount of tax evasion.

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[4]Increasing relative risk aversion, IRRA, is characterised by $R_R(Y) = -\dfrac{U''(Y)Y}{U'(Y)} > R_R(Z) = -\dfrac{U''(Z)Z}{U'(Z)}$

for all Y>Z. IRRA indicates that 'If both wealth and the size of the bet are increased in the same proportion, the willingness to accept the bet (as measured by the odds demanded) should decrease.' (Arrow 1965, p. 36). CRRA indicates that the proportion of income invested in risky assets is invariant to the level of the individual's income.

Friend and Blume (1975) developed a model from which demand functions for risky assets both at the household and the macro-level are obtained. The parameters of the functions are estimated by using cross-sectional household data from the Survey of Financial Characteristics of Consumers (SFCC) which indicated that CRRA is a fairly accurate description of investor behaviour. Using A-S's model, Yaniv (1994) showed that declared income is negatively related to the income tax rate 'if (a) the worst that can happen to a detected evader is the confiscation of his entire undeclared income and (b) the relative risk-aversion is constant and bounded from above by the inverse of the penalty rate.' (p.108) (see Appendix A for the proof).

How tax evasion is affected by the changes in penalty rate can be seen from the expression below:

$$\frac{\partial X}{\partial f} = -\frac{1}{D}(I - X)(t - f)pU''(Z) - \frac{1}{D}pU'(Z) \qquad (2.8)$$

Since each of the terms of (2.8) is positive, increasing the penalty rate will reduce tax evasion.

An increase in the probability of audit, (expression 2.9), will lead to a decrease in the amount of tax evasion, since $f > t$:

$$\frac{\partial X}{\partial p} = \frac{1}{D}[-t\,U'(Y) + (t - f)U'(Z)] \qquad (2.9)$$

So, according to the A-S model, the impact of changes in income and the tax rate on tax evasion cannot be decided without making assumptions about risk aversion. However, the effect of the penalty rate and the probability of audits are unambiguous. A-S concludes that both the penalty rate and the probability of detection have an important effect on deterring evasion.

It is interesting to use specific utility functions, in order to elaborate the predictions of the A-S model under each function. Table 2.1 includes some widely-used utility functions and indicates the predictions of A-S model concerning the various parameters under the restriction of these utility functions, '+' and '-' relate to whether increasing the magnitude of the compliance variable is associated with increasing or decreasing levels of tax compliance, and '0' indicates that results are invariant to changes in the compliance variable.

Table 2.1 The predictions of A-S model under specific utility functions

	Utility Functions			
	$I^{1-e}/1-e$	$-e^{-\alpha I}$	$\alpha I-\beta I^2$ $\alpha>0$	
	$e>0$	$\alpha>0$	$\beta>0$	$\beta=0$
			$I<\alpha/2\beta$	
Coefficient of R_A	Decreasing	Constant	Increasing	0
Coefficient of R_R	Constant	Increasing	Increasing	0
$\partial X/\partial I$	+ if $f\geq 1$, and ambiguous if $f<1$	+	+	1 if $pf>t$, 0 if $pf<t$, and I indeterminate if $pf=t$
$\partial (X/I)/\partial I$	0	+	+	0
$\partial X/\partial t$	- if $f\leq 1$ and $ef\leq 1$, otherwise ambiguous	-	-	0
$\partial X/\partial f$	+	+	+	0
$\partial X/\partial p$	+	+	+	0

Yitzhaki (1974) shows that if the fine is imposed on the evaded tax (as it is applied in many countries including Turkey) rather than the undeclared income, there will not be a substitution effect. Assuming DARA, an increase in the tax rate reduces the amount of income concealed from the government. So, Yitzhaki concludes that an increase in the tax rate will decrease evasion, a result which seems contrary to common sense. This result appears because of the fact that when the expected fine depends proportionally on tax rate, an increase in tax rate does not cause any substitution effect but leads to a decrease in disposable income.

Yitzhaki's (1974) findings concerning the effect of the tax rate has attracted much criticism in the literature. Balassone and Jones (1998) argued that Yitzhaki's findings cannot be totally ruled out since his model does not ignore the possibility of increases in the tax rate leading to increased tax evasion under IARA. Balassone and Jones indicated that although most empirical studies find an increase in the tax rate leads to an increase in tax evasion, the empirical evidence may be in question. Moreover, even in the case that the empirical studies are correct, there are two more possibilities; (i) increasing absolute risk aversion is not impossible. The notion that tax evasion is an inferior or necessary good cannot be ruled out. For example, at low levels of income, evasion may be necessary to provide a sufficient income and also moral considerations may not be high enough. When income increases, evasion is less necessary and the moral cost is higher, (ii) individuals can behave as if they are under increasing absolute risk aversion, although decreasing absolute risk aversion is relevant. For example, as we will see some refinements of the model included social norms and morality costs, and in some of these models, even under decreasing absolute risk aversion, evaded income is considered as an inferior good.

In the experimental work in this study (see Chapter 5), a fine is applied on the evaded tax, ($ft(I-X)$) where f is bigger than 1, rather than on evaded income since this is how the penalty is actually applied in Turkey. Therefore, I use specific utility functions and elaborate the predictions of the Yitzhaki model under each function as I have done for A-S in Table 2.1. (see Table 2.2 below). Comparative statics are given in Appendix B.

Table 2.2 The predictions of Yitzhaki model under specific utility functions

	Utility Functions			
	$I^{1-e}/1-e$	$-e^{-\alpha I}$	$\alpha I-\beta I^2$ $\alpha>0$	
	$e>0$	$\alpha>0$	$\beta>0$	$\beta=0$
			$I<\alpha/2\beta$	
Coefficient of R_A	Decreasing	Constant	Increasing	0
Coefficient of R_R	Constant	Increasing	Increasing	0
$\partial X/\partial I$	<1 (*X* increases slower than *I* so, evasion increases with income)	1	>1 (evasion decreases with income)	1 if $pf>1$, 0 if $pf<1$, and *I* indeterminate if $pf=1$
$\partial(X/I)/\partial I$	0	+	+	0
$\partial X/\partial t$	+	+	ambiguous	0
$\partial X/\partial f$	+	+	+	0
$\partial X/\partial p$	+	+	+	0

Christiansen (1980) has examined the interrelationship between the probability of detection (p) and the fine rate (f) in a modified version of A-S's model. The main aim of his paper was to analyse whether a large fine with a low probability of detection is more effective than a high probability of detection with a small fine to prevent tax evasion. The experimental study carried out by Friedland, Maital and Rutenberg (1978) also investigated this issue (their study and findings are considered in Chapter 4). Christiansen found that when the penalty rate is increased and the probability of detection is decreased with the expected fine for tax evasion held constant, risk-averse individuals will reduce their evasion activity. So, a large fine is more efficient than a high probability of audit in

preventing evasion. Then the question arises as to why the government does not increase penalties up to the point that no evasion exists. As we know, penalties for evasion are not severe in general. The main reason for this is the principle that punishment should fit the "crime"; for example, it is felt to be unfair to sentence people to long periods of imprisonment for small scale tax evasion. Christiansen concluded that if the initial penalty rate is small enough, an increase in the penalty rate will encourage evasion as long as the probability of detection is balanced to keep the expected fine unchanged. He also examined the effect of the tax rate on the amount of tax escaping the tax collector. Like Yitzhaki (1974), Christiansen also points out that the amount of tax escaping the tax collector will reduce with a higher tax rate.

Witte and Woodbury (1985) have developed the A-S model, by assuming a progressive tax structure and arguing that the individual faces three possible tax agency actions, which are (i) audit, (ii) a civil penalty and (iii) criminal sanctions. This means the individual is faced with four possible states of the world which differ from the most beneficial (the individual is not subject to any agency action) to highly undesirable (the individual is audited, prosecuted and subject to criminal sanction). Moreover, Witte and Woodbury assumed that penalties for non-compliance, which are borne by the individual, increase with the extent of tax agency action. The major results of their analysis are briefly as follows; an increase in the probability of audit will encourage higher levels of tax compliance. Increasing the probability of audit has more effect than increasing the probability of a civil penalty. Since lump-sum taxes cause only an income effect, an increase in this sort of tax will lead to higher level of tax compliance. On the other hand, we cannot sign the impact

of a tax change which proportionately lowers tax payments at all levels of income. Finally,

the effect of an increase in pre-tax income upon tax compliance is impossible to sign.

2.2.2 Criticisms and Extensions

The basic models consider the individual's decision to evade as a simple gamble that is

affected mainly by the probability of expected fine and the tax rate. However, most

empirical studies point out that there are some other factors such as perception, attitudes

and moral judgements, and demographic variables. Alm, McClelland and Schulze (1992b)

state that in most countries the audit rate and the penalty for tax evasion are very small.

Therefore, according to the basic economic model everybody should evade taxes and the

amount of tax evasion should be much more than it is. Then, the question that researchers

should try to answer is not *'Why do people evade taxes?'*, but *'Why do people pay taxes?'*.

Dean, Keenan and Kenney (1980) were highly critical of the way economic theory (e.g.

A-S model) tries to explain tax evasion. They argued that the assumptions of analytical

models '...are naive and far-removed from reality' (ibid, p.29). The authors claimed that

although there may be a relationship between the expected fine and evasion, criminological

and social studies found more important factors influencing criminal acts such as moral

beliefs and lack of peer involvement of an individual, etc. Therefore, these types of studies

'...have long abandoned the primitive sanctions/deterrence model.' (ibid, p.29). They

claimed that '...how taxpayers might act if they were condemned to being entirely rational,

utility maximising, automatons can only serve to postpone the emergence of realistic tax

theories and useful policy insights' (ibid, p.44). The limitations of the basic economic

model of tax evasion have been discussed by various writers, such as Lewis (1982), Pyle

(1989,1991), Roth *et al.*, (1989), Cowell (1990), Cullis and Lewis (1997) and Cullis and Jones (1998).

Some limitations of the basic economic models are that they ignore the roles of tax practitioners, cost of compliance, ongoing interaction between taxpayers and tax authority and different sources of income on tax evasion. Now there is a considerable amount of empirical work on the subject of income tax evasion, which finds these and many other variables to be relevant to income tax evasion. The Internal Revenue Service in the USA has detailed 64 potential compliance factors (IRS 1978, reported by Jackson and Milliron 1986) ranging from *'income'* and *'age'* to the *'mental health'*.

Economic models of income tax evasion have been improved significantly over recent years. Later models have tried to relax the more restrictive assumptions in order to increase the realism of the basic models. However, the results of later models in general become ambiguous as a result of incorporating some real-world complexities. Below we will explain the main criticisms of the basic models and highlight the extensions.

2.2.2.1 Mis-perception

Almost all expected utility models assume that taxpayers know exactly the probability of audit and penalty for tax evasion. This is an overly strong assumption for several reasons. Audits may not be random but depend instead on various factors (income sources, amount of income, etc.) resulting in different audit rates for different groups of taxpayers. In general, tax authorities do not make audit rates or the selection criterion for audits public knowledge. Even if a taxpayer knows the exact actual probability of audit, his/her perceived and actual audit rate may differ (for example, they may overweigh the probability

of audit). Previous audits and those of friends and family may all affect the perceived audit rate. Some surveys have tried to find estimates of the perceived audit rate to compare with the actual one. Although the perceived audit rate differs from study to study and seems to be sensitive to the wording of the question, surveys generally indicate that individuals over-estimate the audit rate for their income group (see Roth *et al.*, 1989). However, a few studies found that the audit probability is under-estimated (e.g. Benjamini and Maital, 1985). An experiment by Alm, Sanchez and de Juan (1995) found that subjects over-weighed the probability of audit, even when fully informed about the audit rate. This result may partly explain why there is so little evasion despite the low penalties and the audit rates. Penalty rates also may not be known by taxpayers or may be uncertain. In many countries the penalty in theory and in practice is different since the courts do not fully apply the penalties for evasion. This may be because audit rates are low and only a few individuals get caught so juries are less willing to apply the penalties fully under these circumstances.

2.2.2.2 Preferences

Many experimental studies found that people do not behave according to rules of expected utility models (e.g. Schoemaker, 1982; Slovic and Lichtenstein, 1983; Karni and Safra, 1987 and Loomes, Starmer and Sugden, 1991). For example; the experiments revealed that 'preference reversal' may occur. According to this phenomenon,

> 'preference reversals occur when individuals are presented with two gambles, one featuring a high probability of winning a modest sum of money (the P bet), the other featuring a low probability of winning a large amount of money (the $ bet). The typical finding is that people often choose the P bet but assign a larger monetary value to the $ bet.' (Slovic and Lichtenstein, 1983, p. 581).

So, although the individual prefers one choice, he/she assigns a higher value to the other choice.

There are also 'context effects' in decision taking which cannot be explained by expected utility theory. Alternative description of mathematically identical choice problems lead to different outcomes depending on whether they have been specified as gambling or tax evasion (Baldry, 1986) or as insurance or gambling decisions (Hershey and Schoemaker, 1980).

2.2.2.3 Endogenous labour supply

One of the main assumptions of the basic models is that income is exogenously given. It ignores the interrelationship between the labour supply decision and the decision to evade. There have been a number of studies which allow labour supply to be another variable in the decision to evade taxes, such as those of Andersen (1977), Pencavel (1979), Isachsen and Strom (1980), and Cowell (1985a,b). Pencavel (1979) showed that none of the comparative static effects of parameter changes can be unambiguously signed when labour supply is variable. The only exception to this is an increase in lump-sum income which increases evaded taxes.

In general with hours of work endogenous, there are three effects which are; a portfolio effect, an income effect, and a leisure effect. As we know, in the case of tax changes income and substitution effects work in opposite directions, and the net effect of tax changes cannot be determined. Moreover the tax change will also affect the decision between tax evaded income and non-evaded income. As a consequence, it is not possible to determine the overall effect upon labour supply.

Cowell (1985a,b) assumed separability between the decision about (i) leisure and work time and (ii) working time amongst the official sector and the irregular sector. With this assumption, it is possible to obtain unambiguous results concerning the effects of some parameters. Although Cowell's assumption about the separability of leisure versus work time and work in the official sector versus work in the irregular sectors is useful in determining the effects of the parameters, it still requires strong assumptions (e.g. about the relative risk aversion) to sign the effects of the variables.

2.2.2.4 Psychic costs and social customs

Most empirical studies have found that moral judgements, social norms and guilt feelings are important determinants of tax compliance (see Chapters 3 and 4). However, the basic models regard people's decision to evade as a simple gamble and do not take the effect of psychic costs such as social stigma of evasion into consideration.

Gordon (1989) modified the model of Yitzhaki (1974) by incorporating non-pecuniary considerations (psychic costs such as anxiety, guilt etc.) into the utility function[5]. The psychic cost of evasion increased as the amount of concealed income increased. In this case, increases in tax rate have two competing effects; (i) under the assumption of DARA, the reduction in income leads to lower evasion, but (ii) however, the psychic costs of being dishonest will be relatively lower which induces more evasion. If the second effect (substitution effect) is sufficiently high, then increases in tax rate leads to more evasion. In Gordon's model there were several restrictive assumptions: (i) additively separable

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[5] As indicated by Cullis and Lewis (1997) 'In borrowing from psychology and applying the maximising logic of economics these contributions are a form of economic psychology.' (p.312).

preferences, (ii) constant marginal disutility from behaving dishonestly, and (iii) individuals differentiated only by an honesty characteristic. Gordon classified taxpayers into two groups. The first consisted of the more dishonest individuals (typically all evaders) - this group will decrease the amount of evasion as the tax rate increases (same as Yitzhaki, 1974). On the other hand, the second group, which contains non-evaders and small evaders - under the assumption of DARA, these individuals will evade more if the tax rate increases. The model thus explains why some individuals never evade, even when the expected financial return of evasion is highly positive.

al-Nowaihi and Pyle (2000) developed a theoretical model which relaxes the assumptions made by Gordon (additively separable preferences, constant marginal disutility of evasion and individuals differentiated only by an honesty characteristic). They included 'stigma costs' into the utility function, assuming that stigma costs increase with unreported income. The authors found that increases in the tax rate would result in less income reported to the tax authority if the perceived probability of detection is either sufficiently low or sufficiently high. Individuals who perceive the probability of detection as high will be necessarily small evaders, but those with a low perceived probability of detection may be either small or large evaders. The explanation of the finding that individuals increase the amount of evasion with an increasing tax rate is as follows; when the perceived probability of detection is low, the income effect is smaller than the substitution effect. On the other hand, when the perceived probability of detection is high, the individuals are small evaders and again the income effect will be relatively small. al-Nowaihi and Pyle carried out simulations using a large range of realistic parameter values for a logarithmic utility

function. The results indicated that increases in the tax rate increased the amount of tax evasion for plausible parameter values.

Myles and Naylor (1996) have also modified the model of Gordon (1989). In their model structure, contrary to Gordon's 'psychic cost' of evasion which increases as evasion increases, an honest taxpayer derives a social custom utility by paying all taxes due. Once a social custom of paying taxes is ignored by an individual, then all utility from the social custom is lost. Moreover, they also incorporated a conformity payoff, which depends on the size of the conforming population. One important characteristic of Myles and Naylor's model is that once taxpayers deviate from the social custom of paying taxes, then the amount of tax evasion does not depend on the importance that they give to the social custom. So, an individual either does not evade any taxes or he/she jumps to a positive optimal level of tax evasion. For a given income and tax rate, the critical proportion of evaders required for the individual to evade increases as the social custom and the return from conformity increases. In their model, there is a multiplicity of possible equilibria. The 'no evasion equilibrium' can be destroyed by a small change in the tax rate which causes a form of a non-compliance epidemic. When more people start to evade, conformity payoff decreases and evasion spreads to an even larger proportion of the population. So, this model seems to be useful in explaining possible different equilibria between Turkey and other developed countries say USA. As explained in the previous chapter, although audit rates are much higher in Turkey, compliance rates seems to be much lower, one reason for this may be social customs whose the effect is possibly captured by the tax ethics questionnaire.

2.2.2.5 Public goods and fairness

The basic expected utility models assumed that the way in which tax revenues are spent has no effect on people's decision to evade taxes. However, public goods are generated as a result of tax revenues and they produce benefits for individuals. It is also assumed that the amount of public goods received as well as the amount of taxes paid by an individual would have an impact on his/her perceived fairness of the tax system.

Cowell and Gordon (1988) and Cowell (1990) found that the impact of a tax rate change on declared income depends on the individuals' sense of the relative abundance of private and public goods. If individuals believe that public goods are over-provided compared to private goods (public goods are over-provided if in the equilibrium the marginal utility from public goods is lower than that from private goods), then an increase in tax rate would increase declared income, the result being similar to Yitzhaki's (1974) model. On the other hand, if individuals believe that public goods are under-provided compared to private goods, an increase in tax rate would decrease declared income, under the assumption of DARA. The explanations for these results are as follows; if public goods are under-provided (over-provided) an increase in tax rate would increase (decrease) the individual's total wealth (disposable income and public goods) and this would lead the individual to increase (decrease) the amount of his/her risky assets. However, these results are only valid in a large economy. In a small economy the analysis is ambiguous, since the individual has to consider the effect of his/her evasion decision on the amount of tax revenues and on other people's evasion decision.

Cowell (1990,1992) showed that the standard economic model of tax evasion indicates that under the assumption of self-perceived insignificance (the individual assumes that his/her

evasion behaviour does not change total supply of public goods or the factors determining equity), an individual's declared income always decreases with the perceived share in publicly supply goods or equity (a result which is counterintuitive and against some empirical evidence, see Chapters 3,4). When inequity increases (e.g. public supplied goods falls), the individual's perceived total income decreases which results in reduction in personal well-being and thus makes the individual less willing to take risk under DARA. However, Cowell also showed that if the individual could alter directly perceived inequity through his/her actions and if he/she is sufficiently sensitive to the inequity, then the individual will increase evasion with perceived inequity. For example, if an individual compares his/her own effective financial position and the financial position of the group to which he/she identifies, and if the individual, who is not already evading the full amount, can change the inequity that he/she faces by taking direct action, then by increasing his/her amount of evasion he/she will increase expected disposable income which would directly decrease inequity. So, the assumptions about how inequity enters to the individual's utility function are important, and the validity of the models' predictions relies on the accuracy of these underlying assumptions. Cowell (1992) indicated that '...the crucial question that a model of the tax evasion decision must address is: can the person affect inequity directly by his own actions?' (ibid, p.541).

Falkinger (1988) assumed that a taxpayer expects other individuals in the society to change their declaration behaviour in exactly the same way as he/she does. This assumption is in contrast to the assumption of Cowell's self-perceived insignificance. Assuming further that the benefits of public goods vary across the individuals and that the utility function of the consumer is time separable in public good and income, the results indicated that tax

evasion is comparatively lower when the taxpayer is aware of the public benefits that he/she gets in return for his/her tax payments. Nevertheless, the effect of an increase in the taxpayer's share of benefits arising from public expenditure on the amount of evasion is ambiguous. The results depend on the elasticity of marginal utility from the consumption of public goods, which represents a measure of saturation with respect to public goods. If the relative rate at which marginal utility decreases as public goods increases is less than one, then taxpayers declare more of their income as their shares of public goods increases (in line with the equity hypothesis). However, if the elasticity is more than one, then taxpayers declare less as their share rises.

Another study by Falkinger (1995) assumed a self-perceived insignificance of a taxpayer and showed that the amount of income an individual reports increases (remains constant, decreases) with perceived equity, if and only if the individual's absolute risk aversion increases (remains constant, decreases, respectively) with perceived equity. When the value of the consumption characteristics generated by public goods rises at a decreasing rate with disposable income, then risk aversion increases with equity even under the assumption of DARA. Therefore, the amount of declared income increases with the share of such public goods. Falkinger indicated that public goods such as security measures or sophisticated infrastructure can be given as examples of such goods which are more enjoyable and usable as one's wealth increases. On the other hand, for basic public goods a higher share of public provision can increase the amount of evasion. The author also provided a psychological argument about the positive relationship between risk aversion and perceived equity; individuals would disapprove of tax evasion in a fair tax system more than they would in an unfair tax system. An increase in equity raises the bad reputation of

evaders, thus increasing risk aversion. As a result there would be a positive link between the amount of reported income and equity.

Bordignon (1993) also incorporated a 'fairness' aspect as an extra variable to the income tax evasion model. In his model, fairness is determined endogenously and depends on the tax rate, public expenditure and perceived evasion by other taxpayers. An individual would decide a 'fair tax' to pay as a function of these three factors. 'Kantian Principles' determine the tax amount that each individual considers fair to pay. According to this principle, an individual considers it fair to pay as much as he/she wishes other individuals to pay. Bordignon indicated the findings of many empirical works, which reached the conclusion that a taxpayer's relationship with the government is perceived not only as coercion, but also as an exchange. The taxpayer will compare the tax amount he/she pays with the amount of public goods he/she receives. When an individual feels the 'trade' is not fair, then he/she will try to evade taxes in order to reach a fair term with his/her relationship with the government. Nevertheless, because of the riskness of tax evasion, an individual will evade less than his/her desired level, when he/she perceives that evading the full desired amount is too risky. The intuition behind the model is that a taxpayer has no reason to evade taxes if he/she perceives the trade off with the government as fair. When a taxpayer feels that the trade is not fair, then he/she will evade up to the point that either (i) he/she provides the fairness, or (ii) he/she recognises that evading the full-desired amount is too risky in terms of the expected fine associated with evasion (so a taxpayer will evade only up to the point (i) or (ii), whichever comes earlier). When public expenditure and tax rate are chosen independently (public expenditure is considered as exogenous), Bordignon's non-self-motivated decisions model indicates that an increase in tax rate will

lead to an increase in tax evasion, since individuals perceive the increase in tax rate as unfair and thus increase their evasion activity. However, an increase in public expenditure can affect tax evasion positively or negatively depending on the quantity elasticity of the fair price. For example, when the elasticity is smaller than 1, an increase of 1% in public expenditure would result in a decrease in the fair price at less than 1%. The total income tax a taxpayer feels to be fair increases as public expenditure increases, so the amount of tax evasion would be reduced.

2.2.2.6 Avoidance-evasion

The basic expected utility models only analyse evasion activity but do not consider the interaction between evasion and avoidance; it is possible that increases in expected punishment decreases the amount of evasion, but tax revenues might not increase, since the individuals switch from evasion activities to avoidance activities.

Cross and Shaw (1981,1982) pointed out that although there were many theoretical analyses of tax evasion and many empirical studies of tax avoidance, there had been no work which analyses and explains joint evasion-avoidance decisions. According to Cross and Shaw, both tax evasion and tax avoidance have similar effects a decrease in revenue yields - and the motivation for the taxpayer is the same, namely the desire to reduce total tax liability. Moreover they argue that evasion and avoidance can be both substitute and complementary activities. For example, if the tax authority increases the tax rate, this might lead to tax evaders to switch to tax avoidance (higher tax rates increase return to tax avoidance). Complementarity can occur, for example, if avoidance, say in the form of justifiable expense allowances, leads to evasion by the inflation of such expense claims.

Cross and Shaw have analysed joint evasion-avoidance activity using a model which is similar to that used by A-S to analyse tax evasion on its own.

The effect of parameter changes upon the amount of tax-evaded income is as follows: first, the effect of a change in the tax rate upon evaded income is uncertain, partly because an increase in the tax rate increases avoidance, which generates 'indirect' income and substitution effects; secondly, a rise in the fine rate decreases the amount of evasion, unless income taxes are progressive. It is possible that if income taxes are progressive, evasion can increase. The reason for this is that at the beginning an increase in the fine rate may induce the individual to switch from evasion to avoidance activity. Following which the individual increases avoidance activity sufficiently to choose a low enough tax rate to engender income and indirect substitution effects sufficient to cause a rise in evasion activity. An increase in the probability of detection decreases the amount of evaded tax, unless there is a progressive income tax rate. Under the progressive tax rate, an increase in detection might lead to greater evasion, for the same reason explained above when analysing the effect of a rise in fine rates.

Another joint evasion-avoidance decision analysis has been provided by Alm (1988). He analysed the individual avoidance-evasion joint decision as well the government behaviour when the individual has both evasion and avoidance options. Here, we are interested in the individual's decision rather than the government's. In his model the taxpayer is assumed to decide the amount income to allocate amongst taxable, avoidance and evasion income. Also, there are penalties for evasion if detected, and there are some compliance costs of avoidance (the cost of obtaining information, paying for tax advice, etc.). Expected utility maximisation generates different demand functions for these three activities. Income is

assumed to be constant which the individual allocates between legal income and evasion income. Legal income consists of taxable income and avoidance income. The proportion of taxable income in legal income is called the share of taxable income. A progressive income tax is applied to reported income. The probability of being investigated by the tax authorities is assumed to be constant. In other respects Alm's model is similar to that of A-S. Alm finds that (i) an increase in the probability of detection causes an increase in the amount of legal income, (ii) the effect on the share of taxable income in legal income is ambiguous (it depends on the relative slope of the marginal tax rate and the marginal shelter cost functions in response to a change in legal income),[6] (iii) the effect on the share in legal income and dollar amount of income cannot be signed. The effect on legal income, the share of taxable income in legal income and reported income of a positive shift in the marginal tax rate function are in general ambiguous, as it is a change in the marginal avoidance cost function (the reason for that being that there are two effects, income and substitution, which are in opposite directions). Alm stressed that how important marginal tax avoidance costs and marginal tax rates were in determining the change of variables. He also pointed out that simple tax evasion models that do not take avoidance behaviour in to account might be biased, since simple models consider the effect of change of parameters

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[6] If the tax function is steeper than the cost function, then the taxpayer will decrease the proportion of taxable income as legal income increases. On the other hand, when the cost function is steeper than the tax function, then the taxpayer will increase the proportion of taxable income. An increase in the marginal penalty cost of evasion increases legal income unambiguously. The higher the absolute risk aversion is, the higher the increase in legal income. The reason for this is that both substitution effect and income effect act in the same way, as long as absolute risk aversion is positive.

upon legal income but not necessarily upon taxable income[7].

2.2.2.7 Tax Amnesty

Alm and Beck (1990) analysed the effect of tax amnesty on tax compliance and tax revenues. The authors indicated that in the case of an amnesty, an individual will not only choose the amount of previously unreported income, A, to report but will also decide the amount of current income to declare, X, to the tax authority. Since these choices are made simultaneously, it is possible that there is a trade-off between revenues collected as a result of the amnesty and regular compliance. In general, it is likely that the tax rates for A, t_A, and X, t_X, will be different. In some amnesties tax authorities lower the effective tax rate by cancelling some or all the interests and the penalties, so that $t_A < t_X$. In other amnesties the amnesty tax rate is increased by the requirement of the payment of taxes, interests and penalties, so that $t_A > t_X$. Alm and Beck's (1990) comparative static results indicate that in general, the effect of t_A on A and X, and thus on the total declared income, is ambiguous. Nevertheless, if $t_A > t_X$ an increase in t_A will reduce A and increase X. Assuming DARA, then A+X (total declared income) will be reduced. Nevertheless, tax collections can still increase assuming the tax rate elasticity of A is not large in absolute value. It was also found that the effect of an increase in probability of audit or fine on tax revenues is also

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[7] Alm and McCallin (1990) analysed tax avoidance and evasion as a joint portfolio choice. The comparative static properties of the model are as follows: a reduction in the rate of return on risky income as well as an increase in its variance will lead to an increase in taxable income, the individual switches from evasion to avoidance when the return to avoidance increases. The same result would be obtained if the riskiness of avoidance decreases compared to that of evasion, so the individual switches from evasion to avoidance or *vice versa* according to their returns and risks. The study concludes that the taxpayer reports a greater amount of taxable income when he/she does not know how the future tax laws will allow him/her to avoid and where there is uncertain prospect of tax audit.

ambiguous, since under the assumption of DARA, an increased probability of audit (or fine) has two conflicting effects, income and substitution. An increase in the probability of audit (or fine) will change the composition of A and X. If it increases A, then it will decrease X (and *vice versa*). Finally, the effect of individual beliefs about a future amnesty on declared income is also ambiguous, since the individual does not know if the future amnesty would increase the amnesty tax rate, the penalty and the probability of detection. Malik and Schwab (1991) indicated that the standard tax evasion model predicts an amnesty would have no effect on taxpayers' decisions. The reason is that a taxpayer has already decided his/her optimal level of tax evasion, and being completely honest had always been an option open to the evader. Since he/she did not choose this alternative at the time, he/she would not choose it now.[8] However, in reality many people take advantage of an amnesty programme. Malik and Schwab suggest that tax evasion may generate unexpected regret amongst some evaders[9]. According to this a taxpayer does not know his/her utility function with certainty before the tax evasion decision. But he/she learns the utility after the decision through experience. The authors noted that this is especially likely if the decision is the one that is not taken before. So, it is entirely possible for a taxpayer to declare an amount of income that maximises his/her expected utility, while being uncertain about the disutility associated with the risk of being caught evading

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[8] Unless, he/she receives additional information at the time of an amnesty such as that fine and audit probability are increased for past evasion.

[9] Malik and Schwab (1991) also presented an alternative explanation to the idea that taxpayers take advantage of an amnesty because tax evasion creates unexpected regret. It may be that the taxpayer does not know the value of a parameter which enters the decision problem, such as the probability of audit, at the time the individual declares his/her income. Later, the probability of audit is learned to be high and if an amnesty is offered the individual can report more income.

taxes, e.g. the individual does not know how the friends and the family members will react, when they learn of his/her tax evasion behaviour. After tax declaration, if a taxpayer found out that his/her disutility function was high, then under an amnesty the evader would declare an extra income which would make his/her total declared income equal to the amount he/she would have declared initially, had he/she known with certainty that his/her disutility from evasion would be high. This model indicates that a taxpayer declares an amount of income which is lower than the amount that the person would declare if he/she knew that his/her disutility was high, but higher than he/she would declare if the person knew his/her disutility was not high. Authors also noted that if people know their disutility with certainty, then tax amnesties are irrelevant in the model. In this case their model is the same as A-S (1972). The comparative static results of the model are as follows: (i) an increase in the probability of an amnesty would lead to higher welfare of the taxpayer, (ii) the taxpayer declares less income, when the probability of an amnesty increases, (iii) the effect of increasing the probability of an amnesty on the government's expected revenue is ambiguous, (iv) an increase in the probability of audit increases the amount of initially declared income (as A-S 1972), and (v) the effect of changes in tax rate on declared income is ambiguous (as A-S 1972).

However, Akerlof and Dickens (1982) referring to the 'cognitive dissonance'[10] notion indicate that individuals set their beliefs according to net benefit of different beliefs, but that once the belief is chosen, then it does not change. So, once people decide to evade taxes, especially for reasons that they do not fully understand (for example, Malik and Schwab's taxpayers who do not know their utility functions with certainty), they will find reasons why evasion was in fact justified. Then it is possible for the tax evader to justify his/her behaviour ex post and not apply for tax amnesty, even though rational maximising theory requires him/her to take the advantages of tax amnesties[11]. However, if the evasion decision is the one that is not taken before (e.g. as possible evaders in Malik and Schwab's model) and if amnesty is offered a short while after the evasion, it is probable that the individual will change his/her behaviour rather than belief, thus taking advantage of the amnesty. Cognitive theory implies that when taxpayers start to commit more tax evasion for whatever reasons, both their commitment to social norms and their psychic cost of tax

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[10] People consider themselves as nice and smart, and any information contrary to this will be avoided or evaluated differently. Cognitive dissonance theory indicates that people are not comfortable in holding two apparently contradictory beliefs. For example, the knowledge that 'I smoke cigarettes' and 'smoking seriously damages health' exhibits dissonance, since it indicates the opposition for desire to smoke and the desire to avoid displeasure of illness. Therefore, the person would try to rationalise his/her smoking (e.g. if he/she stopped smoking, he/she would put on weight which is also bad for the health). So people will seek information selectively and evaluate differently in order to avoid unpleasant feelings of maintaining two contradictory beliefs and to provide internal harmony and consistency. See Festinger (1957), Brehm and Cohen (1962), Sears and Freedman (1967), Cozby (1974), Aronson (1979), Akerlof and Dickens (1982) and Akerlof (1991) for more information.

[11] According to Festinger (1964) there is following sequence of cognitive activities before and after the decisions are taken; '(1)...the person gathers evidence for an impartial evaluation of mutually incompatible alternatives,... (2) some time is spent considering new or attractive but unavailable alternatives; (3) the amount of time spent in consideration of the varies alternatives prior to the decision affects the speed and the degree of dissonance reduction following the decision; (4) if it is anticipated that the decision will produce dissonance, the person may try to avoid making the decision; (5) if the decision commits the person to the loss of attractive unchosen alternative(s), he will experience cognitive dissonance; (6) following the commitment there is a temporary period in which attractive aspects of the unchosen alternative(s) become salient, the person then experiences regret and may under certain conditions, reverse his decision; and finally (7), the person will expose himself to whatever information will help him to reduce the dissonance produced by the decision.' (Smith, 1965, p. 513).

evasion will decrease and thus it encourages further evasion (Spicer, 1986). Moreover, according to neutralisation theory (Sykes and Matza, 1957), individuals can reduce guilt feelings by neutralisation strategies that justify guilt producing behaviour. Examples of general strategies of neutralisation are the denial of responsibility (placing the blame on others), denial that anybody has been injured (denying that deviant behaviour really has negative consequences for others), condemnation of the condemners (blaming the law-makers and law-enforcers as the reasons for unjust rules which should not be obeyed), appeal to higher loyalties (justifying deviant behaviour as a response to non-conventional social bonds that are more important than those of the conventional social orders), defence of necessity (indicating that it was the only choice in a given set of circumstances) and the strategy that wrongs are allowable if counterbalanced by good acts (see Sykes and Matza, 1957 and Minor, 1981 for more information). People evade taxes because they can get away with it and then develop consistent attitudes justifying their low compliance rate, such as by indicating the high tax rates, unfairness of the tax system, inefficiency of government expenditure or not knowing the rules, etc. Thurman, St. John, and Riggs (1984) found that guilt neutralisation strategies permit even individuals who believe tax evasion is wrong to evade taxes without feeling guilty. The main finding of the empirical study by Carroll (1992) was that there were significant numbers of people who evaded taxes, but still expressed that they were not cheating the government out of money.

Akerlof and Dickens (1982) and Dickens (1986) using cognitive dissonance theory argued that there may be a positive effect of increasing punishments on crimes. According to this, when punishment is low for a certain crime, but individuals conform to the law, they

develop a motivation to follow the law. On the other hand, with a high punishment (and/or probability of detection), individuals do not need to develop such a motivation to obey the law. So, in this case, when the threat of punishment is ejected, individuals will not feel any restriction not to commit crimes. Thus, a higher punishment may increase crimes when individuals perceive or come across special opportunities. In a similar way, Frey (1992,1997) indicates that a higher enforcement by tax authorities may actually result in lower tax compliance by individuals, when the increased enforcement crowds out the intrinsic motivation which causes people to pay their taxes.

2.2.2.8 Endogenous audit probabilities and corruption

Unaware of the work of A-S (1972), Srinivasan (1973) developed a similar model. He assumed that the taxpayers choose the proportion of true income to declare in order to maximise expected income after taxes and penalties. His assumptions did not change the main result of A-S's model (an increase in the detection rate still leads to an increase in the proportion of declared income). Srinivasan concludes that given a progressive tax function, and a probability of detection, which is independent of income, the wealthier person will declare a smaller proportion of income. On the other hand, if the marginal tax rate is a constant and the probability of detection an increasing function of income, then the optimal proportion of understatement of income decreases as income increases.

Reinganum and Wilde (1985) showed that tax authorities can increase reported income of tax payers by using cut-off audit scheme in which an audit is carried out when income is too low. Assuming taxes and fines are lump-sum and further assuming the individuals are

risk-neutral, their finding indicate that cut-off audits are the most effective from the revenue maximising perspective.

Shu (1992) has pointed out that A-S (1972), Srinivasan (1973) and many other economists have generally focused on maximising expected utility in an uncorrupted bureaucratic system. However, Shu argues that if, say, the tax officials themselves are corrupt, the problem will be more complicated. Shu's model is an extension of A-S, and posits additional parameters for the role played by corrupt tax officials. In the model, the economy is divided into two sectors. Sector 1 is called government-controlled and sector 2 is nongovernment-controlled. It is assumed that a fixed number of identically skilled workers can enter one of the two sectors. It is also assumed that the individual makes his/her decision about labour supply, such as which sector to enter and the number of hours to work, at the beginning of each period, and these decisions determine his/her pre-tax earnings in that period. In sector 1, because it is the government-controlled sector, there is no tax evasion. On the other hand, in sector 2 there is a possibility of evasion. One important difference between the A-S's model and Shu's model is that Shu treats the probability of being investigated (p) as endogenous rather than exogenous. It depends upon parameters such as declared income (a person reporting lower income is more likely to be investigated than one reporting a higher income); bribery (when it increases, the probability of an audit, p, will be lower); and the discipline level of officials. The rest of the model is similar to A-S.

Without getting into too much detail, let us briefly examine the comparative static results of Shu's model. At first sight, lowering the tax rate seems to decrease evasion, since it is less profitable for the individual to evade taxes. However, a lower tax rate makes the

individual relatively richer, and under the assumption of DARA the individual increases

his/her evasion activity. Thus, the effect of tax change on the amount of tax evasion under

DARA cannot be signed (the same result as A-S). The effect of tax rate change on bribery

is again ambiguous. Since the individual is assumed to be risk averse, he/she will decrease

evasion when the penalty rate is higher than before. However, whether bribery will

increase or not cannot be determined. It depends on absolute risk aversion; the more risk

averse the taxpayers are, the more likely they are to pay higher bribes in order to further

reduce the probability of detection. Declared income will increase when the government

sets a higher discipline level of officials. As a result of stricter discipline, tax collectors

will be more diligent and the probability of being detected will be consequently increased.

Accordingly, bribery will decrease. The reason for this is that when discipline is stricter,

corrupt officials will require more bribery to reduce the probability of investigation as

much as before. On the other hand, the taxpayer will not find it worthwhile to pay the

same amount of bribery to reduce the probability, p, by the same proportion as before, since

he/she evades less.

2.3 OTHER APPROACHES

Although many economists have used expected utility theory in order to analyse the

determinants of tax evasion, some economists and many psychologists and sociologists

indicated the importance of the other approaches in understanding tax evasion behaviour.

There is now a growing empirical work which indicates the usefulness and relevance of

these approaches. In order to demonstrate the whole picture and to lay the ground work for

understanding previous empirical work in the subject of tax compliance, we shall now

consider other theories and models relevant to the tax evasion decision. In sub-section 2.3.1 bounded rationality and its relevance to tax compliance is discussed. Behavioural models and their implications are the subject of sub-section 2.3.2. Finally, multiple selves models that regard the individual with different sources of utility are discussed in 2.3.3.

2.3.1 Bounded Rationality

Tversky and Kahneman (1982) indicated that individuals in general apply a heuristic[12] when predicting values of outcomes. The perceived probability of an event occurring is higher, when events come more readily to mind (Tversky and Kahneman, 1973;1974).

Many empirical studies have been carried out in order to test the type of reasoning frequently ascribed to agents in economic theory and most have found that individuals make systematic errors by using decision 'heuristics' or 'rules of thumb' (see Conlisk, 1996 for a review of the role of bounded rationality in economics). The deviations from rationality, which will be explained below, are also summarised by Cullis and Jones (1998, Chapter 5).

It was indicated that there is a trade-off between cognitive effort and accuracy of decision and therefore for a boundedly rational person heuristics may provide an adequate solution cheaper than more elaborate approaches. Bounded rationality indicates that behaviour is reasoned with constrains, but it is not necessarily rational in the sense of expected utility maximisation.

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[12] The term heuristic is used in social and cognitive psychology. It implies decision aids or cognitive short-cuts that are used to minimise cognitive effort for routine decisions. So, the full cognitive effort assumed in decision taking in normative theory is not justified.

2.3.1.1 Prospect theory

The criticisms of the expected model lead to development of an alternative model: prospect theory model.[13] The theory is developed by Kahneman and Tversky (1979) and it is reviewed and discussed by several authors such as Lattimore and Witte (1985), Jackson and Milliron (1986), Roth *et al.,* (1989), and Tversky and Wakker (1995) amongst others. Prospect theory explores how decisions are made and it is developed in order to overcome some problems associated with expected standard utility theory.

Kahneman and Tversky (1979,1984) suggested that there is a two-phase assessment process when an individual chooses between risky alternatives. First, the editing phase, and second, the evaluation phase (in which the edited prospects are evaluated and the highest value prospect is chosen). In the editing phase, the outcomes are first coded, that is, valued as gains or losses relative to current asset level.

> 'People generally evaluate acts in terms of minimal account, which includes only the direct consequences of the act. The minimal account associated with the decision to accept a gamble, for example, includes the money won or lost in that gamble and excludes other assets or the outcome of previous gambles. People commonly adopt minimal account because this modes of framing (i) simplifies evaluation and reduces cognitive strain, (ii) reflects the intuition that consequences should be causally linked to acts, and (iii) matches the properties of hedonic experiences, which is more sensitive to desirable and undesirable changes than to steady states.' (Tversky and Kahneman 1981, p. 456-457).

The second stage in the editing is combination, in which prospects are simplified by combining probabilities associated with identical outcomes. For example, an individual

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[13] There are also other alternative models that alter some of the aspects of expected utility models such as the certainty equivalent model (Handa, 1977), the subjective weighted utility model (Karmarkar, 1978), the differential weighted product-averaging model (Lynch and Cohen, 1978) and the regret theory model (Bell, 1982).

reduces the prospect, (£100, .10; £100, .70), to the prospect of (£100, .80). The next stage

is segregation in which riskless components of prospects are eliminated. For example,

(£300, .80; £200, .20) is decomposed into (£200, 1; £100, .80). The fourth stage in the

editing phase is cancellation; it 'involves the discarding of common constituents'

(Kahneman and Tversky, 1979, p. 274). For example, an individual reduces the choice

between (£200, .20; £100, .50; £-50, .30) and (£200, .20; £150, .50; £-100, .30) to a choice

between (£100, .50; £-50, .30) and (£150, .50; £-100, .30). There are two additional

operations in the editing phase which are simplification and the detection of dominance.

The first one involves rounding of probabilities and/or outcomes. For example, an

individual considers both probability of .48 and .52 as .50. The authors noted that

simplification also involves eliminating of extremely unlikely outcomes. The detection of

dominance indicates 'the scanning of offered prospects to detect dominated alternatives,

which are rejected without further evaluation.' (ibid, p. 275). Kahneman and Tversky

(1979) noted that '...the preference order between prospects need not be invariant across

contexts, because the same offered prospect could be edited in different ways depending on

the context in which it appears.' (p. 275).

Following the editing phase is the evaluation phase in which an individual chooses the

prospect of the highest value (denoted by V). The calculation of V is similar to the

calculation of expected utility (EU). However, decision weights, π, are used in prospect

theory rather than probabilities, and subjective value functions, v, are used instead of utility

functions. The decision weights are functions of the probabilities (e.g. $\pi_1 = \pi(p_1)$),

however, they are not a probability measure. Furthermore, $\pi(p) + \pi(1 - p) < 1$, so decision

weights are not consistent with the rules of probability theory. The value function over

outcomes, v, defined relative to reference points (usually the initial asset position) as gains and losses (i.e. it represents the change between the final wealth and the initial wealth), in contrast to the utility function in expected theory which indicates the final wealth positions. The value function, v, is convex for losses (below the reference point), concave for gains (above the reference point) and steeper for losses than for gains (i.e. losses appear larger than gains).

Figure 2.2 A hypothetical value function
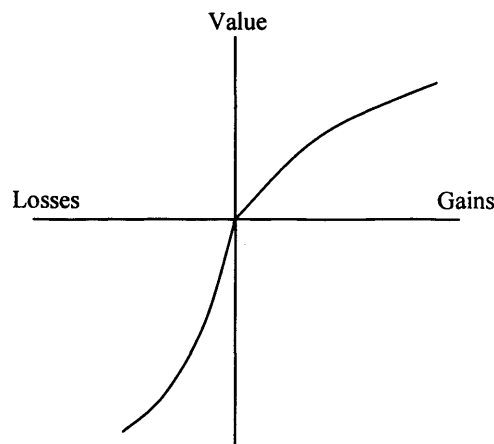
Value

Losses   Gains

These characteristics of value function indicate that when sure gains are involved, in general people avoid risks, while they take risks in order to avoid certain losses. Tversky and Kahneman (1981) and Kahneman and Tversky (1984) give an example to illustrate this. Subjects (doctors) are given a hypothetical scenario in which a disease is expected to kill 600 people. A choice has to be made between Program A, where 200 people live and 400 die and Program B where there is a one in three chance that 600 people live and a two in three chance that no people live. The overwhelming majority of respondents (72%) choose Program A. However, when the scenario is framed as a loss with the same

probabilities (Program C, where 400 people die and Program D, where there is a two in three chance of 600 people dying and a one in three chance of nobody dying), 78% of the respondents choose the risky outcome (Program D).

Kahneman and Tversky (1979) point out that 'Decision weights measure the impact of events on the desirability of prospects, and not merely the perceived likelihood of these events. The two scales coincide (i.e. π (p) = p) if the expectation principle holds, but not otherwise.' (p.280). In general, the decision weights may be affected by other factors rather than probabilities. Ambiguity especially can affect the weight. The properties of the weighting function is as follow: (i) it is an increasing function of p, and π (0) =0 and π (1) =1 (i.e. the weighting function is anchored at 0 and 1); (ii) for very small values of p, the weighting function is a subadditive function of p; there is overweighing of very small probabilities; (iii) for all p, the weighting function reveals subcertainty (i.e. for all 0 < p < 1, π (p) + π (1-p) < 1; (iv) π is regressive with respect to p; 'preferences are generally less sensitive to variations of probability than the expectation principle would dictate' (ibid, p.282); (v) 'for a fixed ratio of probabilities, the ratio of corresponding decision weights is closer to unity when the probabilities are low than when they are high. This property of π, called subproportinality, imposes considerable constrains the shape of π: it holds if and only if log π is convex function of log p. (ibid, p. 282), and (vi) extremely unlikely events are ignored, and events of extremely high probabilities are considered as if they are certain. So weight probabilities are not very well behaved near the end points.

Figure 2.3 A hypothetical weighting function.
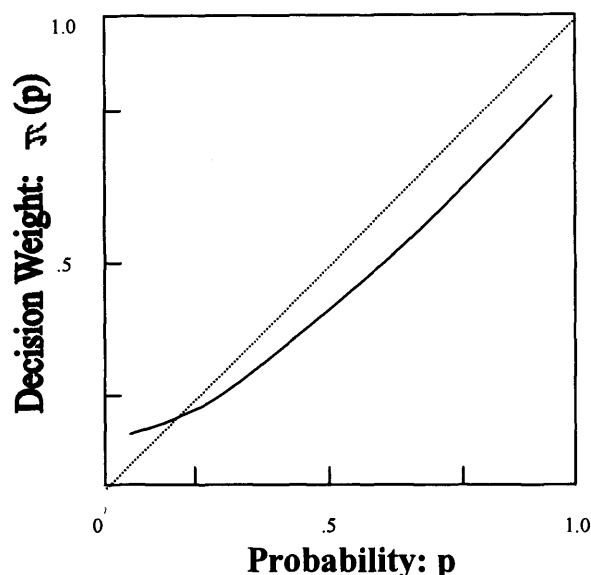
'The following example, due to Zeckhauser, illustrates the hypothesized non-linearity of π. Suppose you are compelled to play Russian roulette, but are given the opportunity to purchase the removal of one bullet from the loaded gun. Would you pay as much to reduce the number of bullets from four to three as you would to reduce the number of bullets from one to zero? Most people feel that they would be willing to pay much more for a reduction the probability of death from 1/6 to zero than from 4/6 to 3/6. Economic considerations would lead one to pay more in the latter case, where the value of money is presumably reduced by the considerable probability that one will not live to enjoy it.' (ibid, p.283).

The above example holds because economists in general assume risk aversion. In prospect theory attitudes towards risk are determined both by v and π. Since the value function over gains is concave and π (p) >p, for very low p risk seeking behaviour such as gambling (especially lottery purchase) can be explained by the theory. On the other hand, the value function over losses is convex and overweighing low probabilities can explain risk aversion behaviour, such as insurance purchase. However, as authors themselves indicated '...the present analysis falls far short of a fully adequate account of these complex

phenomena.' (ibid, p.286). For example, there is some empirical evidence indicating that sometimes low probability disasters are completely ignored.

In some situations, it is possible that gains and losses are coded relative to an expectation or aspiration level rather than the status quo, or one's current assets. For example, consider an individual who has recently lost £2000 through a business venture and is now given a choice between a sure gain of £1000 and an even chance to gain £2000 or nothing. If the person codes the problem as a choice between (£-2000, .50) and (£-1000, 1), then he/she will choose the riskier option in order to avoid certain losses.

The relevance of the prospect theory for tax compliance is indicated by authors such as Jackson and Milliron (1986), Loftus (1985), Spicer (1986), Smith and Kinsey (1987), Chang, Nichols and Schultz (1987), Roth et al.,(1989), Carroll (1987,1989,1992), Webley et al.,(1991), Elffers and Hessing (1997), Robben et al., (1990) and Yaniv (1999) amongst others. These studies indicate that framing is very important in tax decisions. For example, an analysis of focus-group discussion indicates that taxes which have to be paid with tax returns at the end of the year, as well as tax amounts owed in general, especially those due on income from secondary sources, have greater utility than taxes that are withheld, especially from the primary salary. (Ekstrand, 1980).[14] Accordingly, the overwhelming majority of taxpayers in USA (75%) prefer to have more withheld than is necessary (Smith and Kinsey, 1987) and there was a storm of protest in USA at the 1986 tax reform because the act intended to lower advance tax payments for many, thus lowering their tax refunds (Elffers and Hessing, 1997). Loftus (1985) noted that withholdings lead to a shift of the reference point and higher withholdings thus decrease the motivation to

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[14] The study of Ekstrand (1980) is reported by Smith and Kinsey (1987).

reduce taxes at the time of filings both by legal and illegal means. However, as Carroll

(1989) pointed out, increases in withholdings reduce tax evasion only if (i) the reference

point is zero taxes owed at filing time and, (ii) the reference point on withheld income

sources also shifts to new reduced levels. A taxpayer who has paid £5000 in taxes and

owes another £200 at the filing time can take his/her reference point as a £200 loss, a

£5200 loss or, say, £500 gains if he/she paid a total of £5700 in taxes last year. The

taxpayer could also take the reference point as what his/her colleagues or the neighbours, or

other people similar to him/her in some aspects (e.g. income sources, amount of income,

spending level, etc.) have paid. Thus, the reference point can be almost anything, and it is

arbitrary. Carroll (1989) indicates that a discountinuity in the decision weight function at

the reference point in prospect theory causes a difficulty to base policy on its existence,

since the exact location of the discountinuity is unknown. Accordingly, if the probability

of audit has been doubled and taxpayers have been told about it, there may have been four

different outcomes: (i) it might have no effect, if taxpayers consider the probability was too

low anyway, (ii) it might have a small effect, if the probabilities were in the shallow part of

the curve, (iii) it might have an important effect if the probabilities were in the steep part of

the curve, and (iv) it might have a very significant effect, if the increase in probabilities

resulted in a shift in decision weight from certainty of no risk to uncertainty of risk. The

author noted that an annual 1% probability of getting caught at tax evading can be thought

of as a 50% chance when continued over a working life time of thirty-seven years. If a

taxpayer coded the probability of audit as in second case it would produce a much greater

deterrence effect. Moreover, a taxpayer who perceives 2% probability of an audit and 50%

probability of being fined, (if audited), tend to weight second stage probability more strongly than the first stage (Carroll, 1989). This indicates that decisions depending separately on the probability of audit and the probability of fine can lead to more compliance than would be expected from the joint probability of being fined. Furthermore, it implies that more deterrence effect could be obtained from the same policy by advertising a highly probable conditional probability (fine rate) rather than a low probability event (audit rate). The basic effect was named as the *pseudocertainty* effect by Tversky and Kahneman (1981). Johnson and Payne (1985) gave another example to demonstrate this: (i) for every event of serious tax evasion, 1 in 500 evaders is sent to jail to spend some time, (ii) over the average life time of paying taxes (50 years), evaders who continue to evade taxes seriously faces a 1 in 10 chance of being detected and convicted, and when convicted he/she is certain to spend time in jail. Of course, the second way of explaining the outcomes would have a much higher deterrence effect.

If a taxpayer frames taxes as government waste, a loss to the individual and to the society as a whole, then he/she may have strategies for identifying loopholes and the various ways to evade. On the other hand, if the taxpayer frames taxes as contribution and sharing, he/she may have strategies for identifying legal obligations and fulfilling them. Although, prospect theory indicates the importance of editing and framing, there is not a theory about how the editing processes work exactly. (Carroll, 1989).

Elffers and Hessing (1997) suggested that the incentive for tax evasion could be eliminated by the tax authority's deliberately setting taxpayers' advance tax payments slightly higher than their true tax liabilities. However, using prospect theory and assuming the reference point is income after the payment of tax advance (as it was assumed by Elffers and

Hessing, 1997), Yaniv (1999) showed that although increases in advance tax payments would encourage more compliance, they would not completely eliminate the incentive for tax evasion. This would only be possible if taxpayers significantly overestimate the low probability of audit, which is prevalent in many countries.[15] Empirical findings by Chang et al., (1987), Robben et al., (1992), Carroll (1992) and Varma and Doob (1998) also indicated that taxpayers are mainly concerned about out-of-pocket gains and losses at the time of filing.

Alm and Beck (1990) pointed out that an individual is unlikely to participate in an amnesty if his/her reference point is the initial level of previously unreported income. Tax evasion for this individual is a norm and paying taxes in the amnesty is a loss. The individual in this case is a risk-seeker rather than a risk-averter. However, if the individual takes the reference point as 'the level of amnesty income *less* full amnesty taxes', then he/she will be much more likely to declare any unpaid taxes from the previous years. In this case, the individual regards paying taxes as a norm and considers participating to the amnesty as a gain. So it is very important to change the individual's reference point by indicating that paying taxes is the normal and accepted form of behaviour (e.g. indicating tax evasion is a very serious crime, honest taxpayers are victimised by such behaviour and stressing that tax authorities intend to catch and punish tax evaders). Thus, an amnesty increases compliance only if the amnesty makes the individual recognise that paying taxes is the norm.

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[15] Yaniv (1999) also showed that assuming declaration is sufficiently high, higher tax rates lead to reduced tax declaration amount. He also found that while the effect of probability of detection on declaration was positive, the effect of penalty was ambiguous under the prospect theoretic framework.

2.3.1.2 Rules and heuristics

Tversky and Kahneman (1973) suggested that events are judged to be more probable if they come more readily to mind. In the literature this is named as 'availability' heuristic[16]. Availability identifies the subjective sense of the probability of an event's occurrence. Thus, easily imaginable or recallable events are in general thought to have high likelihood of occurrence. People depend heavily on salient information which is easily retrievable from memory. Spicer and Hero (1984), Benjamini and Maital (1985) and Webley (1987) found that tax compliance was higher among individuals who had been previously audited (see Chapter 4). Moreover, information about friends and family members of being audited should affect the perceived risk of evasion positively. Accordingly, recent news on the media about a tax evasion case might temporarily increase the perceived probability of punishment, especially when there are similarities between the taxpayers and the convicted evaders (such as occupation, income, living in the same city, etc.). Carroll (1989) noted that '...the IRS seems to save some juicy fraud convictions for late March to take advantage of the availability heuristics just before taxes are due.' (p.244). However, it is also possible that the news of a convicted evader may have the opposite effect; the taxpayer might think that the IRS is busy with more important tax frauds which involve large amounts, and therefore an average evader might feel safer. The taxpayer may also consider the audit resources are fixed, so every known case of evasion decrease his/her risk of audit, or else the taxpayer might be concerned about the probabilities, in which case every known

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[16] Akerlof and Yellen (1987) noted that in general people use three heuristics which cause biases in their decision taking: availability, representativeness and anchoring. Representativeness indicates that people behave as if stereotypes are much more common than they are in fact in real life, and anchoring suggests that people's judgements rely heavily upon some initial anchoring values.

case of tax evasion increases the perceived risk. People usually interpret information in terms of their prior understanding to support their views.

It might also be possible that an audited person might reduce the perceived audit rate, thinking the low rate of occurrence of an audit has just happened for him/her, and it will take at least for a while for another to happen.

Carroll (1989) indicated that even a simple contingent model can be an efficient way of making reasonably good decisions about compliance with lower cost in time and effort. The author gives the contingent model below as an example;

1- Assess money in pocket (if high, no tax evasion; if low go to step 2);

2- Assess probability of gain (if low, no evasion; if high go to 3);

3- Assess amount of gain (if low, go to 4; if high go to 5);

4- Assess risk of penalty (if high, no evasion; if low, go to 5);

5- Evade (a process with subsets involving planning and execution of the crime)

Although it may be an efficient way of decision making, a simple rule such as this one would not lead to similar tax behaviour as that predicted by expected utility models, it would focus on different aspects of the tax system, such as withholding and information reporting.

Scholz and Pinney (1995) noted that in real life taxpayers do not have precise information about the probability of audit and the fine for evasion. They indicate that duty heuristics provide both a direct and indirect effect to tax compliance. According to this, taxpayers subconsciously observe the performance of the government relative to the amount of taxes they pay. The taxpayers summarise their observations in a judgement, which authors call 'tax duty', and take decisions about compliance depending on this core of previous

experience. So, apart from the direct effect of tax duty in providing a motivation to comply, it also indirectly biases self-interest beliefs in the same direction. Thus, the duty heuristics inadvertently reduces the conflict between self-interest and collective rationality by diminishing the conflict between duty and fear for compliance decisions. Accordingly, taxpayers' sense of duty to pay taxes significantly affects the perceived probability of the expected fine for tax evasion. Taxpayers with duty heuristic will therefore perceive the expected fine for evasion as high, whereas taxpayers with little duty will perceive a low risk of expected fine. These hypotheses are confirmed in the empirical studies carried out by Scholz and Pinney (1995) and Scholz and Lubell (1998a,b). Moreover, they found that duty heuristics have more effect on perceived expected fine than the objective probabilities of risk. This was the case even for the taxpayers who are facing the greatest temptation to evade because of the high potential gains from tax evasion.

Scholz and Lubell (1998a,b) note the importance of trust as a heuristic in tax compliance. According to this, when trustworthy democratic institutions succeed in issuing socially beneficial laws that are willingly followed by trusting citizens, the trusting relationship between citizens and state benefits society in two ways: (i) trust between citizen and government (vertical trust) can expand the range of collective problems that legal authorities are able to tackle. Trusted government institutions will be able to extend the benefits of social cooperation to collective problems which are too costly to resolve in the absence of trust. In order to achieve this, legal authorities use law to define 'focal points' for cooperative solutions. (ii) trust among citizens (horizontal trust) diminishes the enforcement cost of maintaining collective solutions. The higher the trust, the less the need

for monitoring and punishment mechanism, which are costly. So, trust increases social capital by decreasing the enforcement cost involved in maintaining collective solutions.

In the absence of trust, the potential benefits of collective action rely either on altruism or on expected punishments. The effect of trust in large-scale collectives, however, will not be necessarily provide compliance, unlike small-scale collectives; a club member who avoids his/her obligations is very likely to be found out and to lose the benefits of membership. On the other hand, since the cost of monitoring and punishment are much higher in large-scale collectives, a taxpayer who evades taxes is less likely to be found out or lose benefits even if caught. Nevertheless, Scholz and Lubell (1998a,b) point out that the relationship between trust and trustworthiness can be developed in large-scale collectives, even though there is no credible institutional foundation. Authors indicate that individuals learn different heuristics for assessing trust in small-scale collectives in which the relationship between trust and trustworthiness is strengthened through potential punishments. Positive experiences of obtaining benefits from a collective increase trust, and so increase the probability of complying with obligations to that collective, while negative experiences decrease both trust and compliance. Therefore '...attitudes of trust serve as an action related summary measure of the benefits of a given collective that enables citizens to cooperate in the most beneficial collectives while avoiding exploitation in less beneficial ones' (Scholz and Lubell, 1998a, p.401). It is possible that taxpayers generalise this heuristic, use of trust, to large-scale societies. In this case, there will be positive relationship between trust and tax compliance, even though the probability of potential punishments will be much lower in large-scale collective. The empirical study by Scholz and Lubell (1998a,b) indicated that trust changes according to changes in net

benefit (taxes paid *minus* public goods obtained). So, trust increases significantly when the amount of taxes paid decreases, and it reduces when taxes increase. Moreover, both vertical and horizontal trusts positively and significantly affect the probability of compliance. However, in contradiction to the compliance heuristics explained above, a study by Steenbergen, McGraw and Scholz (1992) did not find a significant effect of tax changes on attitudes.

2.3.2 Behavioural Models

The analysis of tax evasion is not only of interest to economists but also researchers in different disciplines. Researchers from a variety of disciplines emphasise different factors in tax compliance. For example, sociologists are more concerned about morality and fear of social disapproval, whereas psychologists have been more concerned about the guilt feelings, risk and rewards. We have highlighted some limitations of economic models, and there has been some empirical evidence (e.g. Spicer and Lundstedt 1976, and Spicer and Becker 1980), which shows some other factors (such as demographic variables, peer group influence and perception of inequity) that also affect tax evasion decisions. Therefore a number of behavioural models, which were thought to be important in explaining the tax evasion decision, will be discussed in this section (for a detailed discussion see Kinsey, 1986 and Hessing, Kinsey, Elffers and Weigel 1988b).

2.3.2.1 Vogel model

Vogel (1974) developed a theoretical model in order to explore the determinants of tax evasion. The theoretical model is based on a survey study which was undertaken in 1969

by the Survey Research Institute of the Swedish National Central Bureau of Statistics. Vogel indicated three determinants of tax ethics, aspiration and evasion which were (i) the exchange indicator, (ii) the social orientation indicator, and (iii) the illegal opportunity indicator. The exchange indicator compared the individual's tax burden with the governmental services he/she received. It was assumed that the exchange becomes less favourable to the individual as income increases since the marginal taxes increase as well, while less social services are received. Social orientation referred to the social class and the knowledge of the tax system. The social orientation indicator showed tax regulation awareness, association participation and public employment. For the illegal opportunity indicator, it was assumed that the self-employed and those with non-wage income not taxable at source had greater opportunities for tax evasion. Contact with evaders was also indicated to have an important influence on tax evasion.

Vogel adapted the study of Kelman (1961) in his tax compliance model, according to which the typology of individuals is dependent on the distinction between compliance, identification and internalisation. Compliance occurs when an individual behaves in a certain way accepting influence from another person or group, since he/she hopes to get a positive reaction from others. Identification occurs if an individual follows another person's or group's behaviour, because this behaviour is related to a satisfying, self-defining relationship with this person or group. And finally, internalisation occurs if an individual is influenced by another person or group, because the induced behaviour is consistent with his/her values. There are conformist and deviant types of these three typologies which indicates six kinds of adaption to the tax system: (i) conformist interlasition, (ii) conformist identification, (iii) conformist compliance, (iv) deviant

interlasition, (v) deviant identification, and (vi) deviant compliance. The first three types

of taxpayers do not evade taxes, while the last three are involved in tax evasion. Vogel

(1974) indicated important differences in tax evasion behaviour amongst compliers,

identifiers and internalizers;

> 'Honesty based entirely on a threat from or a reaction to the fiscal authorities
> (compliance) can easily change to tax evasion if there is an opportunity. In the
> case of identification, honesty is 'prepotent' only insofar as the public and
> important reference groups disapprove of tax evasion. In the case of
> internalization, honesty is prepotent because aspirations are met by the tax
> system. (ibid, p. 509).

So, it seems that while tax enforcement is an important determinant of tax compliance for

compliers, social norms are important for identifiers, and perceived fairness and beliefs

about the tax system for internalizers.

2.3.2.2 Lewis model

Lewis (1982) suggested a model which incorporated (i) the theoretical approach that

economists and political economists have suggested, and (ii) approaches that have been

suggested by psychological and sociological perspectives (see Figure 2.4). According to

this, the box which is indicated by A refers to a country's constitutional and tax structures,

factors which affect the tax enforcement policies in box B. So, this will determine which

type of tax enforcement is more desirable than another. Box C shows the assumptions

about the taxpayers as optimising and risk-averse. These factors in turn affect tax

compliance or tax evasion. However, the effect is in both directions. According to this,

> 'Not only does fiscal policy determine tax-enforcement policies; fiscal policies
> themselves may also be amended by the success or failures of tax-enforcement
> procedures. Fiscal policy and tax-enforcement in turn may be affected by
> changing assumptions about taxpayers and degree of tax evasion. However, as

the diagram reveals, a more direct feedback loop is much more common, in that increases in tax evasion may have effects on fiscal policy and tax-enforcement procedures, while the tax-policy maker's view of the taxpayers and their motivation remains unrevised and of little or no interest.' (Lewis, 1982, p. 157).

The second half of the model (indicated by 2) shows how the attitude and perception of the taxpayers affect the tax compliance at the individual level. The first box (i) includes factors that are found to be important in social surveys: attitudes towards and perceptions of constitutional structure, government and fiscal policy. These factors were specifically indicated by Lewis as taxpayers' support for government and fiscal policy; feelings of coercion, impotence and alienation, the perceived accountability of the relevant fiscal authorities, perception of tax burdens, exchange purposes and fairness of taxation, and so on. These factors interact with taxpayers' perception of enforcement and opportunity. The taxpayer characteristics, box (iii), also interact with boxes (i) and (ii) which in turn determines tax compliance or evasion.

The attitudes and the perception of fiscal policy are also affected by actual fiscal policy and tax enforcement structure. Perceived and actual tax enforcement also interact with each others. 'The main trust of the argument is that effective tax policies must take account of these links and be responsive to these tax attitudes and perception, as indicated by the dotted lines. The dotted lines indicate the comparative weakness of these links in present day tax policy-making and implementation.' (ibid, p. 159). Lewis's model of is quite complex since there are simultaneous effects of factors, feedback loops and bridges between the two types in the model (1 and 2) which are unspecified. Therefore, the model is not suitable for empirical testing. We can see in the model the determinants of compliance, but the nature of the links between variables is not specified. In order to give

more information about the link between attitudes and behaviour, Lewis uses Fishbein and Ajzen's (1975) and Ajzen and Fishbein's (1980) theory of reasoned action. Reasoned action implies that the individuals choose between the behavioural alternatives according to their expectation of which behaviour would result in maximum profit. However, profit is not necessarily expressed in terms of financial gains.

Ajzen and Fisbein's (1980) version of reasoned action theory states that the individuals' beliefs and attitudes exclusively determine the intention, and intention is the best predictor of behaviour. Intentions are determined by the attitudes towards behaviour (is tax evasion good or bad?), and subjective norms, and the relative importance of attitude and subjective norms to the individual. A subjective norm indicates the perception of how an individual should behave with reference to his/her immediate environment or reference groups. Lewis (1982) points out the problem of testing the model because of the difficulty in obtaining precise information about the tax evasion intentions by self-reporting. He indicates that '...without information about the behavioural intentions or the behaviour itself, the principal weapon of this approach, its predictive capacity, can fire only blanks.' (ibid, p.174).

Figure 2.4 Lewis model
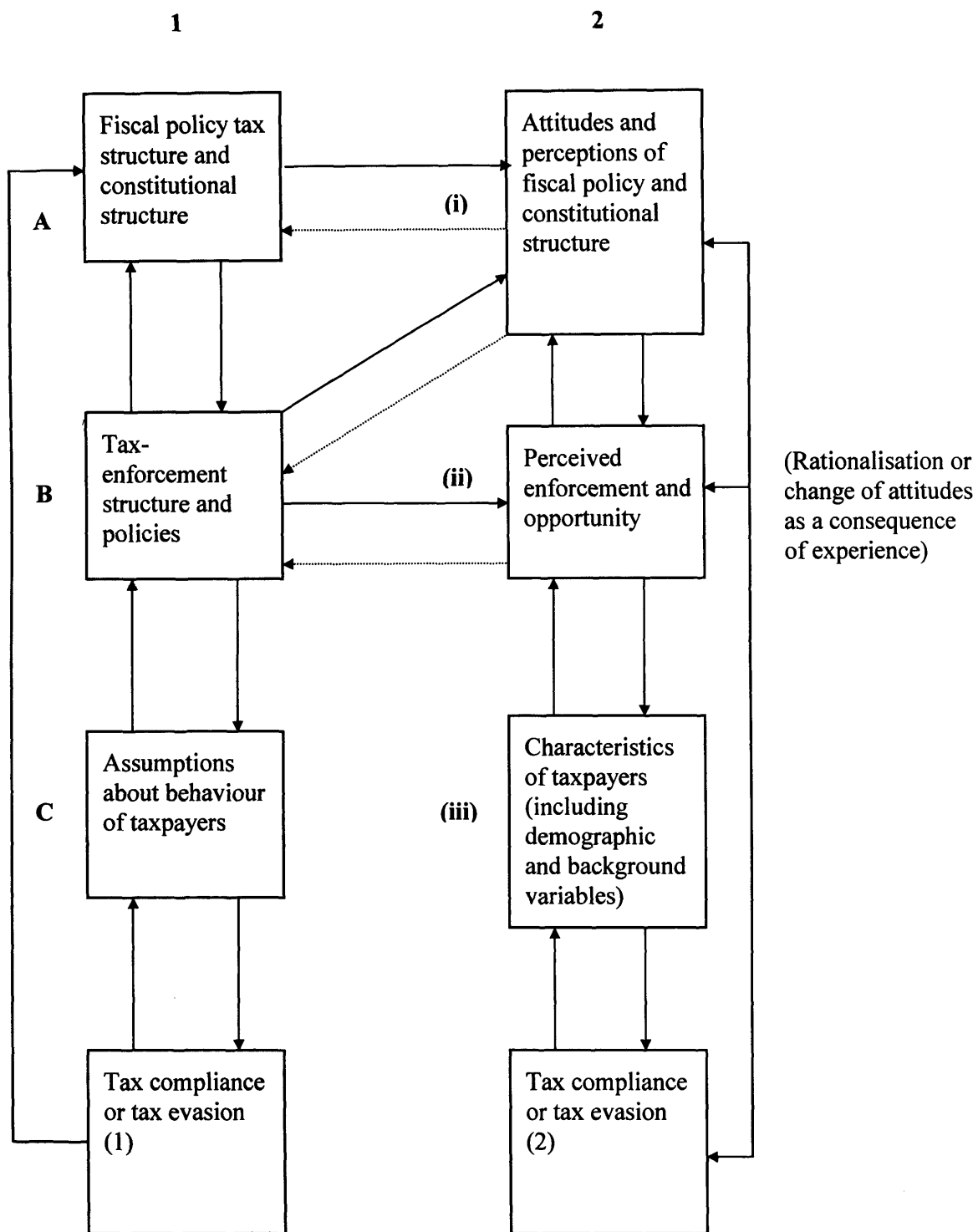
2.3.2.3 Weigel Hessing and Elffers model

Weigel *et al.*, (1987) developed a social psychological model schema of tax evasion behaviour. The model reviewed and discussed by Hessing *et al.*, (1988b), Webley *et al.*, (1991), and Elffers (1991). Their theoretical model is derived heavily from Jessor, Graves, Hansen and Jessor's (1968) general theory of deviance. According to this approach, tax evasion (a deviant act) is seen as a defective behaviour within a social dilemma; the individual is better off if he/she makes a defective decision rather than cooperative one, however everybody will be worse off if all individuals make a defective decision. So, if some individuals pay less than the correct amount of taxes, which is a defective behaviour rather than cooperative, they will be better off. However, if too many individuals do not pay taxes, then the tax system collapses and everybody becomes worse off. Therefore, Weigel *et al.*, (1987) consider tax evasion within the context of a social dilemma (see Figure 2.5). The model indicates two groups of variables instigations and constraints. These variables are given both in the individual level and within the confronting situation. For example, in situational instigation financial strain shows the amount of tax owed after withholding, but financial strain does not necessarily lead to more evasion. This will happen if the financial strain brings about feelings of unfairness in the person (personal strain). 'Location of an individual's position in terms of exposure to these conditions yields an estimate of the probability that he or she will engage in act of tax evasion.' (Weigel *et al.*, 1987, p. 228). An individual first begins to instigate evasion, and then considers the severity of the constraints. The authors emphasised two features of the relationship between social and psychological elements of the model;

'First, the structure of the social and psychological domains ... is formally parallel. Each proposes two major sources of instigation to engage in tax evasion and three major constraints against the occurrence of such behaviour. Second, since the variables comprising the psychological domain are the individual analogues of the variables comprising the social domain, the framework permits a systematic basis for examining the role of individual attributes in mediating the impact of social conditions on behaviour.' (ibid, p.231).

It is assumed that the variables in the model are sufficient to account for the behaviour of tax evasion. The effects of the all variables which are not included in the model are mediated by the variables which are in the model. For example, knowledge of tax regulation can increase the probability of evasion because it increases the perceived opportunity to evade, decreases perceived risk of expected punishment or results in a tolerant attitude to tax evasion.

Elffers, Weigel and Hessing (1987) tested the above model using self-reported behaviour and officially documented behaviour of the same taxpayers and found that there was no correlation between the two dependent measures. While personal constraints were correlated with self-reported behaviour and uncorrelated with documented behaviour, personal instigations were correlated with documented behaviour, but not self-reported behaviour. The experimental study by Webley, Robben and Morris (1988a,b) also supported the hypothesis that the taxpayer perceived the system as a social dilemma.

Figure 2.5 Weigel *et al.*, model

SOCIAL CONDITIONS

Situational Instigations
1 Financial Strain (amount of tax owed after withholding)
2 Social Norms (emphasis on individual wealth as measure of success within reference group)

Situational Constraints
1 Opportunity (occupational rating regarding the probability of cash receipts, withholding at source, etc.)
2 Legal Controls (probability of apprehension and punishment for reference group)
3 Social Controls (number of evaders in reference group)

TAX-EVASION BEHAVIOUR

(Unreported income, unwarranted deductions and failure to file a return)
1 Self-Report
2 Behavioural Outcome Measures

PSYCHOLOGICAL CONDITIONS

Personal Instigations
1 Personal Strain (estimates of difficulty meeting tax obligations and perceived unfairness of tax laws and authorities)
2 Personal Orientation (self-serving versus community orientation)

Personal Constraints
1 Perceived Opportunity (subjective estimate of opportunity to evade)
2 Perceived Risk of Punishment (certainty and severity)
3 Intolerance of Tax Evasion (attitudes and moral beliefs about the propriety of tax evasion)

There are other behavioural models in the tax evasion literature. However, most have not been tested empirically and some are very difficult to test (e.g. Lewis, 1982) whilst others have been only partially tested (e.g. Weigel *et al.*, 1987). None of the behavioural models has been widely accepted amongst the research community, perhaps because of the fact that researchers in the area of tax evasion come from wide variety of disciplines and backgrounds (Fischer, Wartick and Mark 1992).

2.3.3 Economic Psychology Models (Multiple selves)

Cullis and Lewis (1997) developed a tax compliance model, which takes into account preferences over conformity to social conventions. They noted the significance of models (Kuran, 1990; Gutman, Nitzan and Spiegel, 1992 and Roback, 1989) that consider the individual with different sources of utilities. In Kuran (1990) individuals have three sources of utility which are private utility, reputational utility and utility from autonomy. The private utility implies the net expected benefit (economic) from a certain decision. Reputational utility is the net payoff created by the positive and negative sanctions of an expressed preference.[17] Utility from autonomy indicates the value of the freedom to

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[17] Individuals are often rewarded or punished by society for the preferences they express. For some preferences there are no sanctions involved; such as preferring milk over orange juice. However, for most of the issues that economists analyse there are social sanctions involved with revealing one's preferences. Moreover, a preference might bring social sanctions in one society but not in another society, or it may carry social sanctions in one time in a society but not in another time. For example, preferring wine over grape juice may not bring any social sanctions in England, whereas it may carry heavy sanctions in Iran. Again, compared to the last century smoking seems to carry more stigma now. The individual may choose to conceal his/her private preferences in public. Since nobody knows the individual's preferences, he/she may appear to hold any preferences in public. The preferences he/she expresses may cause the denial of social and economical opportunities or on the contrary it may bring rewards such as honours, compliments and job promotions. Similarly, a preference for tax evasion may carry more stigma in UK or USA compared to Turkey.

choose and being able to resist social pressure.[18] Another important point to consider is that individuals can make investment decisions that result in Pareto-preferred welfare changes. Gutman *et al.,* (1992) extended the theory of rent seeking by allowing preferences to vary. The authors noted that modern economists generally ignored the social productivity of values and considered tastes as given and exogenous to the economic system. Although some economists have started to consider tastes as changing in some of their models, tastes are still considered as given when making welfare evaluations. However, even under the structure of Paretian welfare economics, taste regimes can be compared in efficiency terms. Even though the interpersonal comparison of utility is impossible, the suboptimality of a society formed only of one type of individuals (say egoistic) can be showed without a need to make such comparison. This can be demonstrated if a move towards altruistic values would improve the welfare of the egoists in terms of both in their 'old' egoistic utility function and 'new' altruistic utility function. Gutman *et al.,* considered a society formed of two agents who are initially pure egoist. The two agents are allocated a politically given fixed rent. The final outcome of the rent for agents depends on their relative expenditure on rent seeking activities, on their initial endowments, and on the mechanism resulting in a resolution of the conflict. Since both agents are selfish they would both allocate resources for rent seeking activities by involvement in socially unproductive activities such as bargaining and lobbying. Then, compared to the initial endowment both agents would be worse off. However, if because of fixed investments in agents' education they start to have some altruistic values rather

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[18] An individual is said to be exercised full decisional autonomy, maximising the utility from autonomy, when he/she indicates his/her private preferences in public.

than purely egoistic ones, each agent would value his/her counterpart's welfare positively to some degree. Thus, their rent seeking expenditure would reduce and the new welfare equilibrium for the altruistic preferences would be higher than old egoistic preferences.

Cullis and Lewis adopted Roback's (1989) model of conforming to a social cum economic rule of racism to tax compliance. The model highlights the problems of 'market failure', which appears in the process of social convention construction. Individuals have different sources of utilities which are indicated as $U=(Y,C,S)$. Y is income or a composite commodity consumed by the individual, C is the individual's degree of conformity to the convention of compliance and S is the fraction of population that comply. Individuals gain utility both from their own compliance with a social norm and from knowing that other people are conforming to the norm. Individual may gain direct psychic utility or an indirect utility as a result of pecuniary consequences. Since social norms are thought to be public goods, S indicates a collectively consumed, non-excludable good.

Two identical individuals in a society (individual A and B) are assumed in order to explain the investment, production and consumption process of social norms in Cullis and Lewis's (1997) model. Individuals can invest some income, I_C, to lower the price of conformity. The price of conforming to the tax compliance norm includes both the direct pecuniary cost of paying taxes and psychic costs (i.e. thinking that you could be a 'free rider' and thinking that people consider you as 'foolish' for paying all taxes that are due). Lowering the price of conformity will decrease the tax rate for an individual, since general compliance will be higher and thus lower tax rates would achieve the same previous total revenue. Moreover now, because of the increased level of compliance, the psychic cost of feeling 'foolish' will be decreased. In Cullis and Lewis's model the price of conformity, P_C, is given in the x-

axis and the degree of conformity per period, S/t, in y-axis. The private demand to conform at each level of pricing leads to the individual's demand curve. Horizontally summing these two demand curves gives the society's demand for conforming at each price level. Individuals also value whether others comply to the norm, which would produce an external demand. Vertically summing these external demands results in society's demand that others comply to the norm. Finally, society's demand for conformity will be given by vertically summing society's private demand and society's external demand for conformity. Individuals can expend resources to change the price of conformity, they allocate their total income between goods and services, and investment. The total income can all be spent on goods and services, Y, or it can be invested, Ic ,in order to reduce the price of conformity. The initial equilibrium for the individuals will be at a point where the marginal rate of transformation between Ic and Y is equal to the marginal rate of substitution between Ic and Y ($MRS_{Ic-Y}=MRT_{Ic-Y}$). Since lowering Pc produces rents for each individual who conforms not only to the invested individual (i.e. norms have public good characteristics), individuals' private decisions will be sub-optimal. Horizontally summing the individuals' investment will bring the society to the point which is not optimum for the individuals. The individuals can change their allocation by reducing the amount of investment and adjusting to another point.

The 'production ray' transforms the total investment to the price of conforming, other things being equal. The other things assumed to be equal are pointed out by Cullis and Lewis as the inherited level of past investments ($\bar{Ic}_{i-1}$), the production technology of the process ($\bar{Tc}$), and the degree of efficiency with which the technology is utilised ($\bar{O}$). Since the norms have public good characteristics; the equilibrium as a result of isolated

individual decisions is not optimal. The standard public good models indicate that marginal rate of transformation should be equal to sum of individuals marginal rate of substitution. Now at this new equilibrium investments are increased leading to a lower price of conformity and a higher quantity of conformity. Cullis and Lewis indicate that even at this equilibrium, there may be additional inefficiencies. For example, solving the possible consumption externality problem implies another equilibrium with an even lower price of conformity and higher quantity of conformity.

It has been indicated by Cullis and Lewis that the degree of tax compliance will depend on in short, (i) the problems of public goods and externality being solved, and (ii) the position of the production ray and particularly the efficiency of the technology used (the value of the variable O). The 'free rider' problem associated with public goods indicates the necessity for some kind of extra market mechanism to provide efficiency. Thus, indicating the significance of '...the role of opinion formers, interest/pressure groups, nominated or elected officials and political parties. Such individuals or groups have disproportionate ability to influence Pc (superior production rays).' (Cullis and Lewis, 1997, p.318).

In general, individuals try to solve 'free rider' problem by investing in political parties which will legislate a tax code. Many people pay taxes, because they are involved in production of compliance norms by supporting a political party. However, it is also possible that an individual can invest in order to reduce the price of conformity but he/she may not comply himself/herself.

The model indicates that tax compliance is a social and political issue and different countries would have different compliance rates depending on how various problems associated with the public goods aspect of tax compliance have been tackled.

2.4 CONCLUSION

The simple economic model of income tax evasion (e.g. A-S, 1972) indicates that under the assumption of DARA, tax evasion increases as income increases. On the other hand, it is not clear how evasion as a percentage of income changes as income increases. The effect of the tax rate on compliance is also ambiguous. However, if the penalties for evasion are imposed on evaded tax (as it is in many countries) rather than undeclared income (Yitzhaki, 1974), an increase in the tax rate reduces the amount of income evaded under DARA. These basic models of tax compliance all conclude that the penalty rate and the probability of detection are substitutes for each other and increases in either of these variables leads to a higher compliance rate. The basic theoretical model has been criticised as unrealistic and therefore many economists have tried to improve it by making more realistic assumptions. However, these improved models give results that are in general ambiguous or dependent on the validity of the assumptions about how different variables (e.g. fairness) enter the individual's utility function. Some economic models and many behavioural models indicate that social norms, fairness, and deterrence factors such as guilt feelings and social stigma are important determinants of tax evasion. Although this theoretical work is helpful in indicating the factors affecting tax evasion behaviour, the ambiguity of its predictions means that the issue is ultimately an empirical one. There is a

need for empirical studies to test predictions and to find out the effect of policy parameters

in practice.

CHAPTER 3

PREVIOUS EMPIRICAL EVIDENCE:

Survey and Regression Studies

3.1   INTRODUCTION

3.2   METHODOLOGY AND LIMITATIONS OF SURVEY AND REGRESSION
       3.2.1 Surveys
       3.2.2 Regressions

3.3   THE FINDINGS OF THE SURVEY AND REGRESSION STUDIES
       3.3.1 The Effect of Tax Rate
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              3.3.5.1 Legal sanctions
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          ,   3.3.5.3 Guilt feelings
       3.3.6 The Effect of Ethics
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              3.3.8.1 Age
              3.3.8.2 Gender
              3.3.8.3 Marital status

3.4   CONCLUSION

3.1 INTRODUCTION

Since on the whole economic theory fails to obtain unambiguous results concerning the effect of most policy parameters and other factors on the tax evasion decision, there is a need for some empirical studies of tax evasion. Over the last 25 years there have been many empirical studies testing the theoretical models (discussed in the previous Chapter) and analysing the effect of the variables thought to affect tax evasion. Empirical studies on tax evasion can be categorised in three ways: (i) surveys, (ii) regression studies and (iii) experimental work. Each of these methodologies has been used extensively in the literature and has both advantages and disadvantages, which will be discussed in the appropriate sections.

Section 3.2 of this chapter will summarise methodological issues of surveys and regressions and their limitations. The findings of non-experimental works are investigated in Section 3.3. Section 3.4 will summarise and conclude the chapter. The experimental methodology as applied in this study, the experimental works and their findings are analysed in more detail in the following chapter.

3.2 METHODOLOGY AND LIMITATIONS OF SURVEYS AND REGRESSION

There have been a considerable number of survey and regression studies on the subject of tax evasion. In this section methodological issues and limitations will be discussed.

3.2.1. Surveys

There are several methods used, such as mail questionnaires, telephone interviews, personal interviews and discussion groups. Surveys are generally in the form of questionnaires which try to discover what the taxpayer thinks about the fairness of the tax system, or even ask whether they have evaded tax in the past or intend to do so in the future. The simplest way to do that is to obtain a response to a statement on a Likert scale. Developed by Likert (1932), this scale is the most widely used in the literature. It consists of a set of items to which participants respond in either agreement or disagreement, the scale score being obtained by summing the numerically coded agree and disagree responses to each item in the light of whether the item is negative (unfavourable) in direction, e.g. 'Since everybody evades taxes, one can hardly be blamed for doing it', or positive (favourable), e.g. 'I would never pad my deductions'. Lewis (1982) asks 'But why not just ask respondents whether they evade tax or not? If they admit it, ask them how much this amounts to and perhaps even why they do it? What could be simpler?' (p.140). However, he adds that '... some traditional wisdom (and a smattering of social psychology) recommends a tempering of enthusiasm.' (ibid, p.140). When they are asked threatening, embarrassing or sensitive questions, the majority of people answer with a lie (Loftus, 1985). Hessing et al., (1988b) report a survey by Aitken and Bonneville (1980) which revealed that admissions of evasion were very sensitive to question wording and methods used in the survey. While only 9% were agreed with 'stretching the truth', 27% were agreed with 'being less than absolutely honest.' Another survey (Westat, 1980) also found that, in general, personal interviews resulted in higher levels of admitted evasion than telephone interviews.

An important advantage and a disadvantage of survey work is that '... they often include many socioeconomic, demographic, and attitudinal variables that are not available with tax return and audit data, allowing researchers to investigate a rich set of hypotheses about the factors associated with non-compliance. The major disadvantage of survey data is that they are based on self-reports, which often provide very inaccurate information.' (Andreoni et al., 1998, p. 837).

There have been some studies that compared self-reported behaviour with external criteria, which found both over- and under-reporting. Over-reporting may occur because of the failure of the tax authorities to detect evasion which subjects admitted to in a survey. Under-reporting may be the result of unintentional errors, failures to admit evasion, etc. Anonymity is generally guaranteed in survey work in order to get accurate results. Despite anonymity, there are some factors that distort the results of survey work in general, especially in the subject of tax evasion. For example, people may not bother to respond or, worse, evaders may not respond. Even if they do, they may not give truthful answers. Concerns about social approval or disapproval may affect the accuracy of survey work. If tax evasion is not favoured in a social group, then respondents may not admit the fact that they have committed evasion. Moreover there is the issue of how aware people are of their past behaviour. Some inaccuracies in surveys of tax attitudes may simply result from the fact that respondents do not remember what they have done in the past. Nevertheless it is possible to improve the quality of surveys[1]; asking questions about behaviour that is salient and protecting the anonymity of the respondents will help to get more accurate results (see Webley et al., 1991 for a more detailed discussion). On their own, however, surveys of this kind will not give precise results regarding factors affecting income tax evasion or its

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[1] One method to increase the survey reliability is the randomised-response technique detailed by Loftus (1985) and Thomas (1992).

extent. Surveys cannot identify the direction of the relationship between tax evasion and

its determinants. In other words, a tax evader who indicates that his/her tax burden is high

might be trying to rationalise his/her own tax evasion -causality may be in either direction

here. Hessing *et al.*, (1988b) note that an important issue for the usefulness of self-reports

is whether 'denials by evaders' are randomly distributed or not. If they are randomly

distributed then the result of a survey will reveal a lower amount of evasion than the actual

one, but the effects of estimates will be unbiased. On the other hand, Hessing *et al.*,

(1988a) and Elffers *et al.*, (1987) explore the limitations of surveys in their study and

report insignificant correlation between respondents' self-reports of tax evasion and

officially documented behaviour.

3.2.2 Regressions

Most regression studies in the tax compliance literature have used the data provided by the

IRS in the USA and come from the Taxpayer Compliance Measurement Program (TCMP).

Under this program, a stratified random sample of tax returns was subjected to detailed

audit by experienced IRS tax inspectors approximately every three years between 1963 and

1988. The TCMP data reveals line by line detailed information about what the individual

reported and what the inspector concluded that he/she should have been reported. In

general, TCMP surveys involved audits of between 45,000 and 50,000 households. The

main object of the survey was to support the development of the Discrimant Index

Function (DIF), a formula used to rank tax returns according to their expected non-

compliance. The IRS uses DIF scores to select 60 to 70% of all non-TCMP audits (Roth *et*

al., 1989). The DIF formula and its elements are kept secret within the IRS. Another aim

of the TCMP survey was to estimate prevalence and magnitude of non-compliance

(Feinstein, 1999). According to the 1988 survey, while about 40% of individuals underpaid their taxes, 7% overpaid. Most of the underpayments involved significant amounts (i.e. almost two-thirds of underpayments were $1,500 or more). Although the first survey was conducted by the IRS in 1963, TCMP data was not made available to researchers, the public or even Congress for many years. It became available for the research community in the early 1980s, as the result of extensive litigation under the Freedom of Information Act by a researcher (Long v. Internal Revenue Service, 1975). In most cases the IRS has only released the *aggregated* TCMP data to outside researchers, for example, according to zip code. However, the IRS has more recently made individual TCMP data available to researchers. There is no other country in which a random sample of tax returns is audited regularly and made available to researchers.

Clotfelter (1983) carried out the first study which employed regression models using TCMP data, Witte and Woodbury (1985), Slemrod (1985), Dubin, Graetz and Wilde (1987) and others have also analysed non-compliance using the TCMP data. The data set is regarded as the most reliable source of information about tax compliance by some authors (Blumenthal, Christian and Slemrod, 1998 and Andreoni *et al.*, 1998). They indicate that TCMP data is highly informative and helpful for analysing the determinants of tax compliance. Nevertheless others (e.g. Long, 1992) were highly critical of the data set indicating that it is full of problems and not suitable for studying the determinants of tax compliance. The limitations and drawbacks are discussed below.

First, IRS audits have more ability to detect over-reported deductions than under-reported income where the burden of the proof is the responsibility of IRS. For example, it is very difficult for TCMP inspectors to detect unreported income which is not subject to withholding or information reporting such as income from cash only business. Secondly,

TCMP audits do not include non-reporters, which may be a substantial number of individuals. Therefore, it is not possible to analyse the determinants of evasion for the non-filer group. Thirdly, these audits measure both taxpayers' intentional evasion and unintentional mistakes, and in determining the voluntary compliance rate overpayments and underpayments are combined. Fourth, TCMP data contain limited information about demographic and socio-economic characteristics of the taxpayer population, which may play an important role in determining tax compliance. Fifth, some non-compliance is the result of the disagreement between the taxpayers and the IRS inspectors in the interpretation of the law. Moreover, the appeals of taxpayers and their outcomes are not included in TCMP data. Finally, inspectors can make mistakes when they are examining tax returns. A study by Elffers et al., (1991) has tried to test the reliability of the findings of audits. They carried out a study in the Netherlands, in which the auditing of tax returns by a tax officer was verified by a second officer of the same rank and by a team of three experts from the tax service. Overall, results indicated that there were important differences in terms of outcomes obtained. The adjustments recommended for the same tax returns differed significantly between the first officer, second officer and the expert team. Although there may be important differences between the Dutch and US tax systems and the way audits are conducted, some preliminary examinations carried out by the state tax authorities in the US have also found important differences between the state auditors' judgements (Long and Swingen, 1991 and Long, 1980).

Long (1992) argues that using official government statistics and TCMP data in order to analyse determinants of tax evasion is inappropriate. She claims that this data does not measure intentional evasion or negligence '... but misreporting that arises from other sources - including inadvertence, misunderstanding of what are often complicated tax

provisions, or ambiguity and uncertainties in tax requirements.' (ibid, p.116). She

supported her claim as pointing out that the IRS auditors classify only very small numbers

of tax returns as fraudulent or even negligent. For example, the latest available TCMP

showed that fewer than 5% of federal income tax returns were found to warrant negligence

penalties and only 2 per 1,000 returns were imposed with civil penalties. Long also

explained that these rates had stayed the same over the previous twenty years. She

indicates that ' I have come to believe that using official government statistics - whether

these be tax gap estimates or data from regular or research tax audits such as ... TCMP - to

test traditional choice behaviour models is largely inappropriate. Yet TCMP data and

similarly based government measures are perhaps the most common tax compliance data

used to analyze such choice models, at least in nonexperimental settings.' (ibid, p.115).

3.3 THE FINDINGS OF SURVEY AND REGRESSION STUDIES

In Table 3.1, Section A, the survey studies in the subject of tax compliance are given.

Section B of the table reports the previous regression studies. Because of the very large

compliance literature, we report mainly studies which analyse various factors thought to

affect evasion behaviour. Therefore, those studies which attempt to assess aggregate levels

of tax compliance in an economy, and studies which analyse other forms of tax evasion are

not included. The table reports UK, USA and other foreign studies. The first column of

the table indicates the name(s) of researcher(s) who published the study, and the country to

which the study relates. There are a total of 63 compliance (38 survey and 25 regression)

studies reported in the table. Although the studies are categorised as either survey or

regression studies in the table, the distinction is not definitive, since there are a few which

use more than one type of methodology and data source. This information is given in the table alongside the sample used in the study.

Table 3.1: A summary of previous survey and regressions studies

Author (s) and Country	Date Published	Type of Methodology /Data Used	Sample	Main Results	Evaluation
Section A: Survey Studies					
Vogel (Sweden)	1974	Interviews	A nationwide sample of 1796 taxpayers	An individual evades more, if evasion is generalised behaviour in his/her social group. Age and being female are positively associated with tax compliance.	High percentage of self-employed people is selected for the sample, since they have more opportunity for evasion. There were total 200 questions in the survey.
Spicer and Lundstedt (USA)	1976	Interviews	130 Ohio head of households	No relationship is found between perceived penalty rate and tax evasion. However, perceived probability of detection discourages tax evasion.	The study excluded low-income groups, since it was thought that middle and upper groups had more opportunity to evade.
Song and Yarbrough (USA)	1978	Questionnaire and Interviews	278 taxpayers in Eastern North Carolina	While general distrust of people and sense of political efficacy are negatively related to tax ethics, individuals with high levels of income and education exhibit high levels of tax ethics. Overall level of tax ethics is considered to be 'barely passing'. The majority of individuals do not see tax evasion as a particularly serious crime when compared to other crimes.	Detailed information of the operation of the some variables is not given. Moreover, the conclusion that overall level of tax ethics is 'barely passing' is very subjective.
Mason and Calvin (USA)	1978	Interviews	800 Individuals from Oregon	The probability of not being apprehended has the strongest correlation with admitted tax evasion. However, no deterrent effect of civil and criminal penalties is found. Low income, youth and being male are all significantly correlated at least one form of evasion.	A dichotomous measure of three types of evasion was constructed as the dependent variable; failure to file returns, under-reporting of income, and overstatement of deductions. Fear of apprehension was calculated by summing responses to two scale items in which the subjects estimated the probability of being caught when seeking to evade taxes by large and small amounts. However, no question was asked about the dollar amount of evasion. Authors reported that interviewers were asked to judge the honesty of subjects, and they indicated 92% subjects answered everything honestly. Nevertheless, this assessment is a subjective measure rather than an objective one.

Author (s) and Country	Date Published	Type of Methodology /Data Used	Sample	Main Results	Evaluation
Lewis (UK)	1979	Questionnaire and Interviews	200 male taxpayers from Bath	While the people in the sample disapprove of large-scale tax evasion and think any individuals caught should be appropriately dealt with, most of the respondents agree that small-scale evasion should be treated leniently. Respondents believe that a reduction in the tax rate would not have a significant effect on the amount of evaded taxes. Attitudes to income taxation partly depend on income level of individuals.	The sample cannot be thought as representative of attitudes in Britain, since there are more Conservatives, more old people and fewer manual workers in the sample than the overall population in UK. The author did not make clear the difference between *small-scale* and *large-scale* evasion, and these terms can be perceived differently according to respondents. It is also interesting that Lewis chose only to study men. Although men are usually principal taxpayers in the household, it is likely that they make their decision with their partner.
Dean, Keenan and Kensey (UK)	1980	Questionnaire	424 evening school class attendees from Fife, Scotland	Subjects indicate that if there was a low chance of detection they would commit evasion. Moral condemnation of evasion is not severe. Respondents feel high degree of vertical and horizontal inequity.	Non-random sample is used, so it is unrepresentative. It is an important study in the sense that it tries to find out people's attitude towards income tax.
Keenan and Dean (UK)	1980	*As above*	*As above*	Subjects are more tolerant of evasion on part-time earnings. People do not think that tax evasion can be justified as a means of removing perceived inequity in relation to income tax. Older subjects more strongly disapprove of evasion than younger ones. Males disapprove tax evasion more than females.	The article clearly indicates how various variables were measured thus making replication of the study possible.
Grasmick and Green (USA)	1980	Personal and Phone Interviews	390 people from the Southwest	Moral commitment, threat of social disapproval and the threat of legal punishment are positively associated with tax compliance. The threat of guilt feelings, the threat of social stigma and the threat of legal punishment account for 40 % of the variance in illegal behaviour.	No information is given about the refusal rate. However, there is a detailed information about the statistical procedure used and how various factors that thought affect compliance are measured. Also, the sampling procedure yields a sample very similar to target population.

Author (s) and Country	Date Published	Type of Methodology /Data Used	Sample	Main Results	Evaluation
Tittle (USA)	1980	Interviews	1993 household members from New Jersey, Iowa and Oregon	Fear of informal sanctions is a far more effective deterrent than are perceptions of the chances of arrest. Moreover, thresholds are important in deterrent behaviour. An informal sanction threat has to be quite certain to be effective whereas legal sanctions have to be very severe before there is deterrent effect attributable to that perception.	Since the study was published as a book rather than article there is great deal of information about the deterrence theory, and measurement issues of different variables. It also summarises previous sanctions studies and indicates their weak points. Tittle controls the interactions of variables when trying to test the effect of them.
Richards and Tittle (USA)	1981	*As above*	*As above*	For every offence studied in the survey (small and large amount of thefts, marijuana usage, illegal gambling, assault and *tax evasion*) women have higher levels of perceived risk than do men, in spite of the fact that objective probabilities of sanction are lower for woman. The gender difference in perceived risk was explained by the findings that women perceived themselves to be more visible and to have the greatest stakes in conformity. Moreover, women think the crimes were more immoral than do men. Women are less likely to have a desire to commit these crimes which lead to sex-role linked cognitive dissonance. They have less information about the crimes and sanctions, and women perceive more trouble than men do, if they get caught.	The data set is the same as the one used by Tittle (1980). The study includes other types of offences as well as tax cheating. It is very large survey and detailed information is given about the theoretical arguments which are tested in empirical works.
Scott and Grasmick (USA)	1981	Interviews	Random selection of 329 names from Oklahoma telephone-book	Guilt feelings, social stigma and legal punishment (inhibitory variables) are found to be positively associated with tax compliance, while perceived injustice in the exchange (the motivational variable) negatively effect tax compliance.	The refusal rate of survey is not given and the reliability scale for motivational variable is not particularly high (alpha = -0.69). However, this study is important, since it involves motivational (reward) variables as well as inhibitory (cost) variables in order to test deterrence theory.

Author (s) and Country	Date Published	Type of Methodology /Data Used	Sample	Main Results	Evaluation
Grasmick and Scott (USA)	1982	Interviews	401 individuals randomly selected from Oklahoma telephone-book	No relationship is found between either having evaded in the past or intended future evasion and the level of income. However, perceived threats of guilt feelings, social stigma and legal punishment affect evasion behaviour negatively which account for a third of the variation in tax evasion, guilt feelings being the greatest deterrent factor.	Again no information about the refusal rate in the sample is given. The study is interesting since it includes petty theft (value less than $20) and grand theft (more than $20), as well as tax evasion, and compares the effect of deterrence factors on these crimes. Authors measure both past evasion and future intention and suggest that perceived sanctions should be more related to future intentions rather than past evasion.
Warneryd And Walerud (Sweden)	1982	Telephone Interviews	426 Swedish male adults	Age, opportunities for tax evasion and attitudes towards tax crimes are the most important in determining tax evasion. However, the variable perceived risk of punishment and tax evasion do not show a significant correlation.	The sample only includes men and was drawn from a telephone directory. Therefore it may not be representative of the population. In general, internal consistency of the indexes are found to be low (e.g. Cronbach's alpha = 0.59 or 0.54).
Groenland and vanVeldhoven (Netherlands)	1983	Interviews	111 Dutch from Tilburg selected on the basis of their occupational class	It is found that with the same monetary advantage the disposition to commit a fiscal offence (e.g. not reporting extra-income, paying black money, etc.) far exceeds the disposition to commit an economic offence (accepting bribes, stealing from rich families etc.). Moreover, the self-employed are significantly more internally oriented and demonstrated a significantly higher degree of fiscal knowledge than the wage earners. Furthermore, lower educated internals evade less than higher educated internals.	A small-scale study, but designed in such a way that the results can be compared to by Warneryd's 1980 Swedish study.

Author (s) and Country	Date Published	Type of Methodology /Data Used	Sample	Main Results	Evaluation
Wallschutzky (Australia)	1984	Questionnaire	About 420 Australian individuals	Exchange relationship (e.g. perception of high tax rate and perception that the tax system is unfair) is found to be the most important in explaining why taxpayers feel justified in evading taxes. Moreover, evaders are in general older, self-employed, have slightly higher incomes and are more often born outside Australia.	Exact numbers of subjects in the samples are not given. Two samples are used: (i) 'evaders' which included taxpayers who have been convicted of evading taxes and whose names appeared in a report of the Commissioner of Taxation, and (ii) 'non-evaders' who are selected from people whose names appeared on the Commonwealth of Australia Electoral Rolls. It is likely that this second group which is assumed to be 'non-evaders' includes both evaders and non-evaders. However, we do not know the number of evaders in this group.
Mason and Calvin (USA)	1984	Interviews	Two independent samples are used: 800 in 1975 and 801 in 1980 from Oregon	Perceived fairness of the tax system significantly declined between 1975 and 1980. Both probability of detection and income level have positive effects on compliance. The strong relationship between sanction fear and compliance indicates that dissatisfied honest do not commit evasion, because they were afraid of getting caught.	The sampling procedure of the study is reported in detail and seems to be reasonable in obtaining a random sample from the target population.
Thurman, St. John and Riggs (USA)	1984	Interviews	350 adults from the Polk city directory in Southwest	The use of neutralisation strategies significantly decreases the negative effect of the threat of guilt feelings on tax evasion. Moreover, the effect of the ability to neutralise guilt is independent of the level of guilt feelings of tax evaders.	Non-response rate is not given and the coding of some of the answers seems to be subjective. The survey asks about the future intention to evade which is based on hypothetical rather than actual behaviour.
Geeroms and Wilmots (Belgium)	1985	Questionnaire	311 individuals from Belgium	The surprising result is that higher taxes lead to less tax evasion, although the coefficient is not significant. No statistically significant effect is found for the variable fine. There is a higher probability of evasion when others are believed to be evading.	The sample is restricted to people who are mostly self-employed professional and have high income level, since there are more opportunities to evade for these groups. The measurements of the some of the variables that are used in the study are not explained clearly by the authors.

Author (s) and Country	Date Published	Type of Methodology /Data Used	Sample	Main Results	Evaluation
Elffers, Weigel and Hessing (Netherlands)	1987	Interviews and Information from tax returns	155 residents from Rotterdam	There is no significant correlation between survey report of evasion and actual evasion behaviour. The variables that are related with self-report tax evasion are different from the variables that are related with actual tax evasion; personal instigations reveal significant relationship with the actual behaviour but not with self-reports, and the pattern is reverse with respect to personal constrain variable.	There was a multiple audit procedure which significantly reduced the possibility of undetected evasion. This audit procedure identified and eliminated cases of inadvertent non-compliance. Moreover, the procedure assuring respondents anonymity was highly effective and complex. However, the response rate of 23% is very low.
Hessing, Elffers and Weigel (Netherlands)	1988a	*As above*	*As above*	*As above*	Even there were multiple audit procedures, it still possible that auditors make some mistakes. There may be differences of opinion between auditors and taxpayers. For example, 25% of assumed non-evaders reported misrepresentation of income.
Porcano (USA)	1988	Questionnaire	142 individuals selected from a telephone-directory of a Midwestern city	Variables affect different types of tax evasion differently. So, a variable that significantly affects one kind of evasion may not affect another kind of evasion. In general, evaders are males with income sources that are not traceable and perceive that taxpayer-government relationship is not fair.	There is a very high response rate (78%) for this kind of study and some tests are carried out to see if there is non-response bias (the responses of early respondents are compared with those of late respondents). However, the study has a rather small sample and large multivariate analysis is used which includes 18 variables.

Author (s) and Country	Date Published	Type of Methodology /Data Used	Sample	Main Results	Evaluation
Grasmick and Bursik (USA)	1990	Interviews	A random sample of 360 people from a South-western city.	The study analyse the deterrent effect of government-imposed sanctions (fines and prison), socially-imposed sanctions (embarrassment, loss of respect by others) and self-imposed sanctions (shame or guilt). The authors investigate three types of offences; tax evasion, petty theft and drunk driving. The self-imposed cost of shame has the highest deterrent effect for tax evasion followed by government-imposed costs. The effect of socially-imposed sanctions is in the expected direction, but it is not significant. The effect of past evasion found to be positive and significant on future intentions of evasion. None of the socio-demographic variables (age, gender and education) are significant.	It is an informative study with a lot of details about how dependent and various independent variables should be measured. Since it is possible that perceived expected punishments would change over time, the authors use future intentions of evasion. Of course, this does not correspond exactly with actual behaviour. It is possible to improve the measurement of variables for shame and embarrassment.
Thurman (USA)	1991	Interviews and Questionnaire	Random sample of 296 individuals from Oklahoma: the personal interviews were carried in conjunction with an annual survey of the city	The dependent variables were future involvement of under-reporting income or overstating deductions. Although, these two dependent variables are correlated, the relationship was not very high (r=.68). While the threat of guilt feeling has an insignificant effect in predicting under-reporting, it has a significant deterrent effect in overstating income tax deductions. It is also found that non-compliance in general, is a function of past tax evasion behaviour, risk-taking and ability of neutralisation of guilt feelings.	It is not clear from the article how the various independent variables were measured since no examples of questions used in the study were given. The study has a random sample and high response rate; 319 of 330 respondents agreed to participate.
Calderwood and Webley (UK)	1992	Questionnaire and Interviews	153 individuals employed by companies based in Exeter and Plymouth	Most taxpayers are ignorant about the UK tax system. An increase in income tax rate may lead to increase in evasion.	Some of the questions are rather long and may be too complicated for subjects to understand. Interviews that are carried out with 10 subjects after mail questionnaire indicated that the validity of the questionnaire might be in doubt.

Author (s) and Country	Date Published	Type of Methodology /Data Used	Sample	Main Results	Evaluation
Carroll (USA)	1992	Two interviews (one at the beginning and the other at the end of the tax season). Taxpayers kept daily diaries of tax-related thoughts and behaviours. They filled their tax declaration in the presence of a research assistant who asked them to 'think aloud' and recorded their thoughts.	100 Taxpayers in the Boston area	There is a significant number of people who are evading (by under-reporting income or over-deducting), but still indicate that they are not cheating the government out of money. Lower income, a lower proportion of income subjects to withholding, use of tax professionals and diary comments about saving times and lack of fear are positively correlated with under-reporting income. On the other hand, over-deductions related to the use of friends and relatives for information about tax maters.	It seems that diaries are interesting and useful way of gathering data. However, they are difficult to code reliably. Moreover, some subjects filled in several days at once rather than filling at the end of each day. Diaries may also reflect the ability to write the thoughts down as well as the decision process.
Wahlund (Sweden)	1992	Secondary data consisting of public statistics on income taxation, and telephone Interviews and Questionnaire	1427 male Swedish taxpayers	It is found that there is no relationship between tax rate and tax evasion behaviour.	In Sweden, marginal tax rates started to be reduced between 1983 and 1985. There were total 4 surveys used which obtained before and during marginal tax rate changes. Although, it is found that the tax rate did not affect the number of evasion, it is possible that tax rate has an effect on the amount of tax evaded which is not measured in the surveys.
Steenbergen, McGraw and Scholz (USA)	1992	Personal Interviews and Telephone interviews before and after 1986 Tax Reform Act, and information from the IRS data	359 New York taxpayers from Nassau and Suffolk Counties on Long Island.	The TRA's changes in the tax code have no impact on the way taxpayers think about taxes and on their commitment to comply.	There may be a selection bias in the survey (the sample was 359 subjects out of 799 contacts). The 1986 tax reform had little effect on the after tax income of most taxpayers which may explain the insignificant finding of the study. Moreover, authors used subjective version of TRA item as a proxy for TRA change, which may be another reason for the insignificant findings.

Author (s) and Country	Date Published	Type of Methodology /Data Used	Sample	Main Results	Evaluation
Sheffrin and Triest (USA)	1992	Interviews and an experiment	1444 taxpayers. The survey carried out by Louis Harris and Associates on behalf of the IRS, an experiment with 324 introductory economics student	The perceived probability of detection has positive effect on tax compliance. A casual attitude towards compliance is related to significantly increased probability of evasion. People who think of others as dishonest or have a negative attitude toward government in general consider the probability of detection to be lower than do those with more positive attitudes. Personal knowledge of people with difficulties with the IRS causes a significant decrease in the perceived probability of detection. The authors indicate that this suggests higher audit rates may have the perverse effect of increasing tax evasion. The experimental study indicates that the nature of the publicity about compliance is important; students who have read about the large amount of 'tax gap' in the experiment had more negative attitude towards the tax system than those who have read about the IRS's efforts to increase compliance. However, the difference is not statistically significant.	Dependent variables measure whether respondents had evaded in the previous 5 years, but independent variables measure the current attitudes, which might have changed during this period. The information which the students are given in the experiment which mention the IRS's efforts to increase compliance might be perceived as indicating high amount of evasion in the economy. This may explain the insignificant finding; it might have been better if this group had been given neutral information and used as a control group.
Smith (USA)	1992	Interviews	1558 taxpayers from Harris and Associates data	Responsive service and procedural fairness have positive and significant effect on normative commitment to tax compliance.	There are some doubts as to how effectively some of the variables are measured. The dependent variable (under-reported income) seems to include some small amount of unintentional evasion the existence of which taxpayers have only realised after tax declaration.

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Author (s) and Country	Date Published	Type of Methodology /Data Used	Sample	Main Results	Evaluation
Kinsey (USA)	1992	Telephone Interviews	1202 individuals, the survey was conducted by the Minnesota Centre For Research on behalf of the American Bar Foundation	Both the specific effect of personal contacts (who have personally contacted for enforcement purposes) and general effect of vicarious contacts (who have not been contacted directly, but who developed perceptions of likelihood of enforcement through indirect means, e.g. from other people who have contacted directly) are positive on individuals' perceptions of being examined in the future. Moreover, these contacts also increase perceived certainty that evasion will be detected. However, while personal contacts increase compliance by decreasing taxpayers' probability of evading, there is not such effect of vicarious contacts. It is also found that personal contacts have the effect of reducing taxpayers' fear of consequences of future contact.	There is a 29% non-response rate, which is understandable given the fact that the study asked 'direct questions' about past and future intentions of illegal behaviour. The study is important since it measures both the 'specific' and 'general' effect of IRS enforcement activities.

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Author (s) and Country	Date Published	Type of Methodology /Data Used	Sample	Main Results	Evaluation
de Juan, Lasheras and Mayo (Spain)	1994	Questionnaire	2406 Spanish income taxpayers	The results are particularly in line with the classical economic model of tax evasion. Taxpayers who perceive a high probability of detection and penalty rate are found to have a low probability of being predisposed to evade taxes. On the other hand, for the taxpayers who indicate low level of perceived probability of detection and penalty rate, the coefficient is not significant. Moreover, university graduates have a below average probability of being predisposed to evade taxes. Taxpayers' perception of fiscal fairness was not significant, but taxpayers who thought the tax system was not fair (because they paid less taxes than they should have) had a below average probability of evading taxes. For the taxpayers who indicate that tax evasion is widely accepted in their reference group, there is a positive and significant effect on the probability of being tax evader.	Again the non-response rate of the questionnaire is not given. As in many survey studies, a sample of questions used is not available, which prevents replication of the study and make it difficult to understand how the various independent variables and the dependent variable (predisposition to evade) are measured. However, the sample size and the procedure of the sampling of the target population of Spanish income taxpayers seem to increase the genaralisability of the results found to Spanish taxpayers.

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Author (s) and Country	Date Published	Type of Methodology /Data Used	Sample	Main Results	Evaluation
Scholz and Pinney (USA)	1995	Interviews and The IRS tax return data for tax years 1984-1987	445 Long Island taxpayers	For the base group of upper-middleclass taxpayers in the study, objective factors affecting the probability of getting caught has no significant affect on subjective probabilities. On the other hand, tax duty (measured by asking the respondents; what moral obligation they feel to pay taxes, how guilty they feel about failing to report some income and how they feel about carelessly but unknowingly failing to report some income) has a very strong and significant effect on subjective probability and subjective risk for both the base groups and higher income groups. For the higher income groups (tempted taxpayers) objective audit probabilities are significantly related to subjective risk. It is also found that greater knowledge about the tax law reduces subjective risk estimate. Finally, contacts with the IRS significantly increase subjective probability of risk.	The response rate to the survey was 62%: however, authors carry out various tests in order to see if there is a selection bias. The tests that were carried out and the measurement of variables were explained in detail and it was sound. One general problem with the official data is that they do not have information on non-filers. Nevertheless the study findings have important policy implications which were highlighted by the authors.
Antonides and Robben (Netherlands)	1995	Interviews an experiment and official data from the Dutch tax administration	188 subjects from two southern provinces of the Netherlands	The self-reported evasion is not found to be significantly correlated with actual tax evasion. The probability of making unintentional mistakes decreases with the experience of filling tax returns. While positive evaluation of paying taxes decreases the likelihood of evasion, a high opportunity to conceal income increases the probability of evasion. A higher level of education also increases the probability of evasion. The effect of withholdings on the probability of evasion is insignificant. Equity considerations and altruistic motivations are not related to tax evasion.	The study uses three methodologies together which makes it very important. The longitudinal character of the data increases the significance of the study. However, one strong assumption used in the study is that the probability of errors to the benefit of tax administration equals the probability of errors is to its disadvantage.

Author (s) and Country	Date Published	Type of Methodology /Data Used	Sample	Main Results	Evaluation
Scholz and Lubell (USA)	1998a	Interviews and The IRS tax return data for tax years 1984-1987	299 respondents from the Scholz and Pinney's (1995) sample (smaller sample due to the more missing data)	Trust in government and other citizens significantly reduce the probability of non-compliance. Tax equity and fairness are found to have no effect on compliance. While, the effect of tax duty is significant, civic duty (due to vote and sense of duty to country) has no effect on compliance. Political efficacy (i.e. people like me don't have any say about what the federal government does) significantly increased non-compliance, leading to authors to suggest that if efficacy increases with power and wealth, then it indicates wealth and power cause less compliance.	They used a technique, which lowers recall problems and response bias related to social acceptability. A more appropriate and advance technique of econometric analysis is used which tested and corrected potential biases.
Scholz and Lubell (USA)	1998b	Telephone Interviews before and after 1986 TRA and The IRS data	292 taxpayers	The reduction in taxes (as a result of TRA) leads to a significantly higher sense of duty, a greater fear of getting caught and lower mistrust of people. The subjective risk of being caught is not correlated with the real audit threat, but it is correlated with the change in duty. Finally, attitude adaptation is not because of attribution errors caused by attention to more readily observed aspects of the TRA.	The 1986 TRA created a unique natural experiment for changes in tax attitudes, and the authors took advantage of this with very rich combined survey and official data.

Author (s) and Country	Date Published	Type of Methodology /Data Used	Sample	Main Results	Evaluation
Varma and Doob (Canada)	1998	Telephone Interviews	1908 individuals across the province of Ontario: the survey was conducted by the Institute for Social Research at York University	It is found that people who think penalties are harsh for evasion are more likely to evade (the relationship is not in the expected direction). However, the effect of probability of apprehension was in the expected direction.	It is a well-designed and explained study. Dependent variable measures were whether respondents over-estimated deduction, failed to report any income or failed to file tax returns, but the respondents were not asked about the related amounts. It might be difficult to work with someone else's survey, one might wish that different or further questions were asked. In this survey the dependent variable asks whether the person had evaded taxes in the previous three years, but independent variables ask for the current time; so current views are used in order to explain past behaviour.
Hume, Larkins and Iyer (USA)	1999	Questionnaire	164 unlicensed preparers and certified public accountants (CPA) from California	The statements on responsibilities in tax practice (SRTPs) provide guidance to the CPAs on ethical issues. It is found that overwhelming majority of CPAs follow the SRTPs in making ethical decisions concerning to tax return preparation. Moreover, on 3 out of 6 issues tested, CPAs follow SRTPs more often than unlicensed preparers. On the other 3 issues CPAs do not follow the SRTPs any more than unlicensed preparers.	The overall response rate was only about 45%. The study important in the sense that failure to follow the SRTPs results in lower level of compliance. A full questionnaire instruments used in the study is given which indicates how the ethical issues are measured exactly in the survey.
McGee (Armenia)	1999	Personal Interviews	Not given	People do not pay taxes, because (i) the tax authority has not got a proper mechanism to collect taxes, and (ii) the government is corrupt and does not provide any public goods and services. Therefore, people feel it is ethical not to pay taxes.	The article explains the author's and his friends' experiences in the country. Even the most basic information about the research procedure and the sample is not given. No statistical test is applied. The article includes few example of people who explain their justification for tax evasion.

Author (s) and Country	Date Published	Type of Methodology /Data Used	Sample	Main Results	Evaluation
Section B: Regression *Studies*					
Mork (Norway)	1975	Tax declaration and Interviews data from Norwegian Occupational Life History Study	3129 individuals	The group with high income evades a greater proportion of income than lower income groups.	It is assumed that respondents declared their true income to the interviewer. However, the author himself indicates that for low income groups (in which income was too small) something went wrong with the data. No statistical analysis of data was carried out to indicate whether differences were significant.
Dornstein (Israel)	1976	Official Data (personal files for each self-employed taxpayers maintained by the tax authorities)	2500 self-employed taxpayers	In general, conformity to tax regulations is found to be less high among immigrants from underdeveloped countries than among native Israelis and immigrants from developed countries. Age is inversely related to the degree of conformity.	Some of the background information is obtained from the personal files and the author states that other information is obtained from various other sources, but does not specify which, making it difficult to measure reliability. Dependent variables used in the study measure the number of times that a taxpayer is asked to comply with a regulation rather than measuring the amount or the incidence of evasion. The data set does not include information about non-filers.
Clotfelter (USA)	1983	Official Data (the IRS's TCMP survey for 1969)	47000 individuals	Under-reporting increases with both the marginal tax rate and the level of after tax income. Moreover, there is a non-linear relationship between age and compliance with the oldest and youngest individuals being most compliant.	The author used individual level data which was not available outside the IRS (he was an employee of Treasury Department at the time of the study). In the study marginal tax rate and income were highly correlated which bias the findings concerning tax rate and income. Amount of under-reported income is used as dependent variable which is a concern - since unless there is a strong negative relationship between the percentage of underreported income and income, a direct correlation between tax rates and the amount of under-reported income is inevitable. His model may also be mis-specified because of the omitted variable (the average audit rate for each taxpayer class).

Author (s) and Country	Date Published	Type of Methodology /Data Used	Sample	Main Results	Evaluation
Cox (USA)	1984	Official Data (the IRS's TCMP survey for 1979)	55000 returns	There is no effect of marginal tax rates on compliance; the difference in the lowest tax group and in the highest tax group is about 1%.	Cox argued that if the state tax variable found to be correlated with non-compliance then Clotfelter's result concerning the effect of marginal tax rate on compliance can be supported. Since state tax rate is determined, basically by state of residence, but not by the amount of income, the income effect can be separated. The findings of Cox was early results of research in progress and there was no statistical test carried out in the paper.
Witte and Woodbury (USA)	1985	Official Data (the IRS's TCMP survey for 1969)	47000 individuals: data aggregated to the three-digit zip-code level.	Higher overall probabilities of audit are associated with lower compliance rate. There is a relationship between severity of sanctions and compliance but only for a specific group of taxpayers who have high income and are self-employed. Finally, tax evasion is positively related to the opportunities (i.e. tax withholding increases compliance, and itemising deduction or non-labour income decreases compliance).	The equations were estimated for each of seven audit classes defined by income level which were low, medium or high. The authors adopted a random audit assumption which meant that evasion rates in an area had no causal effect on audit rates. This assumption was later criticised by some researchers who indicated that this model was mis-specified because of the random audit assumption.

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Author (s) and Country	Date Published	Type of Methodology /Data Used	Sample	Main Results	Evaluation
Slemrod (USA)	1985	Official Data (a stratified random sample of tax returns collected by the IRS in 1977)	23111 observations	A large percentage of evaders' returns clustered within the upper $10 of their $50 bracket, consistent with his hypothesis. The effect of the marginal tax rate on compliance is not statistically significant, even though the tendency to evade taxes is increased with marginal tax rate. The effects of opportunity, age and marital status on compliance are also insignificant	Taxpayers have identical tax liabilities within the same $50 income bracket. According to this, an individual would have an incentive to under-report income just enough to fall into the top of the next lower bracket. Therefore, evaders would be concentrated in the top of a tax bracket. This approach is innovative and the result has important policy implications. So, the result indicates that the IRS should use proximity to the top of a bracket as an important factor in selecting returns for audit. Especially after 1986 TRA, the incentive to under-report income to fall into the top of the next lower bracket was increased, since the tax rate differential between brackets is higher as a result of the act. However, note that none of the variables used in the study had significant effect.
Crane and Nourzad (USA)	1986	Official Data (derived from Bureau of Economic Analysis, BEA and from IRS; time series data for the year 1941-1987	34 observations	Increases in the inflation rate increase the tax evasion in both absolute and relative terms. The effect of marginal tax rate on aggregate evasion is found to be positive. On the other hand, the amount of evasion decreases with higher detection probability, the penalty rate, and the wage share of income. Finally, increases in true income have a positive effect on absolute amount of evasion, but a negative effect on relative amount of evasion.	The amount of tax evasion was measured as the difference between adjusted gross income (AGI) derived from the BEA and that reported by the IRS and called the 'AGI gap'. While the value of AGI obtained from BEA is reportable income, the value obtained from the IRS is actually reported income. However, the AGI gap takes the income of individuals who are not legally required to file returns as evaded tax. Therefore, the authors tried to make the necessary adjustments in the data set. Nevertheless, an accurate measure of evasion is very difficult to obtain.

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Author (s) and Country	Date Published	Type of Methodology /Data Used	Sample	Main Results	Evaluation
Crane and Nourzad (USA)	1987	*As above*	*As above*	While the effect of marginal tax rate (MTR) is positive and significant on evasion, the effect of average tax rate (ATR) is negative and significant. It is found that in models that do not include ATR, the coefficient of MTR can be expected to be biased downward. The other results are same as above.	Authors argue that an increase in the average tax rate generates only income effect, and assuming DARA, this would increase compliance (ignoring the complications that might appear from the specification of the penalty function). They measured ATR by dividing total AGI by the number of returns filed and express the base tax of the corresponding income bracket as percent of the lower bound of that bracket. MTR is measured as summing the marginal rates in each year' tax schedule after weighting them by the fraction of total AGI in the corresponding tax bracket. The validity of both measure seem questionable. In reality, there would multicollinarity problem between income, MTR and ATR (i.e. as income increases both MTR and ATR will increase).
Madeo, Schepanski and Uecker (USA)	1987	Judgement experiment and official data	65 CPAs specialized in taxation and 6414 individual files aggregated data calculated to researchers' specification based on information in the IRS 1980 TCMP.	Source of income is three times more important than the next most heavily weighted variable, which is the penalty rate. The authors intended to test these findings using data from the TCMP surveys. However, testing the effect of the tax rate structure and penalty for evasion required time-series data, which were not available at the time of the study. Therefore, they have tested the predictions of the remaining two variables (source, and amount of income) by using 1980 aggregated tabular TCMP data. The results confirmed the findings that compliance increased with income and self-employed individuals were less compliant than the individuals whose income consisted of mostly salaries.	These results are important since it indicates the validity of a judgement experiment, which is tested using official data. However, testing the effect of the tax rate structure and penalty for evasion required time-series, data which was not available. Nevertheless, the authors could have tested the effect of some other variables in their experiment which TCMP data include information on (such as marital status and age). This judgement experiment is also important for the reason that it uses CPAs (tax experts) rather than students. However, one may argue that the judgement of experts may be biased compared to the judgement of ordinary taxpayers.

Author (s) and Country	Date Published	Type of Methodology /Data Used	Sample	Main Results	Evaluation
Dubin, Graetz and Wilde (USA)	1987	Annual report of the Commissioner of Internal Revenue (1977-1985) supplemented by socio-economic and demographic variables	400 observations	The audit rate is found to be endogenous, and has a deterrent effect on evasion related to the IRS's incentive to audit according to expected revenues. Compliance increases with per capita income, but at a decreasing rate.	Additional tax and penalties from audits *divided by* total collections, per million audits, (percentage return per audit for individuals returns) is used as the dependent variable. Endogeneity of the audit rates is allowed by using the budget per return and the percent of individuals returns filed. Although, the findings reported are just preliminary results, confirmation of the finding that the audit rate are endogenous, by using different set and type (time-series) of data is increasing the validity of the results found.
Dubin and Wilde (USA)	1988	Official Data (the IRS's TCMP survey for 1969)	47000 individuals' data aggregated to the three-digit zip-code level.	Audit rates are endogenous in five audit classes out of seven which indicates that the amount of evasion in these audit classes also affect audit rates (i.e. the IRS allocates more inspectors to areas where tax evasion is high). The audit rate has a significant negative effect only in one audit class when endogeneity was allowed by using the state level IRS operating budget per return as an instrument for the audit rate. The unemployment rate as well as the percentage of non-white population have a significant positive effect on evasion. Furthermore, increases in the percent employed in manufacturing or decreases in the self-employed variable (opportunities for evasion) lead to higher compliance in all audit classes except for one. Age (being over 65) is insignificant in two audit classes, but positively relate to the compliance for others. Finally, the effect of education (high-school degree) is positive on compliance whenever it is significant which is in four audit classes.	The authors indicate that there is no correlation between budget allocated to a state and the level of compliance in the state, so the instrumental variable results in consistent estimates. However, it is possible that the compliance decisions of taxpayers may be influenced by their perception of IRS enforcement resources in their state, so that the budget variable is part of the reporting equation and therefore cannot be used as instrument.

Author (s) and Country	Date Published	Type of Methodology /Data Used	Sample	Main Results	Evaluation
Klepper and Nagin (USA)	1989	Official Data (1982 TCMP)	37 aggregate data by audit class for each line item	There are differences in non-compliance amongst line items consistent with their assumptions. Non-compliance on income items subjects to information reporting are easier to establish then items which are not subject to any information reporting, but the differences are not found to be statistically significant.	The study is important since it does not consider reported income as homogenous, but disaggregates the compliance decision to the level of line items. However, their sample size is too small to generalise their findings.

Author (s) and Country	Date Published	Type of Methodology /Data Used	Sample	Main Results	Evaluation
Crane and Nourzad (USA)	1990	Official Data (California amnesty data obtained from the California Tax Franchise Board (CTFB) and the detection probabilities - which were different amongst individuals - obtained from Compliance Development of Liaison of the CTFB)	123 individuals who amended a return file previously	The amount of income has a statistically significant positive effect on evasion. The effect of marginal tax rate on evasion is also positive and significant. However, the elasticities of marginal tax rate and income are small. Audit classification has the expected sign indicating that high audit probability individuals evade less than the medium, and the medium probabilities tend to evade less than those with low probabilities. However, audit grouping and differences amongst the audit rates are not statistically significant. Married people are found to be evading more than single, other things equal. Finally, occupational classification indicates that evasion does not differ across occupation.	The authors notes that there is a concern with the probable bias, since evaders who voluntarily participate in the amnesty program may not be representative of all tax evaders in California. However, they have tried to correct the problem econometrically. The advantage of using amnesty data rather than TCMP data is explained by the authors: the amnesty based measure is not subject to the inspectors' ability to discover non-compliance. However, this measure needs the assumption that the amended returns represent the 'truth'. There were also some other strong assumptions that were made in the study; (i) the decision to evade state income taxes was made by taxpayers independently of the decision to evade federal taxes, and (ii) audit rates were exogenous. The information about the audit rates was obtained from Compliance Development Liaison of the CTFB, but Liaison did not give exact audit rates for each return, because of the sensitivity of information involved. However, each original return was classified by Liaison as having had a high, medium or low probability of being audited under the pre-amnesty regime. Authors use these classifications as dummy variables, but it is possible that they are endogenous.

Author (s) and Country	Date Published	Type of Methodology /Data Used	Sample	Main Results	Evaluation
Dubin, Graetz and Wilde (USA)	1990	Official data (state level pooled time-series cross-section data set for the years 1977-1986.	500 observations	Their results indicate that audits are endogenous rather than exogenous and that the audit rate is significantly decreased by information reporting obtained (third party reporting etc.) per return. While the audit rate has a significant positive effect on reported tax per return, audit rates has a negative relationship to returns filed per capita. Average state tax rate has a negative influence both on reported tax per return and on returns filed per capita. Moreover, increases in real income per capita increases both measures of compliance, whereas increases in the unemployment rate reduces both means of compliance (reported taxes per return and returns filed per capita). High-school education degree has a negative but insignificant relationship with reported taxes per return. However, its effect is significant and negative on the number of returns filed per capita. The percentage of the workforce employed in manufacturing industries has no effect on reported taxes per return, but increases returns filed per capita. On the other hand, the percentage of the work force employed in service industries has a strong negative effect on both measure of tax compliance. The only other significant variable is the percentage of the adult population over 65 whose effect is negative on returns filed per capita.	The study's primary purpose was to investigate the overall role of audits in the federal revenue collection process. However, it also included the average state tax rate, the percentage of the adult population with at least a high-school degree, the percentage of the population over age 65, the unemployment rate, income per capita, the percentage of work force employed in manufacturing, the percentage of the labour force employed in the service industry, households per capita, tax forms per capita and the number of households on welfare divided by the total number households as explanatory variables. Two instruments were employed; (i) budget per return and (ii) the number of information reporting per return. However, the validity of these instruments is questionable; it is possible that these variables have an impact on reporting behaviour, so they should have been employed in the reporting equation as an explanatory variables.

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Author (s) and Country	Date Published	Type of Methodology /Data Used	Sample	Main Results	Evaluation
Elffers, Robben and Hessing (Netherlands)	1991	Official Data (non-business income returns for the fiscal year 1986 obtained by the co-operation of the Dutch Ministry of Finance)	413 returns	It is found that there are important differences found in non-compliance rates when the same returns were re-audited by a second officer of the same rank as the first auditor and by a team of three experts. So, it seems that neither the reliability nor the validity of routine tax returns is high.	The result has very important implications for researchers; it indicates the unreliability of using official data as a source of non-compliance rate (which even does not include the judgement whether non-compliance was as a result of intentional evasion). However, the authors could have used some statistical test to show that the differences were statistically significant.
Feinstein (USA)	1991	Official Data (an individual-level pooled cross-section data drawn from 1982 and 1985 TCMP surveys	2267 individuals from 1982 and 3050 from 1985	While there is no significant effect of income on evasion, marginal tax rate has a negative and significant effect on evasion. It is also found that individuals with business and farm income are more likely to evade than others. Furthermore, older people (over 65) evade less, and married persons are more likely to evade.	In this study it was possible to test an independent effect of marginal tax rate and income, since marginal tax rates had changed over the period of 1982-1985, for a given income.

Author (s) and Country	Date Published	Type of Methodology /Data Used	Sample	Main Results	Evaluation
Beron, Tauchen and Witte (USA)	1992	Official Data (1969 TCMP data, 1970 Census of Population and Housing, and Internal IRS documents)	858 individuals	It is found that audit variable is endogenous. There are modest deterrence effects of audits which is significant in only some audit classes. The effect of income on reported adjusted gross income (AGI) is found to be the most significant variable in the model with increases in income leading to higher reported AGI. Taxpayers in areas with a more educated population report lower AGI. However, income and education are highly correlated. When income is omitted from the model, the coefficient on the education variable becomes positive. Older taxpayers (over 65) are more compliant than younger ones. In general, males and people of foreign origin are found to be less compliant. There is no evidence of non-whites being less compliant in this study. One interesting result from a reduced model indicates that IRS activities other than audits (e.g. by returns per full-time equivalent employee) have consistent and significant positive effects on tax compliance.	Unlike most of the previous studies, the authors use taxpayer's reported income as a dependent variable rather than a variable related to auditors' estimates of non-compliance (TCMP measures of voluntary compliance). The total number of returns filed in a district *divided by* the number of full-time equivalent IRS district employees was used as an instrument. Although the authors argued that their instrument was valid because the IRS was not able to distribute its resources among districts in order to achieve its goals, some researchers were concerned about the validity of this argument. There is another important point concerning the data set used in the study; the audit data seems to refer to the audits carried out in 1969 which would not have had any effect on tax returns filed in 1969, but on earlier returns.

Author (s) and Country	Date Published	Type of Methodology /Data Used	Sample	Main Results	Evaluation
Erard (USA)	1992	Official Data (1982 IRS TCMP survey and 1985 TCMP survey)	14700 returns	There is a positive influence of audits on subsequent year tax compliance, but the effect is small and statistically insignificant. It is also investigated whether taxpayers who are audited differed in their reporting behaviour from those who are not audited. The results indicate no positive correlation between compliance and prior audits.	The author used two approaches in order to analyse the effect of tax audits; the first one was whether individuals who were audited and found to be substantially under-reporting (by at least $500) in one year improved tax compliance in a subsequent year. The second approach looked at whether individuals who audited previously differed in their subsequent year reporting behaviour compared to individuals who were not subject to a prior audit. Erard tested the second equation controlling for taxpayers' characteristics and the prior year audit selection process. The small and insignificant effect of previous audits could simply be a result of statistical artifact; for example it may be the results of regression toward the mean, which appears when taxpayers are grouped because of some extreme characteristics.
Crane and Nourzad (USA)	1992	Official Data (from the Michigan Tax Amnesty Program, cross-sectional data)	213 individuals who amended a return filed previously.	State-level evasion increases as federal evasion increases. Higher-income and opportunities result in larger amount of evasion at both levels. Federal marginal tax rates have positive effect on federal tax evasion. There is an interesting result which implies that the use of a professional tax preparer is related to more evasion at the federal level, but less evasion at the state level. No significant effect of being male or married is found.	Although most of the results are reasonable, the data set seems to be extremely limited in its measurement and inclusion of important variables (state level tax rates, audit rates etc.). There is a self selection bias in the data (people are free to decide to participate in the amnesty). Moreover, tax amnesty is offered at the state level (and not the federal), and therefore the connection between federal and state taxes should be known in order to understand the links between state tax evasion, federal tax evasion and state tax amnesty. Authors try to correct these problems econometrically. There is also a strong assumption made, that a taxpayer is thought to be completely honest in his/her amended return.

Author (s) and Country	Date Published	Type of Methodology /Data Used	Sample	Main Results	Evaluation
Kamdar (USA)	1995	Official Data (individual level data from 1971 TCMP)	2047 taxpayers' returns	Information reporting has a positive significant effect on compliance and it is highly effective in reducing the amount of evasion. The finding concerning the level of income indicates that amount of non-compliance increases with income. Finally, there is a significant inverse relationship between tax rates and non-compliance.	This study is similar to the study of Klepper and Nagin (1989), but Kamdar uses individual level data with a much larger sample size. On the other hand, Kamdar's sample is older (1971 versus 1982).
Joulfaian and Rider (USA)	1996	Official Data (1988 TCMP)	3219 low-income filers	Mis-reported income is not affected by tax and credit rates. In general, negative income tax rates induced by the earned income tax credits (EITC) does not affect the amount of income over- or under-reported	The authors investigated the effect of negative income tax rate (EITC) on reporting behaviour, which has been overlooked in the literature. They point out that if declared income decreases with tax rates, then credits which are negative tax rates should have a positive effect on declared income (when tax rate and credits are treated symmetrically, as required by the axioms of the expected utility hypothesis, however, see also prospect theory in Chapter 2). The statistical tests, the measurement of the variables and detail information about the sample used in the study are clearly explained in depth. However, as authors themselves indicated, their results reflect 1988 law and IRS administration which is different from the current, and we cannot generalise the results for those who have higher income or opportunities to conceal income.

Author (s) and Country	Date Published	Type of Methodology /Data Used	Sample	Main Results	Evaluation
Frey (Switzerland)	1997	Official Data (Cross section/time-series data for years 1965, 1970 and 1978)	78 observations	In cantons with a high degree of direct political control by the citizens, tax evasion is lower, while a low degree of direct democratic control leads to high evasion rates. Income deduction possibilities reduce the amount of evasion on the other hand, evasion increases with non-wage income. There is no significant effect of probability of detection or fine.	No detailed information is given about the sample and the way that variables were measured. The sample size is rather small, but the finding indicating that high compliance rate is associated with greater democratic participation is very important one. Citizens comply more when they are involved with decision making and when tax authorities behave towards their citizens as responsible persons who in principle would contribute to the provision of public goods.

Author (s) and Country	Date Published	Type of Methodology /Data Used	Sample	Main Results	Evaluation
Coleman (USA)	1997	Official Data (field experiment looked at changes from 1993 to 1994 in reported income and taxes paid by groups of taxpayers subject to different strategies.	About 47000 randomly selected taxpayers from Minnesota participated in some phase of the experiment plus a number of others as control groups.	Low and mid-income taxpayers who are sent a letter indicating that their return would closely examined by officials increase their reported income more on average than the taxpayers in the control group (who have not received any letter). Those increases are largest amongst high-risk taxpayers (with business income and estimated state taxes). On the other hand, high-income taxpayers have mixed reactions to the examination threat. Enhanced customer services offered for some taxpayers do not have any effect on reporting and only a few people have used the service. Letters that have been sent to taxpayers which refuted the idea that many taxpayers evade on their taxes and reinforce social norms about tax compliance have a modest positive effect on declared income. The different tax return forms, which have been sent to some taxpayers lead to the reporting of more deductions, usually for children's school expenses. The entire experiment has no effect on timeliness of tax filing or use of a tax practitioner. It is estimated that if all low-and mid-income taxpayers had received the audit letter, the hypothetical increase of tax revenues would have been around $73 million (1.79 million x $41).	The experiment was carried out by the Minnesota Department of Revenue with the help of a five-member advisory board which included nationally recognised experts in tax compliance research and statistical methods. The sample size is extremely large and the study is both very well designed and unique. The study received 1996 Award for Research and Tax Analysis for the Minnesota Department of Revenue from the Federation of Tax Administrators (FTA). Although large numbers of individuals were sent a letter indicating their return would be audited, in reality only a small percent of audit threats were carried out, because of the high cost of audits. There may be long-term risk of sending audit threat letters, which are not acted upon. The statistical tests were not given in this paper, but comprehensive report is available from the internet side; http://www.taxes.state.mn.us

Author (s) and Country	Date Published	Type of Methodology /Data Used	Sample	Main Results	Evaluation
Blumenthal, Christian and Slemrod (USA)	1998	*As above*	*As above*	Both lower and middle income taxpayers in the treatment group increase their reported taxes relative to the control group. This increase is more striking in the high-opportunity group. On the other hand, a surprising result is obtained concerning the high-income group; taxpayers in the threatment group decreased their reported income in 1994 relative to the control group, the decrease in reported income is being larger in the high-opportunity group than the low one.	The sample was grouped according to income and opportunity to evade. There were three groups of income; low-income (with AGI les than $10,000), middle-income (with AGI between $10,000 and $100,000) and high-income (AGI over $100,000). Opportunity was grouped as high and low; high-opportunity indicated those who earned business or farm income and who paid Minnesota estimated tax. Estimated tax was required if expected tax would be $500 or more above withholding and expected tax credits.
Feld and Frey (Switzerland)	2000	Official Data (obtained by a questionnaire which is sent to the tax authorities)	The tax authorities of the 26 Swiss cantons.	The tax authorities in Swiss cantons with direct democracy show more trust towards taxpayers that make mistakes (small amount of evasion?) in their tax declaration form. In direct democracies taxpayers are treated with more respect, and there is some evidence that tax enforcement are less intense in direct democracies, but people who do not file tax the declaration form are punished more heavily in more directly democratic cantons.	The authors indicate the importance of trust between the tax authority and taxpayers. The relationship between these two can be thought as a 'psychological contract' and this contract holds especially if individuals are involved in political decisions. When this contract is broken by the tax authority the intrinsic motivation to pay taxes will be crowded out and people behave completely rational in their tax declaration decision. However, the authors do not test all these predictions (probably, because of the lack of data), as Frey (1997) does, especially the one that indicates more representative democratic cantons would have lower evasion rate. However, it seems that Switzerland has a great advantage in studying determinants of tax compliance since different cantons not only have various level of direct democracy, but also have different tax rates, audit rates, fines, etc.

3.3 THE FINDINGS OF THE SURVEY AND REGRESSION STUDIES

3.3.1 The Effect Tax Rate

A considerable number of survey and regression studies have analysed the effect of marginal tax rate on compliance, but with mixed results. While some found that an increase in tax rate led to more evasion (Clotfelter, 1983; Wallschutzky, 1984; Crane and Nourzad, 1986, 1987, 1990, 1992; Dubin *et al.*, 1990; Calderwood and Webley, 1992, and Schulz and Lubell, 1998b), others found the opposite result which indicated that marginal tax rate had a negative and significant effect on evasion (Feinstein, 1991 and Kamdar, 1995). Still others did not find any significant effect (Cox, 1984; Slemrod, 1985; Geeroms and Wilmots, 1987; Wahlund, 1992; Steenbergen *et al.*, 1992 and Joulfaian and Rider, 1996). So, there are no clear-cut and consistent findings of a positive effect of tax rates on non-compliance. Graetz and Wilde (1985) stated that 'Claims ... made by acknowledged tax experts, are commonplace; the myth that high marginal tax rates cause noncompliance is the most pervasive of all. In fact, that lowering the tax rate will induce greater compliance is a claim supported neither by the theory of tax compliance nor by the empirical evidence.' (ibid, p.359). *The inconsistent findings of survey and regression* studies concerning the effect of the tax rate echoes the words of a leading tax expert: 'Statistical analysis of tax evasion is straightforward except that you cannot measure the left-hand side variable and you cannot measure the right-hand side variables.' (cited by Slemrod, 1992). Although this is a little exaggerated, it partly explains the problems of non-experimental studies in tax evasion. The difficulty associated with the tax rate effect is that distinguishing the specific effect of tax rate from income is very hard, due to very high multi-collinearity of the two variables in non-experimental studies.

3.3.2 The Effect of Income

Many survey and regression studies have tried to address the issue of the effect of income level on tax evasion, but the overall results are still not clear. As mentioned in the previous section, the difficulty is the high correlation between income level and tax rate. Moreover, income may be related to some other variables, which also have effect on tax compliance; for example, Beron et al., (1992) found that income and education were highly correlated. The findings of income on either absolute amount of evasion or degree of evasion (the proportion of income evaded) are not clear; there are some studies which found significant positive effect of income on compliance such as Song and Yarbrough (1978), Mason and Calvin (1984), Carroll (1992), Madeo et al., (1987), Dubin et al., (1987, 1990) and Beron et al., (1992). Others found significant and negative effect of income on compliance; Wallschutzky (1984), Clotfelter (1983), Crane and Nourzad (1990, 1992) and Kamdar (1995). Nevertheless, some researchers did not find any significant effect; for example, Grasmick and Scott (1982) and Feinstein (1991). Witte and Woodbury (1985) suggested possible curvilinear effect of income indicating low-and-upper income groups might be committing tax evasion, but their results did not support this hypothesis. The findings of Crane and Nourzad's (1986) study indicated that increases in income level had a positive effect on the absolute amount of evasion, but a negative one on the relative amount of evasion (the proportion of income evaded).

3.3.3 The Effect of Income Source

Income source (e.g. wage, business income, farm income, etc.) seems an important determinant of evasion. Income sources are closely linked with the opportunity to evade taxes; some income types are taxed at source such as wages by withholding which makes it

almost impossible to evade taxes. It is also found that evasion is decreased if incomes are

subject to third party reporting (e.g. Dubin *et al.*, 1990 and Kamdar 1995). Kagan (1989)

reported almost perfect compliance on income items that are subject to withholding or

information reporting. On the other hand, it was thought that the self-employed had the

greatest opportunity to evade taxes. In Turkey, evasion by the self-employed is proved by

the fact that in 1999 they reported average annual income that was lower than the

minimum wage (which is extremely low in Turkey and not really possible to live on).[2]

A considerable number of survey and regression studies found a relationship between

income source and evasion; Keenan and Dean (1980), Warneryd and Walerud (1982),

Groenland and van Veldhoven (1983), Wallschutzky (1984), Porcano (1988), Carroll

(1992), Antonides and Robben (1995), Witte and Woodbury (1985), Crane and Nourzad

(1986, 1992), Dubin and Wilde (1987), Klepper and Nagin (1989), Feinstein (1991) and

Frey (1997). Madeo *et al.*, (1987) found that the source of income was three times more

important than the next most heavily weighted variable in the compliance decision. The

IRS in the UK, USA and many other countries recognise the importance of the variable

and use different audit rates for different income sources.

Survey studies have also found that people in general are more tolerant to evasion activities

from secondary sources, and this type of income has greater utility. (e.g. Ekstrand, 1980

and Westat 1980). There also seems to be a relationship between income sources and tax

ethics, and perceived fairness of the tax system.

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[2] See Chapter 1

3.3.4 The Effect of Equity

In general, equity is thought to have three dimensions. Vertical equity relates to the perceived tax burden of an individual compared to higher-and-lower income taxpayers. Horizontal equity relates to the perceived tax burden compared to the others with the same ability to pay, and exchange equity refers to a taxpayer's perceived benefits received from the government relative to the amount of taxes paid. Smith (1992) and Lempert (1992) indicate another dimension of equity which is important in tax compliance behaviour: the concept of procedural fairness. 'It concerns such questions as how much opportunity individuals... have to tell their side of an issue, how hard the authorities try to be fair to individuals, how correctable decisions are, and how equitably and consistently individuals are treated.' (Smith, 1992 p.224). So, procedural fairness is very closely related to responsive and helpful services. Thus, positive actions of administrators towards taxpayers would increase individuals' positive attitudes and commitment to tax laws, which in turn would result in high compliance. Frey (1997) summarises his empirical findings as follows:

> 'In a broad sense, two kinds of tax system can be distinguished: one is based on the premise that the citizens are responsible persons, and that in principle they are prepared to contribute to the prevision of public goods and the redistribution of income by state, provided this process is reasonably efficient and fair... The second type of tax system starts from the assumption that all citizens want to exploit the tax laws to the fullest, and cheat whenever they can.' (ibid, p.51).

It is therefore the intrinsic motivation which leads to people to pay their taxes which will be crowded out in the second type of tax system. Smith (1992) also found that the effect of procedural fairness and responsive service was significant and positive on normative commitment to tax compliance. There have been many other studies investigating the effect of fairness on compliance. The perception that the tax system is unfair was found to

be most important variable in Wallschutzky's (1984) study in explaining why taxpayers feel justified in evading taxes. Scott and Grasmick (1981) found that perceived injustice had a negative effect on tax compliance. Tittle's (1980) study indicated an important link between perception of fairness and compliance with the social rules and regulations. Spicer and Lundstedt (1976) found positive relationships between equity and both commitment and self-reported compliance. Thurman *et al*'s (1984) study revealed that perceived inequity is significantly related to non-compliance even after controlling for the general effect of commitment. However, note that the findings of surveys indicating a positive effect of unfairness on evasion may simply mean that a feeling of inequity is a rationalisation for evasion. Note also that many surveys fail to find a significant effect of fairness on tax compliance (Mason and Calvin, 1980; de Juan *et al.*, 1994; Antonides and Robben, 1995, and Scholz and Lubell, 1998a). In general, survey studies both in the UK and USA indicate that taxpayers do not perceive the tax system as fair (e.g. Dean *et al.*, 1980; Mason and Calvin, 1984 and Porcano, 1988).

3.3.5 The Effect of Deterrence Factors

Grasmick and Bursik (1990) categorise deterrence factors as legal sanctions (government-imposed punishment), social stigma (the embarrassment and/or loss of respect individuals will experience when they violate a social norm which the peer group supports), and self-imposed punishment (guilt feelings). We summarise the findings of regression and survey studies on these issues.

3.3.5.1 Legal sanctions

The two aspects of legal sanctions are the detection probability and penalty rate. These variables are very important variables in theoretical models constructed by economists and also by criminologists, sociologists, psychologists and decision scientists. The effects of these variables on compliance have a practical importance as well as theoretical one, since the tax authority and government can control their values. Not surprisingly, much of the previous empirical work focused mainly on the effect of these variables and many other studies (in which the main aim was to measure effect of other variables) included penalty and detection probability variables in their models. Although many non-experimental studies have tried to find the effect of legal sanctions, there are special limitations associated with these methodologies apart from the general ones discussed earlier. Regression studies simply assume that taxpayers know their detection probability and further assume that audit rates equal detection probabilities (i.e. audits are perfect in detecting non-compliance). Moreover, the detection probability in real life not only includes the audit probability but also all kinds of efforts by the IRS such as computer matching of third-party information, computerised checks of filed returns for obvious errors, etc. In general regression studies implicitly assume that the actual probability of detection and perceived probability of detection are one and the same.

A more important issue with non-experimental work is the direction of causality; does the probability of detection affect compliance behaviour, or does compliance behaviour affect the probability of detection, or both? (Fischer *et al.,* 1992). There might be an experiential effect which indicates that successful evasion would reduce the perceived probability of detection (see Roth *et al.,* 1989 for more information about this). Cognitive dissonance indicates that individuals who evade rationalise their behaviour by reducing the dissonance

associated with the evasion behaviour by convincing themselves that they will not get caught. It is also suggested by some authors that audit occurrence would affect perceived audit rates (see Chapter 2).

Another problem with survey work is that in most studies the dependent variable measures whether the individual evaded in the past (usually in the previous 5 years), but the independent variables relate to the current perceived probability of evasion. It is also possible that the correlation found between detection probabilities and tax compliance in survey studies may be due to omitted variables. As Fischer *et al.,* (1992) indicated, individuals who fear detection the most are least likely to admit to tax evasion in surveys, so subjects may indicate both high perceived detection and compliance in response to survey questions. An example given by the authors point out that another variable reflecting the opportunity to evade may explain the correlation between evasion and detection rate: 'A taxpayer with a few evasion opportunities (because of source of income and economic situations) may (correctly) perceive a high probability of detection and may comply, not through fears of detection but through lack of opportunities.' (Fischer *et al.,* 1992, p.16). This implies that studies that do not include 'opportunities' as control variable are severely limited in their explanation about the link between detection rate and compliance. With these limitations in mind we summarise the findings of non-experimental works concerning audit and penalty rate below.

Survey and regression work in general has found that the probability of audit has a positive impact on tax compliance (Vogel, 1974; Mason and Calvin, 1978, 1984; Grasmick and Scott, 1982; Dean *et al.,* 1980; Grasmick and Green, 1980; Scott and Grasmick, 1981; Grasmick and Bursik, 1990; Sheffrin and Triest, 1992; de Juan *et al.,* 1994; Varma and Doob, 1998; Witte and Woodbury, 1985; Crane and Nourzad, 1986; Dubin *et al.,* 1987;

Dubin and Wilde, 1988, Beron *et al.,* 1992). However, note that some regression studies such as Dubin and Wilde (1987) and Beron *et al.,* (1990) have found the effect of audit rates to be significant only for some audit classes. Moreover, some survey and regression studies have found no significant effect of audit rates (Warneryd and Walerud, 1982; Crane and Nourzad, 1990 and Frey, 1997). Dubin *et al.,* (1990) have found that while the audit rate had a significant positive effect on reported tax per return, the relationship between audit rates and returns filed per capita was negative.

Another important issue is the link between objective audit rates, audit occurrence, and the perceived audit rate. Sheffrin and Triest (1992) found that individuals who considered others to be dishonest or having a negative attitude toward government tend to perceive the probability of detection as being lower than those with more positive attitudes. Furthermore, personal knowledge of people with problems and difficulties with the IRS caused a significant reduction in the perceived probability of detection. Therefore, Sheffrin and Triest pointed out that higher audit rates might actually have the reverse effect of increasing tax evasion.

Scholz and Pinney (1995) found that objective audit probabilities were significantly related to subjective audit rates only for the high-income groups. For the base group of upper-middle class taxpayers in the study, objective factors affecting the probability of getting caught had no significant effect on subjective probabilities. However, guilt feelings and moral obligations had significant and strong effects on subjective probability and subjective risk for both the base group and the higher income group. Also, greater knowledge about tax law reduced the subjective risk estimate of individuals. Authors found that contact with the IRS significantly increased subjective probability of risk. The results of a study by Scholz and Lubell (1998b) were similar: the subjective risk of being

caught was not correlated with the real audit threat, but it was correlated with the change in tax duty. As mentioned earlier, the concept of cognitive dissonance can explain this.

Kinsey (1992) found that the specific effect of personal contacts and general effect of vicarious contacts on individuals' perception of future audit rates were positive. The author also found that personal contacts increased future compliance, but there was no such effect of vicarious contacts. On the other hand, Spicer and Lundstedt (1976) found that audit occurrence was positively and significantly related both to increased tax resistance and admitted tax evasion. Nevertheless, Erard's (1992) results indicated no significant effect of audit occurrence on tax compliance.

There is less evidence about the positive effect of the penalty rate on compliance than the effect of audit rate. For example, Spicer and Lundstedt (1976), Geeroms and Wilmots (1985) and Frey (1997) found no significant link between reported evasion and penalty, and Varma and Doob (1998) found that people who perceived heavy penalties for evasion were more likely to evade. The authors indicated that experience of tax evasion has taught evaders that they will not be apprehended, so the severity of penalty is not relevant as a deterrent factor. However, some other studies have found a positive effect of the penalty rates on compliance such as Mason and Calvin (1984), Crane and Nourzad (1986) and Madeo et al., (1987). Witte and Woodbury's (1985) results indicate a significant relationship between the severity of criminal sanctions and tax compliance only for one group of taxpayers who were high-income self-employed individuals. Further studies needed to be certain about the effect of penalty rate on compliance. Some authors argued that the penalty rate would deter tax evasion only when the probability of audit above some threshold value.

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3.3.5.2 Social stigma (Peer group influence)

Alm, McClelland and Schulze (1999) indicate the difficulty of defining the notion of social

norm, but state that it '...can be distinguished by the feature that it is process-oriented,

unlike the outcome-orientation of individual rationality... A social norm therefore

represents a pattern of behaviour that is judged in a similar way by others and that

therefore is sustained in part by the social approval and disapproval.' (ibid, p.141).

In general, peer group indicates the individuals' associates, who may include friends,

colleagues, family members, etc. The peer group is also called reference group, and

according to a theorem of sociology, the reference group to which someone belongs is a

determinant of his/her behaviour. It is connected with identification and social stigma.

Identification indicates that there will be a change in belief and thus in behaviour to be like

a person someone admires. So, if a person's loved one, for example, approves of tax

evasion, he/she will in general evade taxes. There will be no social stigma attached to it,

since the individual's reference group is behaving in the same way. Moreover, there have

been empirical studies, which found that tax compliance is affected not only by the

individual's peer group, but also by the perceived prevalence of non-compliance in society

as a whole. As explained in Chapter 2, if a taxpayer perceives the non-compliance rate to

be high, his/her non-pecuniary cost of compliance will be high as well; the individual feels

'foolish' paying taxes, since everybody else is freeriding. In this case, there will be little

social stigma and few self-imposed guilt feelings which the individual can eliminate by

using a neutralisation strategy (i.e. everybody is evading so do I). There are also some

empirical works, which indicate a link between perceived prevalence of evasion and

subjective probability of detection. People who regard others as dishonest or having a

negative attitude toward government, in general believe that the probability of detection is

lower (Sheffrin and Triest, 1992 and Scholz and Lubell, 1998a). Perhaps this finding can be explained by 'cognitive dissonance', for example, those who mistrust others and the government, and thus evade taxes, lower their perceived risk in order to create consistent belief and behaviour. It also seems that changes in the tax rate affect the individuals' trust in others and perceived prevalence of non-compliance in the society; Schulz and Lubell (1998b) found that reduction in taxes led to a significantly lower mistrust of people.

The perceived prevalence of non-compliance was measured in the survey studies by asking subjects to guess the percentage of individuals who intentionally evade taxes (by various ways; over-reporting deductions, not filing and under-reporting income). On the other hand, the effect of peer group influence is measured in general by asking the subjects to think about the 5 people who are closest to them, and then asking how many of them evade taxes. However, some surveys measured peer group influence simply by asking how many people the subject knew personally who do not comply. Several empirical studies were carried out to analyse the effect of these variables and reported significant links with tax compliance; Vogel, 1974; Song and Yarbrough, 1978; Grasmick and Green, 1980; Tittle, 1980; Scott and Grasmick, 1981; Grasmick and Scott, 1982; Groenland and van Veldhoven, 1983; Mason and Calvin, 1984; Wallschutzky, 1984; Porcano, 1988; Geeroms and Wilmots, 1985; de Juan *et al.*, 1994 and Coleman, 1997).

3.3.5.3 Guilt feelings

In general, research found that guilt feelings have a significant and positive effect on tax compliance: for example Grasmick and Green (1980) and Scott and Grasmick (1981). Grasmick and Scott (1982) and Grasmick and Bursik (1990) found that the self-imposed cost of shame had a larger deterrent effect on non-compliance than the individual effect of

legal punishment and social stigma. Moreover, it was also found that there seemed to be interactions between guilt feelings and tax ethics.

Thurman's (1991) results indicated that the threat of guilt feelings had an insignificant effect on predicting under-reporting income, but it had significant deterrent effect in overstating income tax deductions. The author also found that non-compliance was a function of the ability to neutralise guilt feelings. Similarly, the study by Thurman *et al.*, (1984) indicated that the use of neutralisation strategies significantly decreased the positive effect of guilt feelings on tax compliance. Furthermore, the ability to neutralise guilt was found to be independent of the level of guilt feelings of tax evaders.

3.3.6 The Effect of Ethics

It is difficult to describe taxpayers' ethics -obviously it is very close the concept of the social norm. Song and Yarbrough (1978) define the term of tax ethics as '... the norm of behaviour governing citizens as taxpayers in their relationship with the government.' (ibid, p.444).

In general, results of surveys indicate that moral condemnation of evasion is not severe, especially when it involves a small amount of evasion (Song and Yarbrough, 1978; Lewis, 1979; Dean *et al.*, 1980 and Carroll, 1992). Keenan and Dean (1980) found that males disapproved tax evasion more than females, whereas Richard and Tittle's (1981) study indicated that women considered evasion to be more immoral than did men. Warneryd and Walerud (1982) found attitudes towards tax crimes to be one of the most important variable in determining tax compliance, many other surveys also found a positive relationship between ethics and compliance (Grasmick and Green, 1980; Scott and

Grasmick, 1981; Mason and Calvin 1984; Porcano, 1988; Sheffrin and Triest, 1992; Scholz and Pinney, 1995; Antonides and Robben, 1995 and Scholz and Lubell, 1998a).

3.3.7 The Effect of Education

Groenland and van Veldhoven (1983) separated two aspects of education; the general degree of fiscal knowledge and the degree of knowledge involving evasion opportunities. We also need to make a distinction between the levels of education that individuals have and the level of fiscal knowledge individual have for each level of education. Depending on how education is measured studies have found different effects of it on evasion behaviour. Some survey studies have found widespread ignorance about the fiscal system (e.g. Cullis and Lewis, 1985 and Calderwood and Webley, 1992). Lewis (1982) indicated that fiscal ignorance is an important determinant of negative feelings toward taxation; less educated people consider taxation only in terms of its burden, while ignoring the goods and services provided as a result of tax revenues.

The previous research findings indicate that overall effect of education is not clear; contradictory findings appear in the literature. For example, while de Juan *et al.*, (1994) found taxpayers with a university degree had a below average probability of being disposed to evade taxes, Antonides and Robben (1995) found a higher level of education increased the probability of evasion. Dubin and Wilde (1988) found the effect of education on compliance was positive whenever it was significant, which was in four audit classes. On the other hand, Dubin *et al*'s (1990) study indicated education had a negative but insignificant relationship with reported taxes per return, but its effect was significant and negative on the number of returns filed per capita. Beron *et al.*, (1992) found that taxpayers in areas with a more educated population reported lower AGI. The authors used

a number of supplementary regressions, which pointed out that education effect compounded income effect unless both variables are not included in the model. Beron *et al.*, argued that this may be the reason that studies which omit income (e.g. Dubin and Wilde, 1988) found a positive effect of education on compliance. However, Feinstein (1992) indicated that this suggestion is not plausible, since higher educated taxpayers are better at findings legal loopholes as well as being more willing to take risks by means of evasion, and these two effects cannot be separated in Beron *et al*'s model.

One of the reasons that the effect of education was not found to be clear-cut in empirical studies, may be related to measurement issues. Different studies measured education differently such as general fiscal knowledge, high-school degree, university degree, use of enhanced taxpayer information services, etc.

There may also be a link between education and various other parameters. For example, Scholz and Pinney's (1995) results pointed out that greater general knowledge about the tax law reduced subjective risk estimate. According to this, models not including both subjective risk and education would be mis-specified which would include almost the entire regression studies. Cullis and Lewis (1985) found that males had greater fiscal knowledge than females, while Groenland and van Veldhoven's (1982) results indicated the self-employed demonstrated a significantly higher degree of fiscal knowledge than the wage earners. These differences can be explained by the 'rational ignorance' hypothesis (see Cullis and Lewis, 1985).

3.3.8 Demographic Variables

Many survey and regression studies found that demographic variables are important determinants of tax paying behaviour. However, as Roth et al., (1989) stated '... these

variables are commonly designated as merely indicators of tastes or statistical control variables, and few serious efforts have been made to interpret the correlations.' (p.133). Although, some of the later work tried to explain theoretically the reason for significant findings of a variable in one direction, another logical theory would indicate a relationship in the reverse direction. The findings of previous empirical works, which investigated effects of age, gender and marital status are discussed below.

3.3.8.1 Age

The majority of the studies found a positive relationship between age and compliance (Vogel, 1974; Keenan and Dean, 1980; Tittle, 1980; Richard and Tittle, 1981; Warneryd and Walerud, 1982; Groenland and van Veldhoven, 1983; Thurman *et al.*, 1984; Mason and Calvin, 1978; Slemrod, 1985; Witte and Woodbury, 1985; Dubin and Wilde, 1988; Feinstein, 1991 and Beron *et al.*, 1992). However, note that some studies found that the effect of age was in the other direction; Wallschutzky (1984) found evaders were in general older, Dornstein (1976) found age was inversely related to the degree of conformity, and Dubin *et al*'s (1990) result indicated that the percentage of the adult population over 65 had a negative effect on returns filed per capita. Some others studies did not find any significant affect of age on tax compliance such as Slemrod (1985), Grasmick and Bursik (1990) and Crane and Nourzad (1992). Clotfelter's (1983) finding suggested that the relationship between age and compliance is curvilinear, with the oldest and youngest individuals being most compliant, which could explain some of the inconsistent findings in the literature. However, more recent studies did not support Clotfelter's result. The important issue of the effect of age on compliance is to separate taxpayer aging from cohort effects, -cohorts of taxpayers born earlier comply more than

later born cohorts (see, Roth *et al.,* 1989 and Kidder and McEwen, 1989). In order to distinguish these effects, there is a need for individual-level data on compliance over time (see Schmidt, 1989).

In brief, generally survey and regression studies point to a positive relationship between age and compliance. Warneryd and Walerud (1982) indicated that the reason for this finding in surveys could be attributed simply to the honesty of younger people in confessing past evasion. If this is the case experimental studies investigating the issue will be especially valuable.

3.3.8.2 Gender

Some studies found that females were more compliant, but the evidence is less consistent than that between age and compliance. Vogel, 1974; Mason and Calvin, 1978; Tittle, 1980; Richard and Tittle, 1981; Witte and Woodbury, 1985; Porcano, 1988 and Beron *et al.,* 1992 found that males are less compliant than females. Nevertheless, some studies found no significant effect, such as Grasmick and Bursik (1990) and Crane and Nourzad (1992). While, Keenan and Dean's (1980) results indicated males disapproved of tax evasion more than did females, the result of Richard and Tittle (1981) was exactly the opposite. Richard and Tittle's results also indicated that compared to males, females perceived detection for tax evasion to be higher. They suggested that this could be attributed to parents encouraging conformity among girls. More recent survey work shows little difference in tax evasion behaviour between the sexes, which implies that changes in society (more women are working, etc.) may diminish the effect of gender.

3.3.8.3 Marital status

Interestingly, some studies investigated the effect of marital status on compliance; while Crane and Nourzad (1990) and Feinstein (1991) found that married people were more likely to evade, Slemrod (1985) and Crane and Nourzad (1992) found no significant effect of being married.

3.4 CONCLUSION

Several survey and regression studies have been carried out in the literature of tax evasion. Many researchers, however, were concerned about the reliability of both survey and regression data. The main concern of survey data is participation by evaders and the direction of causality, while the problem with audit data is the difficulty of distinguishing intentional evasion from unintentional mistakes.

Results of non-experimental works indicate that the effects of income and tax rate on evasion are not clear-cut. However, source of income (opportunities) is noted to be an important determinant of evasion. Most people tolerate small-scale evasion and think that the tax system is too complicated to understand. Some studies found that there was a positive relationship between equity and compliance. In general studies indicate that individuals do not regard the tax system as fair. There is some evidence about the positive impact of the probability of audit on tax compliance however, there is less evidence about the positive effect of penalties. It was found that peer group influence, guilt feelings and higher tax ethics in general reduce evasion activities. Some studies have found that income from secondary sources (part-time work, etc.) has greater utility than the primary salary. These results point out that while individuals regard some of their income sources as taxable, they show unwillingness to pay taxes on other sources, and therefore take the

risk of evading taxes. It was also found that older people tend to evade less than the younger ones. Finally, although many studies investigated the effect of education, the results found were mixed.

CHAPTER 4

PREVIOUS EMPIRICAL EVIDENCE:

Experimental Studies

4.1 INTRODUCTION

The first known use of the experimental approach in the tax evasion literature was Friedland *et al.*, (1978). Since then the approach has been used by numerous investigators. The basic design of experiments in the tax evasion literature is similar; student subjects obtain 'income' and then decide how much of that income to report to 'the tax authority'. Subjects pay taxes on reported income only. However reported income will be audited with some probability and if the subject is found to have been underdeclaring, he/she will pay a fine at a given rate. The process of declaring income and auditing continues for a certain number of rounds and at the end of the experiment subjects are paid according to their net income in the experiment.

During the experiment the effect of various policy parameters (such as the tax rate, the fine rate and the probability of audit etc.) can be seen by changing these values in certain rounds.

These factors were discussed in Chapter 2, which examined the theoretical modelling of the tax evasion decision. In the following section, the experimental methodology and the limitations of this approach will be explained. The findings of the previous experiments will be discussed in Section 4.3. The discussion in the section will be structured according to the explanatory variables used in empirical works. Finally, the conclusion will review the findings of these studies in Section 4.5.

4.2 THE EXPERIMENTAL METHODOLOGY AND ITS LIMITATIONS

Aronson, Brewer and Carlsmith (1985) grouped experiments as either impact or judgment studies. Impact studies are carried out as explained above (i.e. participants experience the event themselves). On the other hand, judgments studies are carried out using a scenario in

which somebody else experiences the event and subjects are asked what they would do if they were the person in the scenario, or the participants are simply asked to imagine that the event happens to him/her. In general, impact studies are more effective than judgment studies (Fischer *et al.,* 1992). Majority of the studies in tax evasion consist of impact experiments, however, there have been also a few judgments studies which their findings are explained in the appropriate sections.

An important advantage of the experimental approach is that the possible explanatory variables can be manipulated and controlled directly. It does not encounter the problems of survey studies, such as failing to remember past evasion behaviour or unintentional errors (however, unintentional errors could also be problematic in more complicated experiments as reported by Robben *et al.,* 1990). The experimental approach can also overcome most of the problems of TCMP data, for example audits are perfect in detecting evasion in experiment studies (unlike regression studies) and it is possible to identify the independent effect of variables. Experiments in general do not involve random tax errors which were indicated to be a problem of TCMP data. However, one important disadvantage is that individuals involved in the experiment may not behave as they would in real life. For example, participants may try to guess the objective of the experiment and either behave in ways which they think that the experimenter wishes them to or attempt to sabotage the experiment. As a consequence, some investigators have tried to mask the real objective of the experiment within a business game (Webley *et al.,* 1991). Webley and Halstead (1986) found that when the experiment was described as an 'economic problem' subjects responded more like rational optimisers than when it was described as an 'economic game'. They reported that subjects who perceived the experiment as a tax declaration were almost entirely honest, while subjects who considered the experiment as a game in general

declared only part of their income. Webley and Halstead also stated that subjects indicated that use of computers was associated strongly with the playing of the games. They criticised previous experimental studies, where the instructions asked subjects to maximise their net income and the purpose of their experiment was transparent. However, Robben *et al.,* (1990) found no evidence that subjects who guessed the correct purpose of the experiment were less likely to underreport their income than were subjects who failed to guess the aim of the experiment.

Davis and Swenson (1988) have argued that using neutral terms rather than loaded language would discourage role-playing by subjects. Beck, Davis and Jung (1991) carried out experiments in abstract settings by using 'neutral terms' such as surcharge and check rather than using 'loaded terms' like tax rate and audit. However, Alm *et al.,* (1992b) undertook an experiment with 48 students one of the aims of which was to explore the effect of terminology used in experiments. In these experiments, some sessions were run twice, once with neutral instructions and once with loaded instructions, but the use of neutral or loaded instructions did not make any difference to the findings; they produced virtually identical results. Alm *et al.,* (1992b) explained that 'In experimental instructions, context effects might occur because the use of loaded words and the inclusion of irrelevant material may lead subjects to invoke different 'mental scripts', which enable the subject to fill in missing information in the instructions, but which also may unpredictably influence subject choices. Of course, the more explicit and complete the instructions, even in the presence of loaded terms, the less subjects will have to rely on scripts to fill in missing information.' (ibid, p.35). Alm *et al.,* (1992b) argue that when subjects face certain and precise information in the experiment even in the presence of loaded terms, scripts should not be needed to help subjects fill in the missing context. Because the context is already

complete, the use of loaded terms would not affect the subjects' behaviour. However, the experiments with neutral terms may fail to take into account some aspects of tax evasion behaviour that might be important in real life, for example, perception of taxes and moral costs of evasion. Baldry (1986) conducted two experiments one using tax terms and the other employing gambling terms. He found that in the gambling experiment every participant laid a positive bet (even when the expected gain was negative), while in tax experiments only some people evaded. Therefore, he concluded that there were important moral costs involved in tax evasion, but not in gambling. This brings us to another potential disadvantage of the experimental approach; the moral costs of evasion could be very different in 'an experiment' from 'real life'. This aspect of the 'real life' evasion decision is very difficult to incorporate into the experiment. How can one mimic the social stigma (or shame) of either failing to declare all of one's income or being exposed as a cheat (in an ethically acceptable way in an experiment)? Despite the difficulties inherent in experimental studies, given the difficulties of obtaining reliable data by other means, we believe that it is worthwhile using experimental observations as a means of generating data on the subject of tax evasion. As stated by Cowell (1991) ' ... if the participants enter into the spirit of the game, there appears to be every reason to believe the results.'(p.124). Fischer *et al.,* (1992) indicated that '... there are substantial advantages to experimental studies that are lacking in studies employing other methods.' (p.20).

4.3 THE FINDING OF THE EXPERIMENTAL STUDIES

4.3.1 The Effect of Tax Rate

The basic theory of income tax evasion indicates that tax compliance will increase by increasing tax rate under DARA or CARA (Yitzhaki, 1974). This result appears strange and counterintuitive. Several experimental studies have examined whether this result holds empirically.

The study of Friedland *et al.*, (1978) involved 15 Israeli undergraduate psychology students. One of the aims of this experiment was to determine the effect of tax rate changes upon tax compliance. In the experiment there were four rounds in total and each round consisted of ten months. For the first two rounds the tax rate was 25% and in the last two rounds it was increased to 50%. The instructions explained that student subjects would receive a salary each 'month', and they must decide how much income to report. They would pay income tax on the reported income. A random audit, according to a pre-announced rate, would be made each round and fines, also at a pre-announced rate, would be imposed on the amount of tax evasion, if the subject was found to report less than his/her full salary. The instructions pointed out that each student's aim should be to maximise his/her income. The researchers calculated students' net income at the end of each round of ten months and students were given a small money prize according to their total net income at the end of the experiment. The results of the study showed that increasing the tax rate (from 25% to 50%) led to a dramatic increase both in the probability of underreporting and in the extent of the underreporting.

Benjamini and Maital (1985) conducted an experiment with 27 graduate and undergraduate students similar to that of Friedland's *et al.*, (1978). They also found that higher tax rates led to more evasion.

Baldry (1987) conducted an experiment with two groups of students in order to examine the effects of net true income and the marginal tax rate. The first group consisted of 20 paid students and 20 unpaid students. Unpaid students were used to provide a control group in order to see whether payment was necessary to induce rational behaviour. The drop out rate for the unpaid students were very high, therefore Baldry (1987) concluded that payment was necessary and the results for this group should not be taken into account. The second group consisted of another 20 paid students. There were six 'tax rounds' in the experiment. At the beginning of round one, which was held at the end of a lecture, students were given an envelope containing a tax return, information about their gross income and the way to calculate their tax liability. Students were also given the audit and penalty rates. The tax returns for round one were collected at the beginning of the next lecture. Audit and penalty assessments were carried out and placed in an envelope together with the income statement and tax table for round two. Envelopes were distributed to the students at the end of class. The experiment continued in this way for both groups over six rounds. Baldry (1987) notes a major difference between his and earlier experiments ' ... this experiment took place over an extended period (two weeks) and the actual relevant behaviour of the subjects (completing tax returns) took place at a time (within the space between rounds) and place of their own choosing.' (p. 364). Baldry points out that in this experiment subjects could ask for assistance from others, if they wished and also use a calculator, etc. He argues that in this sense the experiment was much closer to the actual tax procedure. The results of the experiment show that, contrary to the simple tax evasion theory, the amount of tax evasion by students who decide to evade was increased by an increase in the marginal tax rate. However, the marginal tax rate was not significantly related to the propensity to evade (i.e. whether evasion took place or not), but note that as a

result of a mistake in the experiment methodology, a multicollinearity problem between the tax rate and income is introduced.

In another study, Beck *et al.,* (1991) considered tax reporting behaviour under income uncertainty. The experiments were carried out with 112 undergraduate and graduate students. There were three separate experiments. In the first and second experiments subjects' risk preferences were controlled by the Berg, Daley, Dickhaut and O'Brien (1986) procedure; subjects' after-tax disposable income was mapped on to the probability of winning a cash prize in a lottery. Risk-neutral preferences were induced by ensuring that, for every additional unit of money (after tax disposable income) earned by subjects, the probability of winning the lottery increased by the same amount. On the other hand, risk-aversion is induced by ensuring that the probability of winning the lottery increased at a decreasing rate with each additional money unit. Subjects' preferences were measured ex-post in the third experiment; by means of measuring subjects' certainty equivalents for a series of lotteries and then assessing the certainty equivalents as the maximum price at which a subject would be willing to pay for a chance to play the lottery in a second-price auction. The results indicated that tax rate changes did not affect declared income in the risk-neutral experiment. In the risk-averse experiment, it was found that increasing the tax rate led to an increase in reported income, the result supports Yitzhaki, (1974). However, the effect was only marginally significant for reported income and insignificant for fractiles. This finding contrasts with the previous experimental work and suggests that, depending on attitudes towards risk, an increase in the tax rate may increase tax compliance, as Yitzhaki's model suggests. In the third experiment, 20 subjects out of 22 were classified as risk-neutral and remaining 2 as risk-averse. The results supported the

finding in experiment 1, that the amount of reported income was not influenced by the tax rate, given risk-neutrality.

An experiment using 120 undergraduate students, carried out by Collins and Plumlee (1991), examined the effect of the tax rate both on underdeclaring and effort (labour supply). There were 12 treatments; (3 for the audit scheme, 2 for the penalty that will be explained in a later section and 2 for the tax rate which was either 30% or 60%). Groups of 10 subjects participated in one of the 12 experimental sessions. The experiments were carried out in a personal computer lab, and each subject was given an employee number and asked to fill in a risk preference questionnaire; there were 9 pairs of hypothetical payoffs, each representing a certainty and a gamble over two outcomes. Collins and Plumlee (1991) noted that 'To minimize any potential demand effects, subjects were told that they were participating in a simulated use of computers in performing quality control tasks.' (p.566). Subjects needed to work in order to earn income in the experiment, and the task was to perform a decoding exercise. The computer program described a hypothetical firm and explained the task to be carried out. After a practice session, four independent work sessions were carried out, and in each session subjects were given a new decoding key in order to reduce the effect of learning the work across session. After each session was completed, a production report was generated by computer then subjects were asked to complete a tax return. Audit selection and any penalty levied on the return were undertaken according to stated rules and rates. This process was continued four times for each of the 12 treatments. After the experiment, a questionnaire enquiring about demographic information and clarity of instructions was given to the subjects. Two dependent variables were used; *underreporting* represented by the amount of actual income earned less the amount of income reported, and *effort* which was indicated by the amount

of actual income earned in performing the decoding task. Collins and Plumlee's (1991) experimental results show that underreporting was increased by increasing the tax rate. However, for effort there was no significant effect of the tax rate.

Alm, Jackson and Mckee (1992a) carried out a tax experiment with 15 undergraduate students. In total, there were 8 sessions and in each session students were arranged into three groups of five. Although subjects did not know the number of rounds in the session, it was predetermined as 25. The procedure of the experiment was similar to those explained above. The subjects were informed about the tax rate, audit rate, penalty multiplier, etc. then they were given an income and asked how much of it to report. If the subject was randomly chosen for audit, then the current and the previous four rounds were inspected and if he/she was found to have underreported in the inspected rounds, some multiple of unpaid taxes would be levied. At the end of the experiment each subject was paid a sum of cash according to their net income (after tax and penalties, if any) obtained in the experiment. There were three different tax rates; 10%, 30% and 50%. The results showed that a higher tax rate led to significantly lower compliance. Alm *et al.*, (1992a) noted that although theoretical studies indicated that tax evasion would decrease with an increasing tax rate, their result was consistent with most of the previous empirical findings including those of Clotfelter (1983) (see Chapter 3). The authors found that the elasticity with respect to the tax rate was about -0.5, which is similar to the result obtained by Clotfelter (1983). However, another experiment by Alm *et al.*, (1995) which also used student subjects found that increasing the tax rate increased the tax compliance. Alm *et al.*, (1995) carried out two sets of similar experiments: one in Spain and one in the USA. The reason for two sets of similar experiments in different countries was to investigate the role of social norms in tax compliance. There were nine or ten subjects in each session and

there were eleven sessions in the Spanish experiment, which was the main focus of the paper. The experiments have been carried out in a way similar to the previous experiments (Alm *et al.,* 1992a) explained above. Again there were three different levels of tax rates, which were 10%, 30% and 50%. The results showed that a higher tax rate leads to increased tax compliance. Alm *et al.,* (1995) stated that 'These results contrast with some empirical (and experimental) work. However, they are consistent with much of the theoretical literature on tax evasion.'' (p.13). The authors do not explain the possible reasons of their apparently contradictory findings in these two similar experiments. Alm *et al.,* (1995) mention only the different results of the two similar experiments concerning tax rate 'The tax rate elasticity for Spain is ... surprisingly ... positive, in contrast to the negative elasticity for the United States.' (p. 14).

Alm, McClelland and Schulze (1999) conducted an experiment with undergraduate students at the University of Colorada at Boulder. There was a total of eleven students in each session and various sessions were carried out during the experiment. The main aim of the study was to investigate how social norms affect compliance behaviour and also, how social customs arise in the first place which will be discussed in the appropriate section. They also analysed the effect of tax rate amongst other variables. In each experimental session there were three parts, which consisted of ten rounds. In each part different independent variables were manipulated to measure their independent effects. The variable tax rate was operated in two levels; 0.2 and 0.5. The average compliance rate was calculated by dividing the total declared income of the eleven group members by total group income in each round. Although, individuals make their tax declaration privately in a group, the individuals decisions was not independent of one another because of the public goods (group surplus multiplier) they received as a result of tax payments. Analysing the

effects in group level rather than individual level considerably decreased the number of observations. It was found that the change in the tax rate did not have any significant effect on the average compliance level (average compliance was 0.28 at the 20% tax rate and 0.29% at the 50% tax rate).

Despite this, the overwhelming majority of previous experimental work indicates that increases in tax rate would lead to more underreporting. However, a few experimental works indicate otherwise. Therefore, this issue needs further investigation.

4.3.2 The Effect of Income

According to income tax evasion theory, increasing income would increase the amount of evasion, provided that absolute risk aversion is decreasing. However, how evasion as a fraction of income changes depends on the assumptions about relative risk aversion; if relative risk aversion is increasing then the fraction of income evaded will decrease, if it is assumed to be decreasing then evasion will be increasing relative to income. If CARA is assumed the proportion of income evaded is invariant in changes in income (see Chapter 2).

Much experimental work has been carried out in order to find the effect of income on income tax evasion (on absolute evasion or relative tax evasion or both).

Spicer and Becker (1980) carried out an experiment with a similar design to that of Friedland *et al.,* (1978). The main aim of the study was to find the effect of fiscal inequity on income tax evasion (which will be discussed later). However, they also looked at the effect of gender, age, tax resistance, and *income level* which is our concern here. Fifty-seven students from the University of Colorado participated in the experiment. It was explained that subjects would each receive 10 'monthly' salaries. Participants would

decide how much of this income to report and then pay taxes on reported income. The random audits took place at a rate 1 in 15 for each month and the fine was equal to 15 times the amount of tax evaded. When a participant was chosen for an audit in any month, he/she was audited only for that month. The rates and rules were known by the participants. The experiment lasted about 45 minutes and small money prizes were given to each subject depending on his/her net income minus fines. Spicer and Becker (1980) used only one dependent variable, the percentage of taxes evaded, in their analysis. They did not look at how the number of incidents of evasion was affected by independent variables. They also did not test the basic income tax evasion theory's prediction concerning the effect of income on the amount of tax evasion. They could have done this by using another dependent variable, the amount of tax evasion. The results showed that actual income did not have a significant effect on the percentage of tax evaded. However, Baldry (1987) found that an increase in true income increased tax evasion, but had no effect on the decision to evade (the number of evasions) or not. This suggests that although net income may affect the amount of evasion, it does not appear to have a significant affect on the decision to be dishonest.

Benjamini and Maital (1985) used declared income as the dependent variable. Three levels of gross income ($10.000, $25.000 and $50.000) were used in the study. The results indicated that increasing income decreased reported income, but the effect was not significant.

Becker, Buchner and Sleeking (1987) conducted two identical experiments in the Universities of Bonn (85 students) and Cologne (31 students). The subjects had to work for their income; the work involved finding numerical patterns in data and completing numerical series in the correct order. The students were paid according to their test results

and asked to declare their income and pay taxes on declared income. Random audits (the probability of audit was not known to the subjects) were carried out and if a subject was found to be evading, he/she had to pay a penalty. Subjects were told that '... if the sum of tax and fine exceeded the sum of pre-tax income and transfer payments, they had to pay out of their own pocket.' (Becker *et al.*, 1987, p.247). The reason for this, and making subjects work for their income, was to increase the degree of 'realism' of the experiment. The primary objective of the study was to analyse the effect of public sector transfer payments on income tax evasion, but the authors also examined the effect of expected audit probability (the subjects were not informed about the audit rate), perceived tax burden and income. As with Friedland *et al.*, (1978) two dependent variables were analysed '... the propensity to evade taxes (whether tax evasion occurred or not) and the extent of taxes evaded (if tax evasion occurred).' (ibid, p.248). It was found that the propensity to evade taxes increased with increasing income. On the other hand, no significant effect of income on the extent of tax evasion could be found. These findings are exactly the opposite of the findings of Baldry (1987).

Alm *et al.*, (1992a) used 'the amount of income reported by the individual' as a dependent variable and found that an increase in true income leads to higher compliance, a finding that is contrary to income tax evasion theory and Baldry's (1987) finding. Alm *et al.*, (1992a) state that '... declared income is a normal good with an income elasticity (0.65 to 0.73) that is significantly less than one. This result is also similar to other empirical work (Witte and Woodbury, 1985; Dubin *et al.*, 1990), in which the income elasticity of reported income is significant and positive'. (p.110).

Bosco and Mittone (1997) carried out experiments with 60 undergraduate students. Each subjects had to earn their income by completing a demanding psychological test. The

subjects voluntarily chose the amount of work (i.e. long or short psychological test) and get paid accordingly. The sort test lasted about 30 minutes and the long one approximately one hour. The subjects who categorised as 'heavy worker' received about £24 and the ones who did 'light works' obtained £12. A fixed 40% tax rate applied to all individuals. The result indicated that the frequency and amount of evasion increased with higher income.

4.3.3 The Effect of Deterrence Factors

The basic theory of income tax evasion indicates that increasing expected punishment (by raising the audit rate, the fine multiplier or both) should increase tax compliance. Much of the experimental literature has been devoted to an investigation of these relationships.

The main purpose of the study by Friedland *et al.,* (1978) was to examine whether a large fine with low probability of audit was a more effective deterrent than a mathematically equivalent small fine with high probability of audit. In order to keep the expected gains from evasion equal to zero, the fine magnitude was the inverse of audit probability in each round. The researchers found that large fines with small probability of detection were a more effective deterrent than small fines with high probability of detection. This finding has an important policy implication, since it is less costly to increase the fine rate than to increase the audit rate. However, the variable *fine magnitude x audit rate* was not statistically significant in regression analyses.

Benjamini and Maital (1985) found that probability of detection did not affect tax evasion behaviour, but tax evasion was higher amongst the individuals who were previously audited.

In an experiment by Chang, Nichols and Schultz (1987), 56 middle-income executive MBA students were presented with a hypothetical tax evasion situation, and asked if they

would evade in each of 6 tax evasion case. In each case the expected utility of evading (playing the audit lottery) and being honest was the same. Therefore, playing the lottery indicated risk-seeking attitudes, while the choice not to play revealed risk-averse behaviour. Amount of tax savings by playing audit lottery was set in two levels, which were $100 and $1000. In general, it was found that people were risk-averse. However, when the subjects were grouped according to whether they perceived audit lottery as negative-payoff lotteries (the decision between a certain loss; payment of tax, and possible bigger loss; payment of tax and fine, if audited) or as positive-payoff lotteries (a decision between certain amount of reduced income; net income after tax payment and a possible larger income; gross income without tax payments). The proportion of risk-seeking individuals was much higher in first group (negative pay-off). This result seems to support prospect theory (see Chapter 2). Chang *et al.,* found that very high penalties and low audit rate are more effective than low penalties with very high audit rate, the result is consistent with Friedland *et al.,* (1978). However, both studies used unusually high and unrealistic values (the audit and fine rate for each case in Chang *et al.,* study were as follows; audit rate $(p) = 10\%$ and fine rate $(f) = 900\%$, $p = 50\%$ and $f = 100\%$ and $p = 90\%$ and $f = 11\%$). Jackson and Jaouen (1989) carried out a judgmental experiment to test the relative effects of penalties and appeals to the taxpayers' conscience in deterring evasion. One importance of the study is that unlike the most of the previous work, this study used potential jurors awaiting jury selection as subjects rather than students, thus tried to increase the representation of the population. Seventy-five subjects were assigned randomly to one of the three groups in the study. The first group was given an essay that strongly emphasised tax penalties for evaders. Group 2 had the obligations of citizens to support the government explained to them and group 3 (the control group) was given a neutral essay

explaining the legislative process followed in enactment of tax provisions. Following the essay, subjects were asked to complete a questionnaire with 23 attitudinal statements that most of them were taken from Spicer and Lundstedt's (1976) study. However, the results did not reveal significant differences between sanction, appeals or control groups.

Spicer and Thomas (1982) studied the effect of audit rates. Fifty-four student subjects were recruited to the experiment, which was similar in design to the study of Friedland *et al.*, (1978). Although the fine magnitude was constant during the experiment, the audit probability was set at three different levels. One third of the subjects received precise information regarding the audit rate in each round. Another third were given imprecise information and told that the audit rate would be low, high or medium in each round. The remaining subjects were not given any information concerning the audit rate. The authors found that the percentage of taxes evaded was negatively and significantly related to the audit rate only for those subjects who received precise information. Moreover, there was also a significant and negative effect of the audit rate on the *likelihood* of evasion both for the group with precise and imprecise information. Finally, there was no significant effect found for the group that did not receive any information about the audit rate, either in terms of the percentage of income evaded or the likelihood of evasion. According to the authors, the important implication of this result was that, since in real life taxpayers' knowledge of the audit rate is not precise, tax authorities seeking to increase compliance by increasing audit rate may find that while the number of occasions (probability) that tax evasion occurs decreases, the amount of taxes paid may not increase. These findings also imply that if the tax authority provided more information about audit rates, then tax compliance should be higher.

Friedland (1982) also pointed out that taxpayers might not have accurate knowledge of the probability of audit and fine rate. In order to test how precision of information affects tax evasion, he conducted an experiment in which the procedure used was almost identical to that used by Friedland *et al.,* (1978). Thirteen student subjects participated in the experiment and there were 16 'months' (in total). The tax rate and income were kept constant while the magnitude of fines and the probability of audits were different for each month. The magnitude of fines and probability of audit were either low or high and the information about them was presented in either precise or vague terms. Friedland's results showed that increasing the fine rate and probability of audits led to an increase in reported income. Moreover, he found that the probability of audit had a stronger effect on tax compliance than the fine rate. However, it should be noted that these findings were inconsistent with the results reported by Friedland *et al.,* (1978). The precision of information about the fine rate and the probability of audit had no effect upon the percentage of reported income (compliance). However, vague information about the audit probability strengthened the deterrent power of low probability audits and increased the deterrent power of low fines.

Spicer and Hero (1985) studied the effect of audit occurrence on evasion in an experiment with 36 student subjects. Again, the experiment was conducted in a similar way to that of Friedland *et al.,* (1978). Although the subjects were informed about the fine rate, they were not told about the audit rate. In order to analyse the effect of audit occurrence on evasion, the level of evasion in the final round of the experiment was regressed on the level of evasion in the first round and the number of audits in the first nine rounds. The results showed that the number of audits had a negative and statistically significant effect on tax evasion in the last round. Spicer and Hero (1985) explained this by the 'availability' effect,

i.e. individuals will tend to assess the probability of an event by the ease of recalling instances of a similar event in the past (see Chapter 2). The findings imply that random audits may lead to significantly higher levels of compliance among those audited, this later finding is not predicted by the conventional economic model. However, Fischer *et al.,* (1992) pointed out that the negative correlation between the audit occurrence and tax evasion could be explained by learning theory. For the subjects who evaded and were audited, the evasion behaviour was unsuccessful. On the other hand for evaders not audited their behaviour was successful, and so they engage in behaviour at which they were successful.

On the other hand, the study conducted by Becker *et al.,* (1987) found that the expected auditing probability had a negative effect on both the propensity to evade taxes and percentage of taxes evaded (see Section 4.3.2 in which details of experiment were explained).

In the experiment of Bosco and Mittone (1997) subjects were asked about the perceived probability of evasion, the results indicated that there was not significant effect of expected audit probability on the propensity of evasion. Although, the fine rate was manipulated in the experiment, the authors did not report its effect on evasion in their paper.

Violette (1989) carried out experiments, which utilised a hypothetical cash income scenario. The main aim of the experiments was to test (i) the effect of communication of legal sanctions and (ii) the effect of communication of informal sanction on tax compliance. There were 256 participants (adult students attending evening classes) who were randomly assigned to one of four groups. The legal sanctions communication group received a message describing legal sanctions for evasion (e.g. conviction rates, fines and jail terms for evaders, the probability of an audit one or more times over life time, etc.).

The informal sanction communication group were given a message that described a (fictional) change in the law. According to this, a new law allowed the media to publish and announce the names of all evaders regardless of the amount of evasion. Then the message explained the possible negative effect of this kind of disclosure on family, friends and colleagues. The third group of participants received information on both legal and informal sanctions. Finally, the fourth group (a control group) received no message. After the assigned communications were read by the subjects, they were presented with a hypothetical evasion scenario. The scenario described a person receiving $10.000 in non-traceable cash income from different customers during a year. Then the subjects were asked the probability of reporting this income if they were in the same situation as the person in the scenario. The second question asked how much of this income subjects would choose not to report (on an 8 point scale ranging from $10.000 to $0). Violette's results showed that legal sanctions affected both the likelihood and the amount of evasion, while informal sanctions did not.

Webley *et al.,* (1991, UK, 04[1]) reported a study, carried out with 46 students in Exeter, which attempted to replicate the findings of Friedland *et al.,* (1978). The main difference was that Webley *et al.,* tried to make the purpose of the experiment opaque, by using a complex business simulation. The subjects had to make a number of financial decisions, which included how much income to declare. It was found that the fine rate had no significant effect on either the percentage of taxes evaded or the number of occasions that tax was evaded. However, the audit probability had a positive effect on the percentage of declared income, and on the number of periods that tax was evaded. Moreover, contrary to

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[1] The experimental number as given by authors in their book titled, *Tax Evasion: An Experimental Approach*

Friedland *et al.,* there was no evidence that large fines with a small probability of detection were a more effective deterrent than the small fines with a high probability of detection. Finally, tax evasion was negatively related to the number of audits, but the relationship was not statistically significant. However, Cowell (1991) has shown that in the above experiment the expected rate of return to tax evasion was negative for three of the four conditions. Cowell asks why, as the expected return is negative and extremely high in some circumstances, subjects evade taxes at all. He suggests three possible explanations for this; (i) that subjects were not aware of the rate of return, (ii) that subjects were aware of the odds in heavy penalties but they decided to evade anyway, (iii) that subjects did not believe the stated probabilities and penalties. According to Cowell, while the first and third explanations raise questions about the validity of the experiment, the second completely undermines the conventional economic model of evasion. Webley *et al.,* argue that the reason that there was evasion, even when the expected rate of return was negative, was because subjects were unaware of the economic logic; '... an audit probability of 1 in 2 coupled with a fine rate of 2 times was mathematically equivalent to an audit probability of 1 in 6 coupled with a fine rate of 6 times. These were assumed to be neutral with an expected rate of return to zero. This is true only if paying a fine is an alternative to paying tax: if you have to pay a fine and the tax you should have paid for that period then the expected rate of return is negative.'(ibid, p.139,140). In the above experiment the second alternative was used (an audited evader has to pay a fine and the tax he/she should have paid). However, Webley *et al.,* stated that the fact that the experimenter believed the rate of return to be zero implies that the subjects may have made the same mistake. The authors argued that this was especially likely since the instructions used in the experiment did not make the exact calculations of the fine clear.

In this study it was not obvious to subjects what the study was about. However, the use of computers and business simulations may make the subjects feel that they are in a game situation. There is also a question whether the tax declaration decision was taken seriously enough, since the subjects had to make a number of financial decisions as well as tax declarations. This may limit the generality of the findings.

Webley *et al.,* (1991, UK, 05) report another study with 54 undergraduate students. The experiment looked mainly at the effect of inequity. However, the effect of being audited was also tested. In order to simplify the experiment, subjects were told that the audit rate was random and 1 in 6. However, in reality the audits were predetermined, and controlled across subjects; one third of the subjects were audited once, one third twice and the rest on three occasions. Webley *et al.,* found no significant effect of audit occurrence on the number of periods in which tax evasion occurred.

Yet another study carried out by Webley *et al.,* (1991, UK, 06) was similar to the above study (UK 05), except that 48 members of the general public were recruited for it. Again, the experiment was mainly aimed at analysing the equity issue, but the effect of audit occurrence was also considered. Subjects were not given audit rate information, but were told that audits would be conducted randomly. During the experiment each subject was audited once, in the 1st, 4th, 7th, or 11th periods out of 12. A comparison of pre- and post-audit income declarations found no significant effect of being audited. However, it was found that for the subjects who were audited in the first period, the frequency of evasion was the least.

Webley *et al.,* (1991, UK, 07) report another study that aimed to find the effect of audit occurrence amongst the other variables. The experiment was carried out with 72 non-student subjects using a similar design to the previous one (UK, 06). A one-way analysis

of variance was used to examine the effect of auditing. The result showed no significant effect. Moreover there was no difference in behaviour between subjects who were audited in the first period and those who were not. The authors point to an important difference in the level of evasion in this and the previous experiment (UK, 06), explained above, compared to their earlier experiments carried out with students (UK, 04 and UK, 05). Student subjects evaded more tax than non-students. The authors gave two possible explanations for this; first, the result may arise because the purpose of the experiment was made less obvious than it had been in earlier studies. Second, and more importantly, the general public may take fewer risks and take the study more seriously than students do.

Another replication of the previous study was carried out by Webley *et al.,* (1991, NL, 01) with 72 Dutch non-student participants. Again each subject was audited once, carried out either in the 1st, 4th, 7th, or 11th period. A significant effect of audit was found on the frequency of underdeclaring.

Webley *et al.,* (1991, UK, 08) reported another study with 48 undergraduate students that looked at opportunity and audit probability. Opportunity was manipulated by providing half of the subjects (high opportunity group) with an unofficial source of income. The audit probability was manipulated in a way that half of the subjects had access to a teletext news story which mentioned that audit inspectors were on strike. In order to cover the aim of the study and make the experiment comparable to an everyday situation, no information was given about the audit and fine rates. However, during the experiment everybody was audited once and there was £500 fine for evasion. The results pointed to no significant effect of opportunity audit probability or timing of audit either on the frequency of underdeclaring or the percentage of income not declared. The authors believed that the reason for the findings was that the manipulation of the audit probability was not

successful enough; the experimental instructions did not explain the importance of the teletext stories. In order to overcome this difficulty some modifications were made to the program. A sentence was added to the information section to make audit probability more salient. The sentence explained that the teletext service might contain helpful information. With above modifications, Webley *et al.,* (1991, UK, 09) conducted the experiment again with 52 undergraduate students. It was then found that the audit probability had a significant negative effect on both the frequency of underdeclaring and the percentage of income undeclared.

An experiment by Collins and Plumlee (1991) using 120 undergraduate students introduced three audit schemes. As with Becker *et al.'s* (1987) experiment, subjects needed to work in order to earn income. The task in this experiment was to perform a decoding exercise. Of three audit schemes, the first was the standard random audit scheme. The second was a cut-off audit scheme, which audited 20% of the subjects who declared the lowest level of income. The third one was a conditional audit scheme, where the tax agency placed taxpayers into two different categories on the basis of the subjects' performance (ability) during the practice round. Then, 20% of subjects with the lowest reported income in the high ability category were chosen for audit. It was found that the audit schemes had a significant effect on the subjects' tax declaration decision. Specifically, the highest underdeclaring occurred under the random audit scheme for reported income, and the lowest under the conditional audit scheme. However, the difference between the cut-off audit scheme and conditional audit scheme was not statistically significant. The results also indicated that the effect of the fine rate on underreporting was not significant.

Beck *et al.,* (1991) experiment, which is explained in detail in Subsection 4.3.1, found that for risk-neutral subjects, there was a significant effect of audit probability and penalty rate upon the level of income declared.

Alm *et al.,* (1992b) found that when the audit rate increased, compliance also increased. They explain that 'The rate of compliance rises in a non-linear way as the probability of detection increases: that is tax revenues increase with greater enforcement efforts, but this pays off declines as the probability increases.' (Alm *et al.,* 1992, pp.29). They found that when the audit probability was low (2%) there was much more compliance than expected utility theory would predict. They stated that the result was consistent with overweighting of low probabilities or extreme aversion to risk at low probabilities. It was also suggested that the high compliance rate might be because of the presence of public goods. Even when the audit probability was zero, the average group compliance was 20%. Expected utility theory would predict zero reported income in this case. Alm *et al.,* argued that this result obtained because of the presence of public goods; subject were getting something (public goods) against their payments (taxes), so they was still compliance even the audit rate was zero. However, subjects showed risk-seeking behaviour when audit probability was high (10%) and they evaded more than would be predicted by expected utility theory.

Alm *et al.,* (1992a) found that fine rate had a positive effect on tax compliance. However, the coefficient of the fine rate was found to be so small that the elasticity of compliance with respect to the fine rate was virtually zero. The coefficient of the fine rate was not highly significant either. The audit rate also had a positive effect on compliance. However, again the elasticity was not large (0.17). According to Alm *et al.,* (1992a) an increase in the fine rate may not have a substantial effect on compliance unless the audit rate is increased significantly, too. However, since increasing the audit rate significantly is

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difficult and very costly, the scope for increasing compliance by deterrence factors are limited. Similar results are reported in Alm et al., (1995). However, Alm et al., (1999) using three levels of audit rate (p=0.02, p=0.1 and p=0.5) and two levels of fine multiplier (f=5 and f=25) was found much larger elasticities: 0.40 and 0.48 respectively.

In conclusion, a number of experimental studies have found a negative relationship between tax evasion and the audit rate, although sometimes the link is not clear-cut. However, there is less evidence of an effect of the fine rate upon evasion. In some cases this may be attributed to deficiencies in experimental design, but it may also reflect the rather complex relationship, which may exist between the variables.

4.3.4 The Effect of Public Transfers

Behavioural models point out that if individuals believe that their tax payments are returned to them by government as services and goods, then they will comply more. Economic models' results depend on the assumptions about how public transfers are incorporated into the individual's utility function.

One of the aims of Becker et al.'s (1987) experiments was to find the effect of transfer payments. In their experiments the amount of transfer depended on the expected sum of all tax payments, and this was known by all of the subjects. However, the subjects were not informed of the expected sum of all tax payments in order to increase experimental reality; it is because the taxpayers do not know exactly how much transfer payments they receive in real life. There were three different transfer share schemes for the Bonn experiment (0.6%, 1.2% and 1.8% of total transfer payments) and another three for the Cologne experiment (1.7%, 3.4% and 5.1% of total transfer payments). Each of the three transfer rates was given the same number of subjects in the experiments. Subjects knew their individual

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percentage rate as well as others, so they could compare their individual shares with those of others. Becker *et al.,* (1987) found that the propensity to evade taxes decreased when transfer payments were increased. However, transfer payments had no significant effect on the extent of tax evaded.

In Alm *et al.'*s (1992b) experiment there was a 'group tax fund', which consisted of the total amount of taxes paid by all subjects, increased by some multiple (m). The group surplus multiplier, (m), reflected the consumers' surplus that taxpayer receive from public goods. There were three different group surplus multipliers in the experiment. After the group tax fund was multiplied by 'm', the amount was divided equally between subjects. Results showed that compliance increased with the size of the group surplus multiplier. These findings suggested that tax compliance could be increased by the government increasing the efficiency of public goods and by providing the goods that individuals value more. However, the increase in compliance was not linear in 'm'. This suggests that there is a limit to how much compliance can be affected by the group surplus multiplier. Furthermore, expected utility theory for risk-neutral people does not support the authors' findings. Alm *et al.,* (1992b) stated that '... most individuals follow a cut-off rule in their compliance behaviour, but their behaviour suggests that they do not use expected utility theory in the determination of the cut-off value. Individual subjects also behave consistently across the three group surplus multipliers, increasing (or not decreasing) their compliance when the multiplier increases.' (p. 34).

Alm *et al.'*s (1992a) experiment tested for the effect of public goods on compliance in two different ways; (i) using a dummy variable for the presence of a public good (a binary 0/1 variable), (ii) using an interaction variable; there were three different groups of five subjects and the tax payments of all five group members were collected into a group fund

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and the fund multiplied by 2 in order to manipulate the consumers' surplus of the public good then the amount was divided between the group members. It was intended to measure individual payoff from the public good. The effect of the presence of a public good on compliance was negative and weakly significant, thus indicating free riding. In contrast, the effect of the payoff from the public good was positive and highly significant, which suggested that taxpayers comply more when they know others are contributing. According to this, tax compliance may be increased by explaining the benefits of public goods financed by individuals' tax payments.

However, another experiment by Alm *et al.,* (1995) failed to find a significant effect of public goods on tax compliance. Even though they incorporated public goods in their experiment in a way similar to Alm *et al.,* (1992a).

In Alm et al., (1999) study group surplus multiplier took two values; m=2 which indicated positive consumer surplus associated with the provision of public goods by government and m=1/2 reflected misuse or waste in government provision. It was found that increasing the group surplus multiplier increased compliance rate significantly (from 0.14 to 0.44).

In general, experimental results show that people will increase their compliance with increasing amount of public transfers.

4.3.5 The Effect of Equity

Some behavioural models and the results of survey works indicate that people who feel that they pay more tax compared to others would increase their evasion behaviour.

Spicer and Becker (1980) tried to test the relationship between equity and tax evasion. Although all 57 student subjects used tax tables based on a tax rate of 40%, one third were told this was the average rate, another third that average rate was 65%, and the final third

that the average rate was 15%. This manipulation was arranged in order to induce feelings of inequity and had an important effect on tax compliance. Their findings showed that the percentage of taxes evaded was highest (33%) among subjects who believed that the average rate was 15%. Subjects who were told the correct average rate evaded 25%, whilst the group which were told that the average tax rate was higher than theirs, evaded only 12% of their income. These differences were statistically significant. So, redistribution of the tax burden will affect the tax evasion decision.

In Becker *et al.,* (1987), in order to measure the effect of the perceived tax burden, subjects were asked during the experiment whether they felt their tax burden was too low, fair or too high. Surprisingly, it was found that the perceived tax burden had a negative relationship with the propensity to evade taxes (if tax evasion occurred or not). However, there was no significant effect of perceived tax burden on the extent of taxes evaded.

In order to find the effect of inequity and earnings comparisons on tax evasion, Webley *et al.,* (1991 UK, 05) recruited 54 undergraduate students. One third of the students were told that the tax rate was 15%, one third told that it was 45%, and the remainder that it was 30%. Earnings comparisons were made, at the end of the first year, by telling one third of the subjects that their competitors were more successful than them, one third that their competitors were less successful than them, and the remainder that they were as successful. The results of the experiment showed that equity did not have a significant effect on tax evasion, contrary to Spicer and Becker's results. Webley *et al.,* argued that, in Spicer and Becker's experiment the difference between the tax rate of the inequity groups was 25%, whereas in this study the difference was only 15%. This decreases the strength of the equity manipulation. Moreover, in the experiment of Webley *et al.,* the tax rate was part of the introduction, and it was possible that most of the subjects had not noticed the difference

of the average tax rates. In order to test this, at the beginning of the next term, the authors asked 19 of the students, what their own and the average tax rates were. Of these only 8 subjects answered correctly. This indicates that inequity could not be manipulated strong enough in the experiment.

Earning comparisons had an effect on the decision to evade taxes; when students were told that their competitors were more successful at the end of first year, they evaded more taxes in the second year.

Webley *et al.* (1991, UK, 06) reported a study with a non-student sample using a different equity manipulation. Forty-eight members of the general public were recruited for the experiments. The number of periods that tax was evaded and the total percentage of income declared were the dependent measures. All subjects received a tax-free starter's allowance of £2,200 (for the small-business simulation). In order to induce inequity, 16 were told that the average allowance was higher than this, 16 were told it was the same and the remaining were told that it was less than £2,200. This manipulation was strengthen in the second and third years by reducing the level of allowance. The participants were told whether they performed as well, better or worse than others in order to provide the personnel comparison (fictious) with other subjects. The authors found that feelings of inequity had no significant effect on tax evasion.

4.3.6 Social Norms, Moral Constrains and Altruistic Feelings

The importance of social norm in tax compliance behaviour was explained in Chapter 2. In general, people would behave according to how others behave, and the pattern of behaviour is maintained in part by social approval and disapproval (see, Kuran, 1990 for a discussion). So, individuals tend to comply with the tax laws as long as they believe

compliance is the norm. On the other hand, if tax evasion is common in the society, then social norm of compliance will disappear and everybody will start evading taxes.

Tax evasion produces anxiety, guilt, reduction in self-image, etc. we have seen the various models, which incorporated these non-pecuniary costs into tax compliance behaviour. Below, we have reported two experiments, which tried to find out the effect of social customs and moral constraints; experiments were carried out by Alm *et al.*, (1999) and Bosco and Mittone (1997). Moreover, Andreoni (1995) conducted an experiment in order to find the effect of altruistic feelings in the public goods experiments.

In Alm *et al.*, (1999) study a group of 11 student subjects who received some certain amount of income and faced a given level of the tax rate, fine rate, audit rate and group surplus. After twenty-rounds in which subjects made their decisions facing various level of the variables (the tax rate, audit rate, etc.), they were asked to vote via majority rules with secret ballots on two alternative levels (low or high) of a single variable. Thus the values of tax rate, the audit rate and the fine rate were voted on by subjects, and then they faced the selected variable by the group vote for ten more rounds. The findings were consisted with the predicted effect of voting on social customs. The individuals' pre-and-past vote behaviour was different under the same fiscal regime (identical value of parameters). When individuals voted against higher enforcement rate, compliance decreased significantly, almost falling to zero. Alm *et al.*, (1999) indicated that when the groups rejected any attempt to raise sanctions, it was perceived as an indication by each individuals that others did not want to follow the tax laws. Therefore, it was socially acceptable to evade taxes (non-pecuniary cost of feeling 'foolish' in paying taxes was increased), since the other people would do the same. This finding contradicted to the general thought that voting tends to increase tax morale and thus tax compliance (see, for

example Pommerehne, Hart and Frey, 1994). Although in this study voting destroyed the social custom of tax compliance, the experiment also found that social customs can be affected by group communication. In some sessions students were allowed to communicate with each other, before the voting took place. The group members discussed for five minutes without any direction or involvement from the experimenters. This modification, what authors called 'cheap talk', led a decision in favour of greater enforcement, and post-vote compliance was always higher than pre-vote compliance. So, it seems that the discussion clarified benefits of paying taxes and strengthened the norm of the compliance. It is also possible that 'cheap talk' about voting might increase the altruistic feelings present among subjects. However, authors argued that it is more likely that the result was because of the presence of a social norm of tax compliance. The typical statements were made by subjects during the 'cheap talk' were as follows; ' it is not right if some pay and others do not', 'we should vote for the higher audits to make sure everybody pays', and 'if everyone pays, we are all better off'. Thus, communication transformed the group decision to the individual level leading to higher social norms amongst subjects that increased tax compliance. Alm (1996) indicated that 'Social norms can be changed by fiscal institutions...compliance is decreased when there is a social expression via voting of a willingness to tolerate tax evasion, and compliance is increased when there is a social expression via voting of an unwillingness to tolerate tax evasion.' (p.123).

Bosco and Mittone (1997) tested the effect of tax morale and social stigma in their experiment with 60 undergraduate student subjects. There were total four groups in the experiment; in group A, there was total absence of moral constrains (16 subjects); in group B, only collective moral constrain (social blame) was manipulated (14 subjects); in group C only subjective moral constrain (15 subjects) and group D implied collective and subjective

moral constrains (15 subjects). The presence or absence of a collective moral constraint was manipulated by indicating that the audit process would be public, or by telling that the audits would be private and by assuring total anonymity to all subjects. So, it was assumed that social moral constraint could be mimicked in the experiment by making the audits in front of all the participants and by announcing the results. Thus subjects, thinking that the other agents involved in the study (researchers, lecturers, and other subjects) strongly condemn tax evasion, would be more restricted in their evasion activities (i.e. they would be worried about the risk of being found as a 'cheater' by their teachers and fellows). The presence of subjective moral constraint was manipulated by introducing redistribution of 70% of total revenue among all the participants. By doing so, it was assumed that because of the altruistic feelings, subjects would dislike the idea that other people might suffer as a result of their tax evasion behaviour. However, note that the problem with this manipulation is that there is another effect, which cannot be distinguished; this is the same as introducing 'public goods' in to the experiment, which some previous studies showed that it led to an increase in the compliance rate. Therefore, even the result of their study would indicate higher compliance with the introduction of redistribution of the total revenue, the separate effect of altruistic feelings, public goods or income could not be distinguished in this sort of experimental design.

The multiple regression analysis showed that 'anonymity' (social moral constraint) had significant and opposite signed effect on the amount of evasion. Thus, indicating that subjects rather than being worried by the risk of being detected as 'cheaters' by lecturers and fellows, felt a higher incentive to evade as a demonstration of courage. On the other hand, subjective moral constraint (redistribution of tax revenues) had a positive and

significant effect on tax compliance. This experiment seems to be a good example for demonstrating how difficult it to mimic is some aspects of real life in an experiment.

Andreoni (1995) indicated that most of the previous public goods experiments[2] found that participants were more cooperative than predicted. This either implied that subjects had tastes for cooperation which they brought in to experiment from real world or subjects did not understand the experiment for some reasons (poor instructions-motivation, simply subjects are incapable, etc.) and made considerable amount of mistakes. The first alternative implies some kind of altruistic feelings or social customs, which the authors called 'kindness', and the second alternative simply indicates subjects did not understand the correct incentives, which was called 'confusion' by the author. Andreoni noted that it is not possible to separate the specific effects of confusion and kindness in the previous experiments. Therefore, he conducted an experiment with 120 students which subtracted out the incentives for kindness, so leaving confusion as the only explanation for cooperative behaviour in the experiment. The results showed that approximately half of the all the cooperative behaviour was as a result of kindness. Thus indicating some subjects do not 'free ride' because their altruistic feelings or social norms.

4.3.7 Demographic Variables

4.3.7.1 Age

Since the overwhelming majority of experimental studies recruited student subjects, in general the effect of age has not been analysed. Amongst the few studies, which have looked at this effect, Friedland *et al.,* (1978) found a negative relationship between the age

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[2] Bernheim *et al.,* (1985), Bernheim (1986), Andreoni (1989) and Altonji *et al.,* (1992).

and tax evasion. Baldry's results also indicated that increasing age had a positive affect on honesty. However, Spicer and Becker's study found no significant effect of age on tax evasion.

4.3.7.2 Gender

The study by Friedland *et al.,* (1978) looked at the difference in evasion behaviour between females and males. They found that women were more likely to evade than men, although women evaded a much smaller fraction of their income. The same result also found by Benjamini and Maital (1985). Nevertheless, later studies that also looked at the effect of gender on tax evasion, in general found that females comply more than males (Spicer and Becker, 1980; Baldry, 1987; Spicer and Hero, 1985).

4.4 CONCLUSION

Given the difficulty of obtaining data on the subject of tax evasion economic experiments, in this area, have proved useful. Moreover in using experiments we have an opportunity to understand how people might react in a controlled environment. On the other hand, we need to be careful in interpreting the results of experiments. It may be one thing to evade in 'experiments' and very different in 'real life.' Moreover, the majority of the experiments in the literature have used small numbers of student subjects. For example, whilst the study by Friedland *et al.,* (1978) is important as a pioneer of experimental work, it is used only 15 student subjects. It is possible that students may not represent the behaviour of members of the general public.

In general experimental works on the subject of tax evasion indicate that people report less income with increasing tax rate. The effect of penalty and audit rate are positive on

compliance, and there are some individuals who overestimate the probability of audit. Moreover, subjects increase compliance with increasing amount of public transfers. Tax evasion would increase when individuals feel that they are treated unfairly. Finally, demographic variables such as gender and age seem to have an effect on compliance. However, experimental results are not always consistent. Some results of the experiments contradict others. The reason for this may depend on whether individuals regard the situation as a game, gambling or a tax evasion decision. Nevertheless, in general experimental findings are consistent with those reported for regression and survey studies, which strengthens the reliability of the findings.

CHAPTER 5

THE AIMS AND DESIGN OF THE EXPERIMENTS

5.1   INTRODUCTION

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5.4   CONCLUSION

5.1 INTRODUCTION

Models of tax evasion and their predictions have been discussed in detail in Chapter 2. Empirical works have been discussed in Chapter 3 and 4. Although there has been a significant amount of empirical study in the subject of tax evasion, the effect of some factors on evasion is not clear-cut. The purpose of this chapter is to explain the objectives and methodology of the study reported in this thesis and to give basic information on the data set used.

In order to investigate causal links between taxpayer compliance and the factors, which are thought to affect the tax evasion decision - such as income, tax rate and expected fine - we conducted a series of tax experiments. Apart from the economic factors that affect tax evasion, this study also analyses the influence of variables such as age, gender and tax ethics. The basic design of experiments in the tax evasion literature has been similar, and the overwhelming majority of them have been carried out with student subjects. This study has been carried out using participants from a wide variety of professions, as well as groups of students. In the following section, the main purposes and the importance of the study will be discussed. In Section, 5.3 the methodology of the experiments and basic information on the data set obtained will be presented. Section 5.4 concludes the chapter.

5.2 OBJECTIVES AND IMPORTANCE OF THE STUDY

We have obtained data from seven experiments in order to analyse the factors which are thought to be the determinants of income tax evasion. These factors have been fully examined in the previous chapters. In this study we are mainly interested in the effect of economic and policy parameters, such as income, the tax rate, the fine multiplier, the audit rate, public transfer payments, previous audits and the way audits are conducted (random or

non-random). The specific purpose of each experiment will be explained in Section 4.3, when we present information about the design and subjects of the experiments, which have been carried out with Turkish citizens.

Most of the previous experiments in the tax evasion field have been conducted using students as subjects. In general, students are less experienced in filling in tax returns and other tax matters. Therefore, the use of only student subjects may limit the generality of the results obtained. For example, Robben et al., (1990) reported that students were more likely to underreport their income than non-students. Therefore, we carried out the experiments using samples from different professions, as well as with groups of students. We have carried out one experiment with students (experiment 5) in order to replicate previous experimental methodology and compare the results with our other experiments.

Most of the previous experiments involved small numbers of participants, typically fewer than 50 and sometimes as few as 10-15 participants. A larger number of subjects may increase the reliability of the experimental findings. In this study in the seven experiments, we involve 268 participants, which makes it one of the largest tax evasion experiments undertaken.

Often experiments in this area have been conducted in a 'laboratory' situation using microcomputers. Webley and Halstead (1986) found that the use of computers was strongly related by subjects to the idea of playing 'games' and people behaved differently according to whether they regarded the experiments as a game or as a tax declaration decision. In real life, people complete their tax declaration form wherever they want and can get help from others. In order to make the experiment closer to the actual tax assessment procedure, and also to protect privacy by giving participants the opportunity to complete the tax forms in their own homes, a total of 5 experiments were conducted over a

longer period than is normal in this kind of exercise. The tax forms were distributed to participants at the beginning of a day. At some point during the day, participants decided how much of their income to declare on the tax form, and the forms were collected the following day. The experiments continued in this manner over four rounds that lasted for several days. The values of variables used in the experiments were chosen to be consistent with the actual policy parameters in Turkey. In most of the experiments reported in the literature, these parameters have been set and changed quite arbitrarily in order to see whether these changes affect behaviour. In this study, it is possible to see if changing expected rate of return in a small way makes any difference to tax evasion behaviour.

This is the only experimental research that has been carried out into tax evasion using Turkish subjects. There is some evidence that countries with similar fiscal systems have very different tax compliance rates (Alm *et al.,* 1995). Therefore, social norms and culture may play an important role in tax evasion. For example, a British taxpayer and a Turkish one may behave quite differently under the same tax system. Cullis and Lewis (1997) pointed out that different countries have different compliance rates according to how the public goods characteristic of social norm of paying taxes have been tackled. Although tax experiments are increasingly conducted in the USA, the UK and some other developed countries, carrying out an experiment with Turkish subjects will give specific and valuable information about the taxpayers in Turkey.

Alm (1991) argued that it is not possible to generalise the results unless neutral instructions are used in the experiment. For example, he recommended the use of the word 'surcharge' instead of tax rate. In this way role-playing by subjects may be discouraged. However, since the decision to evade taxes is not the same as a simple decision to gamble, the use of abstract instructions may not capture the important factors in tax behaviour such as tax

ethics and perception of fairness (Baldry, 1986 found that people behave differently in 'gambling' and 'tax' experiments). Therefore, we used 'loaded' terms such as tax rate, probability of audit, fine rate and penalty rate in the experiments. Moreover, Alm *et al.,* (1992b) found that when complete and precise information is provided the use of either loaded terms or neutral terms make no difference to the results. As will be explained in the next section, in the experiments reported later subjects are given precise and complete information about values of income, the audit rate, the fine rate and the tax rate. Therefore, using loaded terms may not limit the findings of our experiments.

Finally, prizes were given to participants in order to encourage them to take the experiments seriously. Often these were in cash form and typically had a value in Turkish Lira equivalent to between £25 and £70. The average household income of the subjects involved in the study is less than £340 per month, so that a typical prize was equivalent to several days' pay.

5.3 DESIGN AND SUBJECTS OF THE EXPERIMENTS

In this section, the basic design of the experimental groups and information about the data set obtained will be explained. We tried to improve the methodological approach of the experiments by introducing several changes to the previous methodologies. Although the tax forms and instructions used in the experiments were broadly similar to those of Friedland *et al*'s (1978), there were some significant differences. Firstly, unlike Friedland *et al.,* (1978) we have not asked the participants to maximise their net income in the experiments. Secondly, we have used more realistic values of the parameters (such as the audit and fine rate) that are similar to the actual tax parameters in practice. Thirdly, the amount of income for each month has been chosen randomly for the individuals rather than

giving the same income for each month or increasing it each month by certain amount. Fourthly, we have not presented the experiments as 'games', but as tax declaration decisions. Fifthly, all experiments, apart from one[1], have been conducted out of the classroom setting. Sixthly, with one exception[2] we carried experiments over longer periods to increase realism. Finally, we have designed the experiments with several months and rounds, which allows us to manipulate large variety of tax compliance related variables.

5.3.1 Experiments 1, 2, 3 and 4 (Experimental group 1)

The main aim of the first four experiments was to determine the effect of income, tax rate and expected fine (audit rate x fine multiple). These experiments were carried out in the same fashion and the parameter values that were used for each of these experiments were the same. Therefore, we will explain these four experiments under the same heading. The sample for the experiments is not randomly selected, but involved people who thought to have opportunities for tax evasion because of their qualifications and occupations.

The first experiment was carried out with 33 doctors, 2 dentists and 1 nurse at the University Hospital in Manisa. One-to-one contact was made with each individual in the sample. The instructions (Appendix C) were read to the members of the group. The subjects were assured of confidentiality and anonymity. It was also explained that the research was for the purpose of academic study. After the instructions were read to the members of the hospital, subjects participated in the experiment. The instructions were

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[1] Experiment 5 is conducted with students in classroom in order to replicate the methodologies of most previous experiments such as those Friedland *et al*'s, Alm *et al*'s and many others.

[2] Experiment 7 in which the design of the experiments required more than 20 days since there were 80 rounds if the experiment were carried out similar to our other experiments which would have been too long and subjects might have lost interest in the experiment.

also included in an envelope with the tax forms, so subjects could refer to them anytime they wished.

The instructions explained that each subject would receive salary slips for each round of ten months and there would be four rounds altogether. 'Loaded' terms such as 'taxable income', 'audit probability', 'penalty', etc. were used in the experiment. Since all participants were liable to pay income tax, the over-whelming majority of the subjects were familiar with these terms. The terms were explained to very few participants who were unfamiliar to them. For each 'month' participants decided how much of their taxable income to report to the tax authority and they paid tax on the income that they declared. Audits were conducted randomly according to a pre-announced frequency. When the subjects were audited and their income was found to be underreported, a fine, a pre-announced multiple of evaded tax, was imposed.

'Net income less fine' is calculated as gross income minus tax paid minus any fine. The tax envelopes were distributed at the beginning of one day and collected the next day. The envelopes containing the instructions and the tax table for round 1 were given to each of the participants. The tax table told them what their gross income would be for each of 10 months. Income for each month was varied in order to find any income affect and to make the experiment more interesting for the participants. For the first month the tax rate was 25%, the fine magnitude was 3 times the tax evaded, and the audit rate was 10% for each month. These parameters were known by the participants, since they were written at the top of tax tables for each month (see Appendix D). Participants reported their 'declared income', the amount of 'income tax' and 'net income' in appropriate columns for each month for round 1. The tax forms for round 1 were collected next day. Audit selection was performed by drawing numbered chips from a container with one chip for each subject.

The columns headed 'audited', 'fine', and 'net income less fine' were completed for round 1 and placed in an envelope together with tax tables for round 2. The envelopes were distributed to participants next day at the hospital. The experiment continued in this fashion over 4 rounds and took place over a 10-day period. At the end of the experiment, participants were asked to complete a small questionnaire which asked the participants about their age, sex, marital status, real income, occupation, number of children, whether they played the lotteries and how interesting they found the experiment. The purpose of the questionnaire was to obtain information about individual characteristics which may affect the tax evasion decision. At the end of the questionnaire an open-ended question was asked about what the subjects thought are the most important reasons for tax evasion in Turkey. Participants could give as many answers as they want for this question.

It seemed that subjects were enthusiastic and took the experiment seriously. Since all the participants were medics, a medical textbook (value £50) was given as a prize to the participant who had the highest total net income-less fines at the end of the game.

The parameters that were used for each round can be seen in Table 5.1.

Table 5.1 The parameters for experimental group 1.

Number of Rounds	Tax Rate (t)	Fine Magnitude (f)	Audit Rate (p)
Round 1	25%	3	10%
Round 2	25%	1.5	15%
Round 3	50%	3	10%
Round 4	50%	1.5	15%

The expected fine (pf) for this experimental group was either 0.3 (rounds 1 and 3) or 0.225 (rounds 2 and 4). In the experiment paying, a fine was an alternative to paying a tax. Thus a person who declared an income below their real income paid the amount of evaded tax

multiplied by the fine rate[3] rather than a fine plus the tax he/she should have paid. The

expected rate of return of evasion was positive.[4] The optimal strategy for a risk-neutral

individual is to declare zero income whenever the product of audit rate and fine multiple is

less than one (See Table 2.2). It is also straightforward to calculate declared income for

various parameters under specific utility functions[5].

The second experiment was conducted with 52 participants, in Adana. Participants in the

experiment were mostly lawyers, although there were some individuals who did not have a

degree, e.g. secretaries, cleaners, and whose jobs involve less responsibility and their real

income was lower than that of the lawyers. This group also includes some lecturers,

businessmen, shop-owners, etc. The aim of choosing a different occupational group was to

increase the generality of the findings. Moreover, including other occupations provides

different real incomes, which may also affect the tax declaration decision. In general, less

educated subjects are expected to have lower real income and more children than lawyers

and other participants who are graduates. This experiment was conducted in the manner

explained above and the same parameters were used. However, in this experiment a cash

prize of about £70 was given to the participant who had the highest net income at the end

of experiment. In this and the following experiments we added a survey, which was

intended to measure participants' tax ethics and beliefs in law and institutions. There were

10 statements (see Chapter 7) and participants were asked to respond to each of them using

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[3] This is how the actual penalty is levied, $f(I\text{-}X)$, in Turkey as in many other countries. It can be shown that applying the penalty on evaded tax rather than evaded amount is more efficient as it avoids deadweight loss (Balassone and Jones, 1998).

[4] $(1\text{-}p\text{-}pf)$ which is either $[1\text{-}.10\text{-}(.10\text{x}3)] = 0.6$ or $[1\text{-}.15\text{-}(.15\text{x}1.5)] = 0.625$. In percentage terms expected rates of returns were 60% and 62.5%.

[5] For example, If we assume the specific utility function of $I^{1\text{-}e}/(1\text{-}e)$ and further assume $e=1$ (as some empirical studies indicate) and solve the maximum expected utility for the parameters in Table 5.1 for the standard Yitzhaki (1974) model, the individual will declare zero income in all rounds of the experiment.

one of the 5 multiple-choice answers (strongly agree, agree, undecided, disagree and strongly disagree).

The connection between a person's tax ethic and tax evasion will be analysed in Chapter 7. The third experiment was also conducted in Adana, in the same fashion as experiments 1 and 2 with judges, lecturers, businessmen and housewives. In total, there were 41 participants. Again, a cash prize of about £70 was given to the participant who had the highest net income at the end of experiment.

We undertook the fourth experiment with 24 participants who were mainly architects and engineers in the city of Mugla. The money prize for this group was about £25.

5.3.1.1 Basic Information on the Experimental Group 1

Table 5.2 presents selected descriptive statistics of the subjects involved in experiments 1-4. The average percentage of income declared is the ratio of declared income to actual income, averaged across all subjects and rounds.

Table 5.2 Descriptive statistics for experimental group 1

Number of Subjects	153
Mean Age (years)	37.5
Percent Female	47.1
Percent Married	70.6
Average Percentage of Income Declared	57

As can be seen from Figure 5.1, the average compliance rate is higher amongst females than males (the difference is significant with a z value of 5.246)[6]. This result is consistent with the most previous experimental works reported in the literature.

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[6] The Mann-Whitney U test which is explained in Chapter 7 is applied.

Figure 5.1 Average compliance rates according to gender (experimental group 1)

GENDER
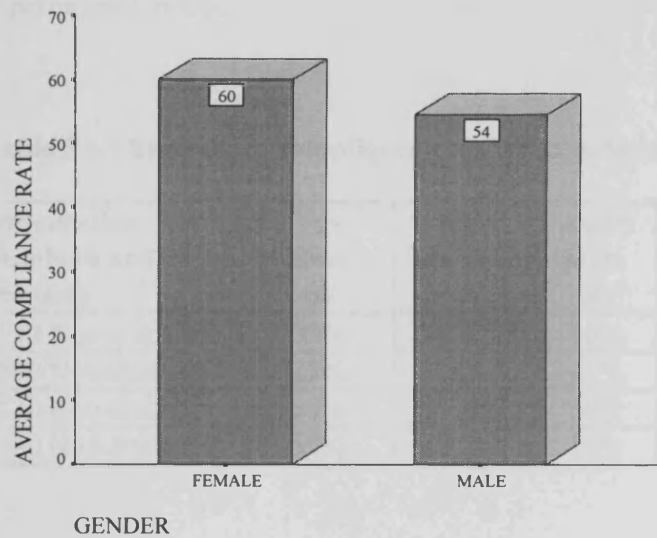
In Figure 5.2, we can see that in this experimental group, on average married people are more compliant than single, divorced and widowed ($z = 8.648$).

Figure 5.2 Average compliance rates according to marital status (experimental group 1)

MARITAL STATUS
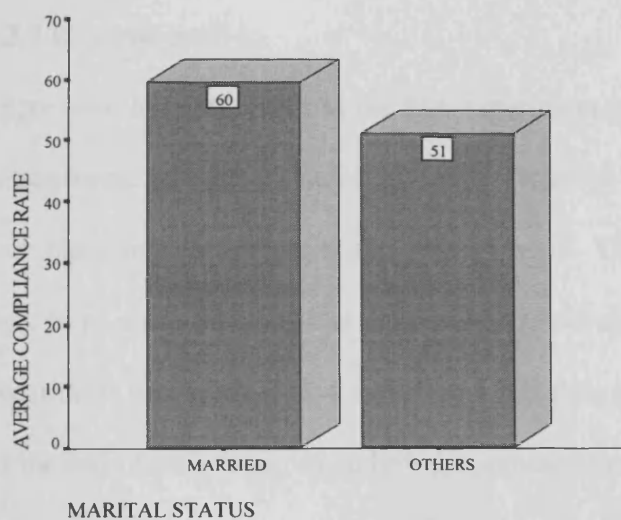
We can also calculate the average compliance rate according to each round for this experimental group.

Table 5.3 The average compliance rate for experimental group 1

Observation Numbers and Subjects	Tax Rate (*t*)	Fine Multiple (*f*)	Audit Rate (*p*)	*pf*	Average Percentage of Income Declared
1530 Non-students	25%	3	10%	.30	62.3%
1530 Non-students	25%	1.5	15%	.225	59.1%
1530 Non-students	50%	3	10%	.30	52.1%
1530 Non-students	50%	1.5	15%	.225	50.1%

As can be clearly seen from the above table, the average compliance rate is decreasing by tax rate, but it is increasing with combination of increasing audit rate and fine multiple (*pf*). Although the second result is in line with most economic models and previous findings, increasing tax rates lead to lower tax compliance which is consistent with most of the previous findings of experimental studies, but not the economic model (i.e. Yitzhaki, 1974).

5.3.2 Experiment 5

There were 60 participants in the fifth experiment who were the fourth year undergraduate management students at the Middle East Technical University in Ankara. The experiment took place in a lecture-room and lasted 1 hour. The subjects were told that all decisions were to be made privately and discussion was not allowed with any other participants. The experiment was again over 4 rounds, but this time each round consisted of only 3 months. At the end of each round an audit was conducted randomly according to the pre-announced

rate in full view of all subjects, but only the audited student knew their audit results, so the privacy of the subjects were protected as in the previous experiments.

The purpose of this experiment was to replicate the previous methodologies of many experiments, such as Friedland *et al*'s, Alm *et al*'s and others, which were conducted with students in classroom/laboratory environment. Another aim of the experiment was to test whether a large fine coupled with a small probability of detection was a more effective deterrent than a small fine with a high probability of detection. In all rounds the 'expected fine' was held constant.

The parameters in this experiment were as follows;

Table 5.4 The parameters for experiment 5

Number of Rounds	Tax Rate (*t*)	Fine Magnitude (*f*)	Audit Rate (*p*)
Round 1	25%	3	5%
Round 2	25%	1.5	10%
Round 3	50%	3	5%
Round 4	50%	1.5	10%

The prize for the participants who had the highest net income was about £30. However, since there were 10 students who achieved this, the prize was divided equally amongst them.

5.3.2.1 Basic Information on the Experiment 5

Table 5.5 gives the basic statistics for experiment 5. Because this experiment consisted of students, mean age and the percentage of married people are lower than the previous experimental group.

Table 5.5 Descriptive statistics for experiment 5

Number of Subjects	60
Mean Age (years)	22.58
Percent Female	25
Percent Married	1.7
Average Percentage of Income Declared	16.4

Importantly, the percentage of income declared is much lower in this experiment compared with the previous group. There may be a number of reasons for this. Firstly, the expected rate of return to evasion in this experiment is higher (85%) than the previous ones (60 and 62.5%). Secondly, we carried out this experiment in a 'laboratory' situation to replicate previous methodologies and to compare to the results found. The experiment lasted only one hour, as many of the experiments in the literature, rather than several days as our previous experiments. It seems that replicating previous experiments by carrying out the experiment in a classroom setting and choosing subjects for an audit in full view of the class may have led subjects to treat the experiment more like a 'game', and as a result they have evaded more. Finally, the difference may be the result of subjects being students and it is possible that the students and non-student groups behave differently (experiment 6 was carried out in order to investigate this).

In this experiment, contrary to the previous experimental group, females declare less of their real income than males. The difference is significant with a z value of 3.331 (Figure 5.3).

Figure 5.3 Average compliance rates according to marital status (experiment 5)
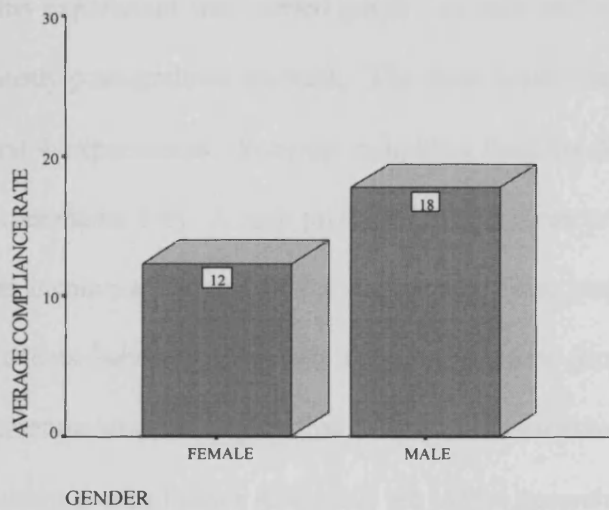
Table 5.6 shows the average percentage of declared income according to parameters used in the experiment with the order of rounds. As can be seen from the table, the 'expected fine' is constant in all rounds. The examination of average percentage of income declared implies that although increasing tax rate increased evasion, the changes in the composition value of p and f made little difference.

Table 5.6 The average compliance rates for experiment 5

Observations Numbers and Subjects	Tax rate (t)	Fine multiple (f)	Audit Rate (p)	pxf	Average Percentage of Income Declared
180 Students	25%	3	5%	.15	19.6%
180 Students	25%	1.5	10%	.15	17.3%
180 Students	50%	3	5%	.15	14.4%
180 Students	50%	1.5	10%	.15	14.3%

5.3.3 Experiment 6

This experiment was carried out in Leicester and involved 19 Turkish subjects who were mostly post-graduate students. The method and the parameters used were the same as the first 4 experiments. Subjects completed their tax declaration forms in their own time (as experiments 1-4). A cash prize of £20 was given to the participant who had the maximum net income at the end of the experiment. The purpose of this experiment was to see if students behaved differently from non-student groups. This is important, since in the literature student subjects have been used extensively and if the student group and non-student groups behave differently we cannot generalise the previous findings.

5.3.3.1 Basic Information on the Experiment 6

The average percentage of income declared is much higher in this experiment than in experiment 5 (61.6% compared with 16.4%, see Table 5.7 and 5.5). It is possible that lower deterrence factors (expected fine) in experiment 5 may explain the huge difference found in compliance rates between these two student groups. However, it seems more likely that replication of previous methodology of the literature (i.e. conducting the experiment in classroom/laboratory environment in a short time) account for their lower compliance rate; participants may regard this kind of experiment more like 'games'. The compliance rate in experiment 6 is also higher than non-student groups (see Table 5.2). The higher compliance rate of students subjects may be explained by the fact that students have not experienced actual income loss because of direct taxes in real life, whereas non-student individuals have and therefore they can refer to their real life experiences in the experiment. The only difference between the experimental group 1 and experiment 6 was the subjects used in the experiments (non-students versus students), apart from this the

parameters used and the methodology of experiments were the same. Unlike Robben *et al.'s* (1990) results, we did not find any evidence that student subjects underreport more than non-students (when the same methodologies were used in the experiments). Robben *et al.,* carried out the experiments in a 'laboratory' situation like experiment 5). Students would appear to treat the experiment as a 'game' in a laboratory situation and therefore declare less (i.e. to enjoy the 'game', they declare less than their true income and see whether they can get away with it).

Table 5.7 Descriptive statistics for experiment 6

Number of Subjects	19
Mean Age (years)	25.9
Percent Female	58.8
Percent Married	52.9
Average Percentage of Income Declared	61.6

Figure 5.4 implies that in this group females are more compliant ($z = 8.757$). On the other hand, married people are less compliant in this experiment, $z = 5.176$ (Figure 5.5).

Figure 5.4 Average compliance rates according to gender (experiment 6)

GENDER
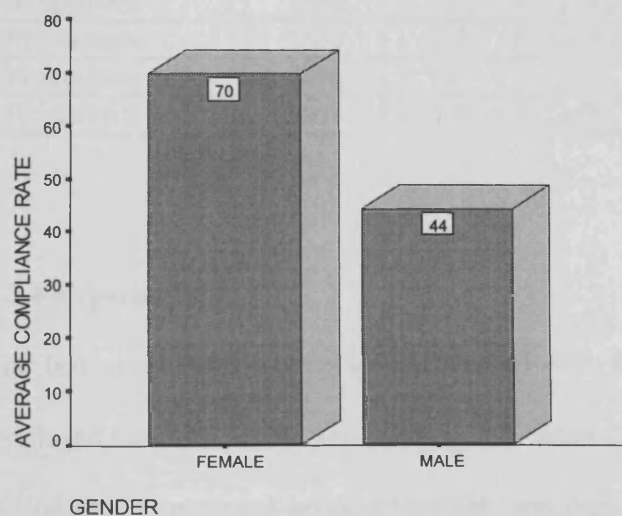
Figure 5.5 Average compliance rates according to marital status (experiment 6)
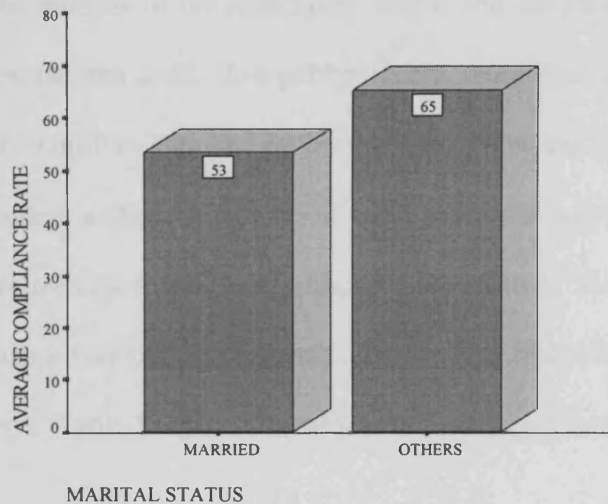
As Table 5.7 indicates that while increasing the tax rate increases evasion, the higher expected fine leads to more compliance.

Table 5.8 The average compliance rates for experiment 6

Observation Numbers and Subjects	Tax rate (*t*)	Fine multiple (*f*)	Audit rate (*p*)	*pf*	Average Percentage of Income Declared
190 Students	25%	3	10%	.30	73.3 %
190 Students	25%	1.5	15%	.225	65.7 %
190 Students	50%	3	10%	.30	58.2 %
190 Students	50%	1.5	15%	.225	48.7 %

5.3.4 Experiment 7

The last experiment took place in Istanbul with 38 participants who were mostly self-employed business people and teachers. However, 2 of the subjects indicated that they did not take the experiment seriously enough, and therefore their responses were not included

in the data set. This experiment was different from the previous ones in some aspects. One purpose of the experiment was to find out the effect of a public transfer payment and non-random audit. In a public transfer round each subject received a fixed public transfer of 20 million Turkish Lira irrespective of how much tax was paid by any subject. In a non-random audit round a cut-off audit scheme is applied in which the 10% of subjects who declared the lowest level of income are audited. This last experiment was also designed in such a way that the separate effects of the probability of audit and the fine rate could be seen. Table 5.9 gives the values of the variables that were used in this experiment.

Table 5.9 The parameters for experiment 7

Number of rounds	Tax Rate (t)	Fine Magnitude (f)	Audit Rate (p)	Public Transfer[7]	Non-Random Audit[8]
Round 1	25%	3	10%	0	1
Round 2	25%	3	10%	1	0
Round 3	25%	3	15%	0	0
Round 4	25%	3	10%	0	0
Round 5	25%	1.5	15%	0	0
Round 6	25%	1.5	10%	0	0
Round 7	50%	3	10%	0	0
Round 8	50%	1.5	15%	0	0

The procedure of this experiment was also different; it was carried out on a one-to-one basis (see footnote 2). There was a practice round plus 8 rounds, each consisting of 10 months. However, the subjects did not know the exact number of rounds in order to avoid the last round treatment (if any). For each subject the order of rounds was selected

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[7] 1 indicates Public Transfer Payment of 20 million of Turkish Lira, 0 means no Public Transfer Payment.
[8] 1 indicates non-random audit, 0 indicates random audit.

randomly so that the order of the rounds would not affect the overall results of the experiment.

Unlike the previous experiments in this study, each participant was paid according to his/her net income in the experiment. The payment method was changed in order to find out whether paying each subject would make a difference to the experimental findings. In each round each subject's total net income minus fines was calculated. One of the 8 rounds was selected for payment, the winning participant being paid 1% of the selected rounds' total income minus taxes minus fines. In order to determine the payment round, each participant drew a number from a container, which included all the numbers of the rounds. In the instruction (see Appendix E), it was explained that since each round had the same probability of being chosen, participants should take decisions in each round as if that round would be chosen for payment. In order to make the experiment closer to the real tax assessment procedure, each participant was told that if total net income minus fines was negative in the selected round for payment, they had to pay that amount from their own pocket. However, at the end of the experiment each participant earned a substantial amount of money. While the lowest income earned by a participant was £7.50, the highest was just under £18. The total amount paid to the subjects in this experiment was £505.

At the end of the experiment, subjects were given a risk preference measurement instrument used by Moser, Evans and Kim (1993,1995) and by Kim (1994). Risk preferences were measured in order to see whether it affected tax evasion decision. The risk preference measurement instrument asked people to choose between a certain thing that paid TL10,000,000 and a series of 15 lotteries with different probabilities of winning TL20,000,000 or nothing. After subjects finished their selection, one of the items out of 15 was randomly selected by each subject for the payment. In the selected item, if the subject

had chosen the certain thing, he/she was paid 10% of TL10,000,000 (TL1,000,000). On the other hand, if the subject had preferred the lottery for the selected item, then the lottery was conducted and according to its outcome, the subject won TL2 ,000,000 or nothing.

In addition, there was also an evasion scenario, which asked subjects if they received a cash payment from different customers, which totalled 1 billion TL for the year, would they report this income to the tax authority. If they did not report all of the income, how much they would not report. Then, we asked subjects to guess the probability of detection in Turkey (see Appendix F). The purpose of this scenario was to investigate the relationship between perceived probability of detection and tax evasion (the findings will be presented in Chapter 7).

At the end of the experiment, there was a survey with twenty-two statements, most of them taken from the tax resistance scale developed by Spicer and Lundstedt (1976) and also used by Jackson and Jaouen (1989), and some of them taken from Song and Yarbrough (1978). These statements were intended to measure attitudes towards taxation (analysed in Chapter 7). As with other experiments post experimental questionnaire asked the participants about their age, sex, real income, etc.[9]

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[9] For a few subjects some of the answers (such as age and real income) were missing in the questionnaire, this information obtained by telephone interviews a few days after the experiment had completed.

5.3.4.1 Basic Information on the Experiment 7

Table 5.10 indicates the basic information on data set.

Table 5.10 Descriptive statistics for experiment 7

Number of Subjects	36
Mean Age (years)	37.2
Percent Female	77.8
Percent Married	55.6
Average Percentage of Income Declared	68.1

Again females are more compliant then males in this last experiment, however the difference is not significant (i.e. $z = .868$) (Figure 5.6).

Figure 5.6 Average compliance rates according to gender (experiment 7)
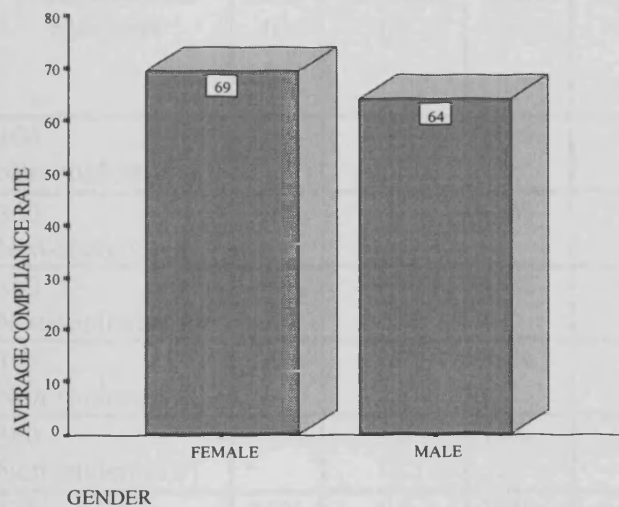
Married people also declared significantly ($z = 9.197$) more income than single people, (Figure 5.7).

Figure 5.7 Average compliance rates according to marital status (experiment 7)
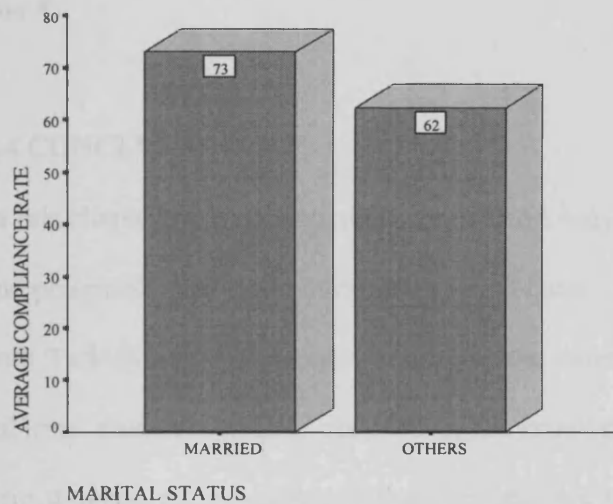
Table 5.11 The average compliance rates for experiment 7

Observation Numbers and Subjects	Tax Rate (t)	Fine Multiple (f)	Audit Rate (p)	Pubic Transfers	Non-Random Audit	pf	Average Percentage of Declared Income.
360 Non-students (1)	25%	3	10%	0	1	.30	89.61%
360 Non-students (2)	25%	3	10%	1	0	.30	77.76%
360 Non-students (3)	25%	3	15%	0	0	.45	68.71%
360 Non-students (4)	25%	3	10%	0	0	.30	73.90%
360 Non-students (5)	25%	1.5	15%	0	0	.225	68.28%
360 Non-students (6)	25%	1.5	10%	0	0	.150	66.65%
360 Non-students (7)	50%	3	10%	0	0	.30	65.59%
360 Non-students (8)	50%	1.5	15%	0	0	.225	62.17%

As can be seen from Table 5.11 the effect of non-random audit on tax compliance is positive (see lines 1 and 4) as is the payment of the public transfer (compare line 2 with line 4)

5.4 CONCLUSION

In this chapter we have explained the methodology and the objectives of the experiments and presented some basic information about them. We have carried out seven experiments with Turkish citizens in order to analyse the determinants of tax evasion. In total, 268 subjects' data successfully obtained in the experiments; there were very few participants who dropped out or indicated that they did not take the experiment seriously enough. Unlike most of the previous experiments in the literature, we have included participants from different professions, as well as groups of students. Also, we have carried out the experiments away from the classroom (except for the experiment 5 with students in which the classroom/laboratory effect was present). In order to encourage the subjects to take the 'experiments' seriously, we offered a prize to the person in each experiment who obtained the highest net income. We believe that these changes have increased the realism of the experiments.

In Chapter 6 we will investigate how various variables affect the decision to evade taxes and the amount of taxes evaded. Chapter 7 analyses the effect of the perceived audit rate on the likelihood and the amount of evasion.

CHAPTER 6

DETERMINANTS OF

THE DECISION TO EVADE,

THE PERCENTAGE AND THE AMOUNT OF EVASION:

Empirical Analysis of Experimental Results

6.1 INTRODUCTION

In this chapter we report the results of a series of tax experiments that were carried out in 1998 with different groups of Turkish citizens. In total 268 individuals completed the experiments. The objective of the exercise was to obtain data with which to test the effect of certain variables upon (i) the decision to evade income taxes, (ii) the proportion of income evaded and (iii) the amount of income tax evasion.

The chapter will give the results of testing the specified tax compliance model using the conditional logit, and logit techniques as well as fixed- and random-effects regression. The followings section contains the model specification. In order to understand how various parameters affect the decision to evade taxes, the logit and conditional regression are used, which is the subject of Section 6.3. Fixed- and random-effects regression models are used in order to investigate the effect of variables on the extent of evasion. These results are given in Section 6.4. Finally, Section 6.5 compares the findings with the previous experimental works, and concludes the chapter.[1]

6.2 MODEL SPECIFICATION

We consider a simple theoretical model, in which individuals are expected utility maximisers and care about two things: their financial well-being and the stigma or shame that arises when caught evading tax. Then, the utility function will be $u = U(y, \xi)$ where y is financial gain and $\xi = 1$ if the individual chooses to evade and 0 otherwise. If I is taxable income, f is the fine rate, p is the probability of tax audit and θ is the proportion of income declared, then expected utility will take the following form:

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[1] This chapter is a much-revised version of Pudney, Pyle and Saruc (2000). Section 6.2 and the first part of 6.3 were drafted by Pudney following joint discussion by all three authors. Sections 6.3.1 onwards are the work of present author alone.

No evasion: $EU = U((1-t)I,0)$

Evasion: $EU = pU((1-t\theta-ft(1-\theta))I,1) +(1-p)U((1-t\theta)I,0)$

An individual maximises her/his expected utility. This can result in two types of optimum: (i) a corner solution at $\theta = 1$ and (ii) an interior solution at some $\theta < 1$.

The first one, $\theta = 1$, will be observed in the case of:

$U((1-t)I, 0) > \max_{\theta<1}\{pU((1-t\theta-ft(1-\theta))I,1)+(1-p)U((1-t\theta)I,0)\}$. This is likely to happen especially when the stigma/shame costs are large. Although, tax evasion, if detected, may not have as much public disgrace as it would have in developed countries, it is safe to assume being exposed as a tax cheater would have at least some social stigma in Turkey. For the interior optimum, $\theta < 1$, the first order condition is:

$\partial EU/\partial\theta = tI[(f-1)pU_y((1-t\theta-ft(1-\theta))I,1)-(1-p)U_y((1-t\theta)I,0)]=0$ (6.1)

where $U_y = \partial U(y,\xi)/\partial y$. Thus the optimal degree of income reporting can be written in the general form:

$$\theta = \widetilde{\theta}\ (p,t,f,I)$$ (6.2)

If we assume a utility function, $U(y, \xi) = y^\sigma - \phi\xi$, where $\sigma < 1$, which exhibits DARA and CRRA, then the solution for θ does not involve income at all:

$$\widetilde{\theta} = \frac{1 - A(1 - ft)}{t(1 - A(1 - f))}$$

where $A = \left((f-1)p/(1-p) \right)^{1/(\sigma-1)}$.

We do not use any specific functional form for utility in our empirical work, but instead use simple linear approximations of the variables[2]: tax rate, probability of audit, fine multiplier and log experimental income, so that all variables are in dimensionless form. Moreover, we also include a number of other explanatory variables in order to capture the variation in preferences stemming from differences in characteristics such as age, gender, and economic circumstances as reflected by actual (rather than experimental) income.

The two types of solution for the expected utility maximisation problem lead naturally to a two-part econometric model, analysing the corner and interior solutions separately. Thus we estimate the following conditional distributions, using conventional econometric forms for both:

$$\Pr(\widetilde{\theta} = 1 | \text{p, t, f, I, z}) \tag{6.3}$$

$$f(\widetilde{\theta} \ | \ \widetilde{\theta} < 1, \text{p, t, f, I, z}) \tag{6.4}$$

where z represents all observable characteristics of the individual that may affect the form of preferences, such as demographic variables and economic circumstances as reflected by actual (rather than experimental) income. For the discrete probability (6.3) the logit model is used as an approximation, which is analysed in the next Section. For the conditional density (6.4) a regression approximation is used, which is the subject of Section 6.4.

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[2] Experiment 7 analyses the effect of additional variables such as public transfer payments, previous audits and non-random audit.

6.3 THE CONDITIONAL LOGIT AND LOGIT ANALYSIS OF TAX COMPLIANCE

Although the dependent variable evasion is a continuous variable, in this Section we are interested in how various economic and demographic variables affect *the decision to evade taxes*. In order to investigate this, we used the conditional logit and logit regression analysis. According to this, if a person declares less than their income for any month, the dependent variable takes the value of 1 and if the person declares his/her income honestly the dependent variable takes the value of 0.

The fixed-effects logit model is as follows:

$$\Pr(y_{ij} = 1 | x_{ij}) = \frac{\exp(x_{ij}\alpha + u_i)}{1 + \exp(x_{ij} + \alpha + u_i)} \qquad (6.6)$$

where $i = 1...n$ indexes individual experimental subjects and $j = 1...J_i$ indexes series of the experiments. The dependent variable $y_{ij} = 1$ if the outcome involves evasion and 0 otherwise; the row vector of independent variables is $x_{ij} = \{1, j, p, f, t, \ln(I)\}$. Note that the fixed effects u_i can capture the preferences shifter z_i which are constant through all series of the experiments for a given subject. Chamberlain (1980) first noted that it was possible to estimate panel data logit models consistently in the presence of fixed effects, using an appropriate conditioning argument. This approach maximises a likelihood function constructed from the conditional sample distribution $P_r\left(y_{i1}...y_{ij_i} \mid \sum_j y_{ij}\right)$. However, this conditional probability is identically equal to 1 for individuals with no variations in their experimental responses, and the conditioning variable Σy_{ij} contains potentially important

sample information. As a result, a considerable sacrifice of efficiency may be the price paid for the robustness of this approach. Therefore, we will also use logit regression[3] in order to test the effect of variables where there is no variation in the experiments for a given subject (age, sex, etc.).

6.3.1 Experimental Group 1

6.3.1.1 Fixed-effects logit regression for experimental group 1

In these experiments our aim is to analyse the effect of economic variables (namely income, tax rate and expected fine) on *the decision to evade*. The experimental group contains 153 subjects. Table 6.1 indicates the results of conditional logit regression

Table 6.1 Fixed-effects logit regression for experimental group 1

Variables in the Equation				
Variable	β	S.E.	Wald	Sig.
ln (experimental income)	.491	.191	2.566	0.010
Tax rate (*t*)	4.768	.468	10.197	0.000
Expected fine (*pf*)	-7.054	1.359	-5.192	0.000
Number of observations	3120			

The influence of experimental income upon the decision to evade appears to be positive. The effect is significant in a statistical sense at the 1% level. Similarly, an increase in the tax rate leads to a statistically significant increase in subjects' decisions to evade taxes.

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[3] See Hosmer and Lemeshow (1989); Aldrich and Nelson (1984); Greene (1993) and Johnston and Dinardo (1997) for detailed information about logit models.

This finding is in line with most previous experimental findings (see Table 6.20). The effect of expected fine (pf) is as indicated by deterrence theory; a higher expected fine discourages individuals from becoming tax evaders.

As a result of using conditional regression we lose 74 individuals' data (2960 observations)[4]. These individuals had no variation in their experimental responses (i.e. they either evaded in all months of the rounds or did not evade in any month). Moreover conditional logit regression does not give the separate effect of the variables which are constant across all experiments such as gender and age. Therefore, we will also use the logit regression to include those observations and variables. However, note that in order to use logit regression an additional assumption has to be made: individual effects are uncorrelated with explanatory variables.

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[4] Because some of the data for some variables (such as actual income) is missing for a few subjects, actual logit regression includes extra 71 individuals' data (2840 observations).

6.3.1.2 Logit Regression for experimental group 1

Table 6.2 shows the findings of the logit regression.

Table 6.2 Logit regression for experimental group 1

Variables in the Equation				
Variable	β	S.E.	Wald	Sig.
ln (experimental income)	.205	.126	1.628	0.104
Tax rate (t)	1.959	.297	6.596	0.000
Expected fine (pf)	-2.754	.883	-3.109	0.002
ln (actual Income)	-.630	.066	-9.559	0.000
Age	-.024	.003	-7.225	0.000
Male	.091	.067	1.356	0.175
Single	.151	.085	1.766	0.077
Risk	.040	.029	1.387	0.165
Number of observations	5960			

The effect of tax rate and expected fine is similar to the finding of the conditional logit regression. However, the effect of experimental income is no longer significant. A high tax rate increases non-compliance significantly, again the effect of expected fine on decision to evade is negative and significant. The logit regression indicates that there is strong significant evidence of a negative influence of the individual's actual income and age on the probability of evasion. The effect of the variable single is positive and statistically significant at 10%. The variable risk is measured by asking subjects if they gamble or play lotteries, if so how often. A dummy variable was used for the measure which took a value between 0 and 3. The results indicate that the risk variable is not significant, nor is the variable male.

6.3.2 Experiment 5 (Students)

6.3.2.1 Fixed-effects logit regression for experiment 5

One aim of this experiment was to analyse whether a large fine coupled with a small probability of detection was a more effective deterrent than a small fine with high probability of detection. Therefore, in all rounds the expected fine was held constant. The experiment was carried out in a 'laboratory' environment in order to replicate previous methodologies in the literature.

Table 6.3 Fixed-effects logit for experiment 5

Variables in the Equation				
Variable	β	S.E.	Wald	Sig.
ln (experimental income)	.337	.572	0.589	0.556
Tax rate (t)	3.242	2.523	1.285	0.199
Dummy variable (Low p with high f)	.128	.594	0.216	0.829
Number of observations	96			

Table 6.3 indicates that none of the variables are significant. As previously indicated fixed-effects logit regression only includes those individuals who have variations in their experimental responses (i.e. those who evade in some rounds and comply in others). Only 8 out of 60 subjects had variations in their experimental responses in this experimental group. Fifty-two individuals (624 observations) were dropped due to lack of variations in their experimental responses. The majority of the students (47) evaded in each round of the experiment and small number of individuals (5) were honest in every round. The high number of non-compliant individuals in this experiment may be a result of the use of

student subjects, or it may be due to the use of the different methodology (i.e. carrying out the experiment in a laboratory setting)[5]. It would seem that subjects approach the experiment more like a game when it is conducted in artificial settings as opposed to them filling in declarations forms at a place/time of their own choosing. Perhaps when a variety of decisions have to be made in a classroom/laboratory setting in a couple of hours, the tax declaration experiment becomes a simple game for the student subjects. This indicates the importance of performing the experiments in out-of-laboratory settings.

6.3.2.2 Logit Regression for experiment 5

In order to see the effect of demographic variables we have carried out logit regression, which includes all observations obtained from 60 individuals (Table 6.4).

Table 6.4 Logit regression for experiment 5

Variables in the Equation				
Variable	β	S.E.	Wald	Sig.
ln (experimental income)	.059	.238	0.248	0.804
Tax rate (t)	.518	.970	0.534	0.593
Dummy variable (Low p with high f)	.023	.238	0.097	0.922
Age	-.298	.086	-3.430	0.001
Male	-1.310	.442	-2.962	0.003
Risk	.499	.143	3.491	0.000
Number of observations	720			

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[5] In order to test this, we carried out another experiment (experiment 6) again using student subjects but this time subjects declared their income in their own time and the place they chose.

Again, as with the fixed-logit regression, the experimental variables (income, tax rate and low p with high f) are not significant. The effect of age and male on decision to evade is negative and significant. The effect of variable risk is positive, as one would expect.

6.3.3 Experiment 6 (Students)

6.3.3.1 Fixed-effects logit regression for experiment 6

This experiment was also carried out with students, but this time the variables and methodology used were the same with the first experimental group. The fixed-logit regression was carried out (see Table 6.5) in order to see whether we would obtain similar results to experimental group 1.

Table 6.5 Fixed-effects logit regression for experiment 6

Variables in the Equation				
Variable	β	S.E.	Wald	Sig.
ln (experimental income)	.111	.507	0.220	0.826
Tax rate (t)	4.101	1.226	3.343	0.001
Expected fine (pf)	.186	3.526	0.053	0.958
Number of observations	520			

The effect of the tax rate is similar to the finding from experimental group 1; an increase in tax rate increases the probability of evasion significantly. However, the students' results indicate that there is no statistically significant effect of the expected fine on the decision to evade, nor is there a significant effect of experimental income.

6.3.3.2 Logit Regression for experiment 6

Table 6.6 gives the results of logit regression for the student group.

Table 6.6 Logit regression for experiment 6

Variables in the Equation				
Variable	β	S.E.	Wald	Sig.
ln (experimental income)	-.076	.460	-0.166	0.868
Tax rate (*t*)	4.380	1.099	3.986	0.000
Expected fine (*pf*)	-3.026	3.204	-0.945	0.345
Age	-.463	.0535	-8.657	0.000
Male	3.213	.409	7.838	0.000
Single	-5.194	.597	-8.695	0.000
Risk	.833	.209	3.974	0.000
Number of observations	680			

The results show that amongst the experimental variables the tax rate has a positive impact on the decision to evade. Other experimental variables (income and expected fine) are not significant. For the demographic variables, age has a negative influence on the decision to evade which is consistent with our previous experimental findings. Male participants evaded more often, while single people evaded less than married people in this experiment. The effect of the risk variable was, as expected, positive and significant.

6.3.4 Students' Behaviour

In order to find out whether student subjects behaved in the experiment in ways substantially different from employed people of the same age, we carried out another logit regression with pooled data from experimental group 1 and the experiment 6. Table 6.7 gives the findings of the regression.

Table 6.7 Logit regression for experimental group 1 + experiment 6

Variables in the Equation				
Variable	β	S.E.	Wald	Sig.
ln (experimental income)	.170	.118	1.441	0.150
Tax rate (t)	2.114	.278	7.594	0.000
Expected fine (pf)	-2.837	.826	-3.432	0.001
Students	-.430	.108	-3.985	0.000
Age	-.042	.003	-13.149	0.000
Male	.060	.061	0.987	0.324
Single	-.127	.076	-1.663	0.096
Risk	.0498	.0279	1.782	0.075
Number of observations	6760			

The above results indicate that students behave somewhat differently than non-students; it appears that students are more compliant than employed people in the experiments in which the same methodology, procedure and variables were used. Student subjects in experiment 6 evaded significantly less than the employed people in experimental group 1. This may be explained by the fact that students have no tax paying experience in real life, which leads an actual loss of income to taxation. On the other hand, non-student subjects have experience in tax matters and know the discomfort of losing part of their income as direct taxes, so it is possible that non-student subjects may be referring to their real life experience during the experiment. This result highlights the importance of using non-student subjects in tax experiments in order to obtain more accurate results.

6.3.5 Experiment 7

6.3.5.1 Fixed-effects logit regression for experiment 7

The main aim of this last experiment was to find out the separate effects of the probability of audit and the fine rate. Moreover, in this experiment we also investigated the effect of two more variables; a public transfer payment and non-random audit (see Section 5.3.4). A fixed public transfer of 20 million TL is given to each subject in one round irrespective of how much tax they pay. The effect is measured by a dummy variable which takes the value of 1 if there is a public transfer in the round, and 0 if there is not. A non-random audit implies that 10% of the subjects who declared the lowest income are audited (see Chapter 5). Again, the effect was measured by a dummy variable (0 indicating random and 1 indicating non-random audit). Table 6.8 gives the results of fixed-effect logit regression[6].

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[6] Since there are only 8 males in this last experiment we have also run all the regressions with the female only sample in order to test if the results differ; it was found that although the significance level of some of the variables increased (e.g. fine multiple was significant at 10% in females versus 1% in the whole group), the overall results were similar. It is believed that the reason for the higher significance level for the female only group was the reduced number of observations as a result of the elimination of male subjects.

Table 6.8 Fixed-effects logit regression for experiment 7

Variables in the Equation				
Variable	β	S.E.	Wald	Sig.
ln (experimental income)	1.671	.226	7.367	0.000
Tax rate (*t*)	4.532	.888	5.103	0.000
Fine multiple (*f*)	-.350	.132	-2.650	0.008
Audit rate (*p*)	12.786	3.985	3.208	0.001
Public Transfer	-.846	.242	-3.493	0.000
Non-random Audit	-1.164	.238	-4.881	0.000
Previous Audits	.010	.037	0.278	0.781
Number of observations	2080			

An increase in experimental income encourages evasion in the experiment which is consistent with the few experimental studies that have investigated the issue (see, Table 6.20). The results indicate a strong positive effect of tax rates upon the decision to evade income tax. The effect of the fine multiple is negative and significant as expected, indicating the deterrence effect of a penalty on the propensity to evade. Surprisingly, however, we have found that the effect of audit rate is positive and significant. This finding can be attributed to a 'spite' or the 'crowding out' effect. Frey (1997) indicated increasing audit rates might crowd out the intrinsic motivation to pay taxes; higher audit rates can destroy the trust between the parties which would reduce tax ethics and thus tax compliance (see Chapters 2 and 3). In this experiment there seems to be some evidence to support these predictions. As explained in Chapter 4, we have made some methodological changes in this experiment. In order to analyse whether these changes affected the subjects' behaviour we will examine another fixed-logit regression in Section 6.3.5.3, which will include only the rounds that were used in the first experimental group. The

effect of public transfer upon the decision to evade is negative. This finding is consistent with the behavioural models of tax evasion that point out the importance of the fairness issue, and it is also in accordance with the findings from some survey and experimental studies. The effect of non-random audit is also negative and significant as expected, indicating a deterrence effect of strategic audits. The variable previous audits measured how many times the individual was audited in the previous months, before he/she made the tax declaration decision. The results indicate there to be no deterrence effect of previous audits on the incidence of tax evasion.

6.3.5.2 Logit regression for experiment 7

In this experiment we also obtained information about each subject's education level (i.e. whether they have a university degree or not). Moreover, we also measured people tax ethics by 18 statements, and then used average scores of the 17 statements from these, which proved to be reliable, as an additional explanatory variable (see Chapter 7).

Table 6.9 Logit regression for experiment 7

Variables in the Equation				
Variable	β	S.E.	Wald	Sig.
ln (experimental income)	.830	.164	5.049	0.000
Tax rate (t)	2.390	.640	3.732	0.000
Fine multiple (f)	-.181	.097	-1.867	0.062
Audit rate (p)	6.802	2.916	2.332	0.020
Public Transfer	-.505	.177	-2.847	0.004
Non-random Audit	-.696	.174	-3.991	0.000
Previous Audits	-.074	.025	-2.904	0.004
Risk measure	.108	.024	4.388	0.000
ln (actual income)	.242	.088	2.755	0.006
Degree	-.530	.137	-3.861	0.000
Tax Ethic	-.404	.092	-4.370	0.000
Age	-.063	.006	-9.613	0.000
Male	-.843	.128	-6.569	0.000
Single	-.390	.114	-3.425	0.001
Number of observations	2640			

The results indicate a strong positive effect of experimental income and the tax rate upon the decision to evade. While the fine multiple has the expected sign and is significant at 10%, the audit rate has a positive sign with significance level of 5%. The effect of both public transfers and non-random audit is negative and significant on the probability of evasion. Logit regression also indicates a deterrence effect of the number of previous audits on the decision to evade, the result being significant at 1% level, a finding in line with availability heuristic (see Chapter 2). The effect of the risk variable (obtained by a risk preference measurement instrument) is positive which indicates people with less risk

aversion evade more often in the experiment. Moreover, the results indicate that higher actual income leads to a lower probability of evasion. On the other hand, the effects of university degree and tax ethics are negative on the frequency of evasion; these findings indicate the importance of social norms and education in tax compliance behaviour (see, psychic costs and social customs, and multiple selves' models in Chapter 2). Finally, there is strong evidence that old, male and single people are less likely to engage in evasion in this experiment.

6.3.5.3 Experiment 7 (the effect of expected fine)

In the above analysis of fixed-effect logit regression, it is found that the coefficient of the audit rate is positive and significant. Since there were some methodological changes in this last experiment, it is necessary to test whether these changes affected the results. Therefore, out of 8 rounds that were used in this experiment we have taken the 4 rounds in which the value of parameters were the same as those for experimental group 1 to see whether the effect of expected fine still holds for this experiment. Table 6.10 gives the findings of the fixed effect regression.

Table 6.10 Fixed-effects logit for experiment 7 for 4 rounds only

Variables in the Equation				
Variable	β	S.E.	Wald	Sig.
ln (experimental income)	2.289	.423	5.407	0.000
Tax rate (*t*)	3.690	1.265	2.916	0.004
Expected fine (*pf*)	-5.594	1.670	-3.350	0.001
Number of observations	700			

The effect of tax rate and income is similar to the findings of the first experimental group. The results show that the expected fine has a negative effect, which was the same as in experiment group 1. We can conclude that changes made in the methodology of the last experiment and the different payment method used did not affect the finding of the expected fine variable when we use the exact rounds that were also used in the experimental group 1.

6.4 FIXED- AND RANDOM-EFFECTS REGRESSION

For interior values of the evasion rate $(y=1-\theta)$ we use a panel-data regression model in which the amount of evasion carried out by an evader i in the jth series of the experiment is:

$$y_{ij} = w_{ij}\,\beta + v_i + \varepsilon_{ij} \tag{6.5}$$

In this model, w_{ij} indicates the row vector of observable explanatory variables, v_i represents unobservable personal characteristics of the individual and all other random factors affecting any particular experimental outcome are given by ε_{ij}.

We estimate the model (6.5) in two alternative ways. One is by means of fixed-effects (or within-group) regression, in which the v_i are considered as arbitrary unknown constants and eliminated by the within-group transform. This requires applying standard multiple regression to the following equation:

$$(y_{ij} - \bar{y}_i) = (w_{ij} - \bar{w}_i)\beta_i + (\varepsilon_{ij} - \bar{\varepsilon}_i) \tag{6.6}$$

where $\bar{y}_i$, etc. indicates the mean of a variable over all series of the experiments undertaken by individual i. Note that this within-group transform eliminates both the

unobservable effects v_i and all observable variables which have no variations over experiments (such as age, real income, etc.).

The second alternative method of estimating the model (6.5) is to use random-effects regression, which is based on the assumption that the individual effects, v_i, vary randomly across individuals, independently of all observed variables. Under these circumstances, the model can be estimated by means of two-step generalised least squares. However, note that the assumption of independence is a strong one, and it is important to test its validity, which we do by means of the Hausman test. This involves a comparison of the fixed-effects estimates of β (which do not require the independence assumptions) with the random-effects estimates of β (which do). A statistically significant difference implies the rejection of the independence assumption, and suggests that the random-effects estimates may be biased.

We also use another model in which the dependent variable is the log of the cash amount of evasion, e, (ln experimental income, ln$I$, - ln declared income, ln X,) rather than the proportion of income evaded, y, (1- declared income, X, / experimental income, I,). This is done in order to see how economic variables, especially income, affect the absolute amount of evasion.

6.4.1 Experimental Group 1

6.4.1.1 Model 1

The fixed- and random-effects regression results are given in Table 6.11 for model 1 in which the degree of evasion, y, is the dependent variable. Note that the results are computed using the set of observations from experimental group 1 where the degree of evasion is positive, and thus represent the distribution of y conditional on evasion.

The fixed- and random-effects regression results are very similar to each other. However, the Hausman test, which compares the results of two regressions, turns out to be significant (with a P-value of about 2.4%). Thus the independence assumption, which underlies the random-effects model, is rejected in this experimental group, but not by a huge margin. Therefore, whilst bearing in mind that there is a possibility of bias in the random-effects estimation, it seems reasonable to give some attention to the qualitative pattern of the coefficients of the explanatory variables (age, gender, etc.) which are constant across months of the experimental group 1 for any given individual.

Table 6.11 Fixed- and random-effects regression for model 1 (Experimental group 1)

Dependent variable, y = $1\text{-}X/I$, regression on sub-sample of tax evaders, $(y>0)$								
	Fixed effects				Effects Random			
Variables	β	S.E.	t	Sig.	β	S.E.	z	Sig.
Ln (experimental income)	-.063	.010	-5.749	0.000	-.062	.011	-5.624	0.000
Tax rate (t)	.504	.025	19.747	0.000	.499	.025	19.310	0.000
Expected fine (pf)	-.467	0.75	-6.203	0.000	-.497	.076	-6.511	0.000
ln (actual Income)	-	-	-	-	.079	.039	2.004	0.045
Age	-	-	-	-	-.005	.002	-2.679	0.007
Male	-	-	-	-	.071	.040	1.771	0.077
Single	-	-	-	-	.023	.049	0.473	0.636
Risk	-	-	-	-	.020	.017	1.142	0.253
Number of observations	4741				4632			
Hausman test	$\chi^2(3) = 9.47$							

The results point out that a high assigned income reduces the degree of evasion – strictly speaking, the finding indicates that an increase in ln experimental income decreases the proportion of evaded income: $\dfrac{\partial y}{\partial \ln(I)} < 0$. This finding can easily be transformed in terms of Yitzhaki's (1974) model in order to test its predictions.

$$\frac{\partial y}{\partial \ln I} < 0 \Rightarrow \frac{\partial}{\partial \ln I}\left(1 - \frac{X}{I}\right) < 0 \Rightarrow \frac{\partial}{\partial \ln I}\left(\frac{X}{I}\right) > 0 \Rightarrow I\frac{\partial}{\partial I}\left(\frac{X}{I}\right) > 0 \Rightarrow \frac{\partial}{\partial I}\left(\frac{X}{I}\right) > 0$$

This finding implies IRRA from equation 5.b (in Appendix B), since only in the case of

IRRA, $\dfrac{\partial(X/I)}{\partial I}$ will be bigger than zero. This is consistent with exponential and quadratic

utility functions (see Table 2.2), but not with CRRA utility.

We can also transform the result in terms of the effect of income on declared income to see

whether our results indicates CARA, DARA, or IARA according to equation 4b.

$$\frac{\partial}{\partial I}(\frac{X}{I}) > 0 \Rightarrow \frac{1}{I}\frac{\partial X}{\partial I} - \frac{X}{I^2} > 0 \Rightarrow \frac{\partial X}{\partial I} > \frac{X}{I}$$

This result does not tell us much, although it may be consistent with DARA provided the

negative coefficient is not too large (as it is the case in Table 6.11). However, it is possible

to get a clear answer from model 2 (see Sub-section 6.4.1.2).

Table 6.11 also indicates that higher tax rate increases the proportion of evaded income.

So that $\dfrac{\partial y}{\partial t} > 0$.

$$\frac{\partial}{\partial t}(1 - \frac{X}{I}) > 0 \Rightarrow \frac{-\dfrac{\partial X}{\partial t}I}{I^2} > 0 \Rightarrow \frac{1}{I}\frac{\partial X}{\partial t} < 0 \Rightarrow \frac{\partial X}{\partial t} < 0$$

From equation 6.b we can rule out CARA and DARA, and this finding may suggest IARA

since under IARA Yitzhaki finding concerning the effect of t is ambiguous. However,

there seems to be some inconsistency concerning our findings and Yitzhaki predictions,

since it seems that some of our results point to DARA while some of them indicate IARA

according to Yitzhaki. This inconsistency is shown clearly in model 2 below.

Increasing the expected fine leads to a lower degree of evasion, which is consistent with

Yitzhaki and deterrence theory. The random-effect regression indicates that age is

associated negatively with the degree of evasion (the effect is significant at the 1% level).

However, wealthy people and males evaded more. The remaining two variables, single and risk had no significant effect in this experimental group.

6.4.1.2 Model 2

In this model the dependent variable is the log of underreported income (e), which is calculated as the log amount of experimental income assigned ($\ln I$) less the log amount of income reported ($\log X$). Here, we are interested to find the effect of the explanatory variables on the absolute amount of evasion rather than relative tax evasion. The results are given in Table 6.12.

Table 6.12 Fixed- and random-effects regression for model 2 (Experimental group 1)

Dependent variable, $e = \ln(I-X)$, regression on sub-sample of tax evaders, $(e>0)$								
	Fixed effects				Random Effects			
Variables	β	S.E.	T	Sig.	β	S.E.	z	Sig.
Ln (experimental income)	.870	.031	28.051	0.000	.866	.031	27.634	0.000
Tax rate (t)	1.289	.072	17.886	0.000	1.279	.072	17.545	0.000
Expected fine (pf)	-1.182	0.213	-5.553	0.000	-1.239	.215	-5.755	0.000
ln (actual income)	-	-	-	-	.170	.108	1.571	0.116
Age	-	-	-	-	-.008	.005	-1.351	0.177
Male	-	-	-	-	.153	.112	1.366	0.172
Single	-	-	-	-	.032	.135	0.240	0.810
Risk	-	-	-	-	.039	.048	.0488	0.817
Number of observations	4741				4632			
Hausman test	$\chi^2(3) = 5.44$							

The Hausman test is not significant in this model, which indicates the validity of the assumption of independence for the random-effects regression.

The effect of log of experimental income on the log of absolute amount of evasion turns out to be positive and highly significant, thus $\dfrac{\partial e}{\partial \ln I} > 0$. Again we can convert our results in terms of Yitzhaki's (1974) model prediction.

$$\frac{\partial}{\partial \ln I}\left(\ln(I-X)\right) > 0 \Rightarrow \frac{1}{I-X}\left[\frac{\partial I}{\partial \ln I} - \frac{\partial X}{\partial \ln I}\right] > 0 \Rightarrow \frac{1}{I-X}\left[I\frac{\partial I}{\partial I} - I\frac{\partial X}{\partial I}\right] > 0$$

$\Rightarrow \dfrac{I}{I-X}\left[1-\dfrac{\partial X}{\partial I}\right]>0 \Rightarrow 1-\dfrac{\partial X}{\partial I}>0 \Rightarrow \dfrac{\partial X}{\partial I}<1.$ This implies DARA from equation 4b.

This finding seems to be consistent with the findings of model 1. So, we can rule out IARA and CARA according to our results.

In model 1 our results indicated IRRA from equation 5.b; it is possible to see if model 2 contradicts to this finding.

$\dfrac{\partial X}{\partial I}<1 \Rightarrow \left[\dfrac{\partial}{\partial I}(\dfrac{X}{I})+\dfrac{X}{I^2}\right]I<1 \Rightarrow \dfrac{\partial(X/I)}{\partial I}<\dfrac{1}{I}-\dfrac{X}{I^2}.$ This result does not tell us much, it

indicates $\dfrac{\partial(X/I)}{\partial I}$ is smaller than this term: $\dfrac{1}{I}-\dfrac{X}{I^2}$ (which is a positive number).

However, the result is not inconsistent with model 1 which has indicated IRRA.

Table 6.12 shows that an increase in tax rate increases the log of evaded income. So,

$\dfrac{\partial e}{\partial t}>0 \Rightarrow \dfrac{\partial}{\partial t}\left[\ln(I-X)\right]>0 \Rightarrow \dfrac{1}{I-X}\left[0-\dfrac{\partial X}{\partial t}\right]>0 \Rightarrow -\dfrac{1}{I-X}\dfrac{\partial X}{\partial t}>0 \Rightarrow \dfrac{\partial X}{\partial t}<0.$ The

result is the same as model 1. This finding again rules out DARA and CARA according to equation 6.b. However, equation 4.b indicates DARA. Therefore, our results do not support the simple model of Yitzhaki (1974). An increase in the tax rate decreases the tax compliance rather than increases the tax compliance as predicted by the simple economic model; our finding is consistent with most empirical studies including experiments (see Table 6.20). Moreover, note that as explained in Chapter 2, with some modification of the model (including social norms, etc.) under some conditions a positive relationship between the tax rate and amount of evasion can be obtained (see Chapter 2). Our findings indicate that a simple tax evasion theory, one which treats the taxpayer as selfish utility maximiser

who does not care about tax ethic, norms, fairness, etc. does not explain tax evasion behaviour very well.

The random-effects regression indicates that the effect of expected fine is similar to model 1, none of the other variables are significant in this experimental group.

6.4.2 Experiment 5 (Students)

6.4.2.1 Model 1

Table 6.13 gives the results of the experiment (5) carried out with students in order to see whether a large fine coupled with a small probability of detection was more effective in reducing evasion than a small fine combined with a high probability of detection. In all rounds the expected fine was held constant.

Table 6.13 Fixed- and random-effects regression for model 1 (Experiment 5)

Dependent variable, y = 1-X/I, regression on sub-sample of tax evaders, (y>0)								
	Fixed effects				Random Effects			
Variables	β	S.E.	t	Sig.	β	S.E.	Z	Sig.
ln (experimental income)	-.010	.007	-1.369	0.172	-.010	.007	-1.422	0.155
Tax rate (t)	.142	.030	4.690	0.000	.144	.030	4.677	0.000
Low p with high f	-.013	.007	-1.871	0.062	-.014	.007	-1.945	0.052
Age	-	-	-	-	-.014	.012	-1.179	0.238
Male	-	-	-	-	.062	.033	1.866	0.062
Risk	-	-	-	-	.026	.014	1.832	0.067
Number of observations	635				635			
Hausman test	$\chi^2(3) = 0.00$							

The result of the Hausman test is insignificant indicating that there is no bias in the random-effects regression.

The effect of income on the degree of evasion is negative but insignificant. The effect of the tax rate is similar to experiment group 1, i.e. positive and highly significant. We find that large fines with a small probability of detection were a more effective deterrent than small fines with high probability of detection in reducing the degree of evasion (a finding similar to the Friedland *et al.,* 1978), although the effect is significant only at the 10% level. While the effects of male and risk on the proportion of income evaded are positive and significant at the 10% level, the remaining variable, age, is not significant at the 10% level.

6.4.2.2 Model 2

Table 6.14 gives the effects of variables on the log amount of evasion.

Table 6.14 Fixed- and random-effects regression for model 2 (Experiment 5)

Dependent variable, $e = \ln(I\text{-}X)$, regression on sub-sample of tax evaders, $(e>0)$								
	Fixed effects				Random Effects			
Variables	β	S.E.	t	Sig.	β	S.E.	z	Sig.
ln (experimental income)	.974	.013	72.815	0.000	.973	.013	71.591	0.000
Tax rate (t)	.217	.053	4.034	0.000	.221	.054	4.037	0.000
Low p with high f	-.018	.013	-1.427	0.154	-.020	.013	-1.503	0.133
Age	-	-	-	-	-.020	.019	-1.060	0.289
Male	-	-	-	-	.098	.054	1.794	0.073
Risk	-	-	-	-	.038	.023	1.627	0.104
Number of observations	635				635			
Hausman test	$\chi^2(3) = 0.00$							

The effects of tax rate and being male in model 2 are in line with model 1. There is a very strong positive effect of the amount of income on the amount of absolute evasion. None of the remaining variables are significant at the 10% level.

6.4.3 Experiment 6 (Students)

6.4.3.1 Model 1

Table 6.15 gives the results of regression for the student subjects. The experiment here was same (methodologically) as that for experimental group 1.

Table 6.15 Fixed- and random-effects regression for model 1 (Experiment 6)

Dependent variable, $y = 1-X/I$, regression on sub-sample of tax evaders, $(y>0)$								
	Fixed effects				Random Effects			
Variables	β	S.E.	t	Sig.	β	S.E.	z	Sig.
ln (experimental income)	.056	.031	1.833	0.067	.063	.033	1.891	0.059
Tax rate (t)	.561	.071	7.834	0.000	.558	.076	7.314	0.000
Expected fine (pf)	-1.267	0.212	-5.959	0.000	-1.409	.225	-6.237	0.000
Age	-	-	-	-	-.024	.019	-1.207	0.227
Male	-	-	-	-	.270	.166	1.623	0.104
Single	-	-	-	-	-.110	.146	-0.757	0.449
Risk	-	-	-	-	.050	.085	0.599	0.549
Number of observations	574				526			
Hausman test	$\chi^2(3) = 0.00$							

Model 1 indicates that unlike experimental group 1, the effect of the log of income is positive on the log of the proportion of evasion amongst the student evaders: $\dfrac{\partial y}{\partial \ln I} > 0$.

$\frac{\partial}{\partial \ln}(1 - \frac{X}{I}) > 0 \Rightarrow \frac{\partial}{\partial I}(\frac{X}{I}) < 0.$ This indicates DRRA in Yitzhaki's (1974) model from equation 5.b.

$\frac{\partial}{\partial I}(\frac{X}{I}) < 0 \Rightarrow \frac{\partial X}{\partial I} < \frac{X}{I}.$ Thus, $\frac{\partial X}{\partial I} < 1$ implying DARA from equation 4.b. On the other hand again our finding concerning the tax rate indicates $\frac{\partial X}{\partial t} < 0$, as in experimental group 1, which rules out the possibility of CARA or DARA according to equation 6.b. Once again our results do not support Yitzhaki's (1974) model.

The variable expected fine is significant and its effect is similar to our earlier finding. Others variable are not found to be significant in this experiment.

6.4.3.2 Model 2

Table 6.16 Fixed- and random-effects regression for model 2 (Experiment 6)

Dependent variable, $e =\ln(I\text{-}X)$, regression on sub-sample of tax evaders, $(e>0)$								
	Fixed effects				Random Effects			
Variables	β	S.E.	t	Sig.	β	S.E.	z	Sig.
ln (experimental income)	1.031	.097	10.620	0.000	1.034	.102	10.079	0.000
Tax rate (t)	1.358	.224	6.059	0.000	1.303	.234	5.548	0.000
Expected fine (pf)	-3.471	0.664	-5.222	0.000	-3.902	.695	-5.608	0.000
Age	-	-	-	-	-.045	.061	-0.736	0.461
Male	-	-	-	-	.570	.515	1.105	0.269
Single	-	-	-	-	-.374	.451	-0.829	0.407
Risk	-	-	-	-	.173	.262	0.660	0.509
Number of observations	574				526			
Hausman test	$\chi^2(3) = 0.00$							

Again, the effect of income on the amount of evasion is positive and strongly significant in this experiment as it was with earlier experiments; $\dfrac{\partial e}{\partial \ln I} > 0 \Rightarrow \dfrac{\partial X}{\partial I} < 1$, so this result also indicate DARA (according to equation 4.b) the result of model 1 is consistent with the finding of model 2. In this model specification again, as with experimental group 1 we cannot conclusively say whether relative risk aversion is decreasing, increasing or constant (unlike specification of model 1) from equation 5.b. Again $\dfrac{\partial (X/I)}{\partial I} < \dfrac{1}{I} - \dfrac{X}{I^2}$, so $\dfrac{\partial (X/I)}{\partial I}$

is smaller than the term: $\frac{1}{I} - \frac{X}{I^2}$ (thus $\frac{\partial(X/I)}{\partial I}$ may be positive, zero or negative and may

be indicating IRRA, CRRA or DRRA respectively). Model 1 for this experiment has

indicated DRRA and model 2 is not contradicted by this result. But again the effect of tax

rate is positive and highly significant on the log amount of evasion, and this result indicates

a higher tax rate to lower the amount of declared income. As in model 1, our result is

contradictory to Yitzhaki's (1974) model.

The effect of the remaining variables is in line with the findings of model 1: there is a

strong deterrence effect of expected fine on evasion and none of the remaining variables

have a significant effect.

6.4.4 Student Behaviour

Table 6.17 gives the results of pooled data of experimental group 1 and experiment 5 in

order to find out whether student evaders behaved differently to non-student evaders in an

experiment in which the same procedures and methodology were applied. The results of

the random-effects regression are given in Table 6.17 for models 1 and 2.

Table 6.17 Student behaviour (model 1 and 2)

	Dependent variable, y = 1-X/I, regression on sub-sample of tax evaders, ($y>0$)				Dependent variable, e =ln(I-X), regression on sub-sample of tax evaders, ($e>0$)			
	Model 1				Model 2			
Variables	β	S.E.	z	Sig.	β	S.E.	z	Sig.
ln (experimental income)	-.050	.010	-4.846	0.000	.886	.0297	29.758	0.000
Tax rate (t)	.508	.024	20.897	0.000	1.290	.069	18.662	0.000
Expected fine (pf)	-.563	.071	-7.837	0.000	-1.462	.204	-7.158	0.000
Student	-.089	.066	-1.348	0.178	-.245	.186	-1.317	0.188
Age	-.004	.002	-2.146	0.032	-.005	-.006	-0.854	0.393
Male	.103	.038	2.665	0.008	.231	.108	2.130	0.033
Single	.012	.049	0.245	0.806	-.006	.129	-0.050	0.960
Risk	.022	.017	1.252	0.210	.046	.048	0.956	0.339
Number of observations	5267				5267			
Hausman test	$\chi^2(3) = 7.11$				$\chi^2(3) = 7.20$			

Since the Hausman test is not significant (i.e. P value is greater than 0.05) for both models, the independence assumptions, which underlie the random-effects models, are accepted, and therefore Table 6.17 indicates only random-effect regressions for model 1 and 2.

The results of both models indicate that student evaders do not behave significantly different from non-student evaders with the same characteristics (age, marital status and risk measurement) in their response to the changes of the experimental variables.

6.4.5 Experiment 7

6.4.5.1 Model 1

Table 6.18 gives the results of the last experiment for model 1 in which the dependent variable is the degree of evasion.

Table 6.18 Fixed- and random-effects regression for model 1 (Experiment 7)

Dependent variable, y = 1-X/I, regression on sub-sample of tax evaders, (y>0)								
	Fixed effects				Random Effects			
Variables	β	S.E.	t	Sig.	β	S.E.	z	Sig.
Ln (experimental income)	-.062	.010	-5.726	0.000	-.061	.011	-5.290	0.000
Tax rate (*t*)	.173	.033	5.103	0.000	.181	.035	5.043	0.000
Fine multiple (*f*)	-.012	.005	-2.124	0.034	-.015	.006	-2.464	0.014
Audit rate (*p*)	.123	.172	0.717	0.473	.174	.182	0.953	0.341
Public Transfer	-.056	.012	-4.402	0.000	-.059	.013	-4.331	0.000
Non-random audit	-.142	.013	-10.859	0.000	-.145	.013	-10.471	0.000
Previous Audits	-.000	.002	-0.036	0.971	-.000	.002	-0.062	0.951
Risk measure	-	-	-	-	.024	.012	1.868	0.062
ln (actual income)	-	-	-	-	.076	.044	1.726	0.084
Degree	-	-	-	-	-.148	.074	-1.982	0.047
Tax Ethic	-	-	-	-	-.090	.047	-1.906	0.057
Age	-	-	-	-	-.010	.003	-3.066	0.002
Male	-	-	-	-	.218	.081	2.680	0.007
Single	-	-	-	-	-.030	.060	-0.507	0.612
Number of observations	2335				2183			
Hausman test	$\chi^2(7) = 0.00$							

The effects of both variables, income and tax rate; are similar to the findings of experimental group 1. These findings are important since we changed our experimental methodology in this last experiment. The rounds were randomly ordered and subjects did not know how many rounds there were in advance. Also, each subject was paid according to their net income in this experiment, etc. The effect of audit rate turns out to be insignificant, while the effect of fine multiple is negative and significant at 5%, thus indicating a deterrence effect of fine multiple on the proportion of evasion amongst evaders. The effect of public transfer payment and non-random audit on the proportion of income evaded is also significant and negative. So, people comply more if they receive something from the government as a result of their tax payments, and tax authorities can reduce the degree of evasion if they apply a cut-off audit scheme rather than random audits. The number of previous audits has no significant effect on the extent of tax evasion. The variables age, university degree and tax ethics have negative and significant effects on the proportion of evaded income. On the other hand, the effects of risk measure and actual income are positive and significant at the 10% level. The effect of variable being male on the proportion of evaded income is also positive and significant at the 1% level, thus indicating that although males have a tendency to be more honest in this experiment (see Table 6.9), when they evade they evaded by a larger proportion of income. These findings are consistent with experiment 5 and some previous experimental findings (Friedland *et al.,* 1978; Benjamini and Maital 1985), but we should be cautious in generalising the results since the overwhelming majority of the subjects were females in this experiment.

6.4.5.2 Model 2

Table 6.19 indicates the results for the dependent variable log amount of evasion.

Table 6.19 Fixed- and random-effects regression for model 2 (Experiment 7)

Dependent variable, $e = \ln(I-X)$, regression on sub-sample of tax evaders, $(e>0)$								
	Fixed effects				Random Effects			
Variables	β	S.E.	t	Sig.	β	S.E.	z	Sig.
ln (experimental income)	.833	.042	19.722	0.000	.844	.043	19.191	0.000
Tax rate (t)	.643	.131	4.893	0.000	.787	.136	5.036	0.000
Fine multiple (f)	-.019	.022	-0.872	0.383	-.028	.023	-1.242	0.214
Audit rate (p)	.180	.668	0.269	0.788	.270	.695	0.388	0.698
Public Transfer	-.214	.049	-4.331	0.000	-.230	.051	-4.451	0.000
Non-random audit	-.607	.050	-12.002	0.000	-.618	.052	-11.696	0.000
Previous Audits	-.012	.008	-1.516	0.130	-.013	.008	-1.570	0.177
Risk measure	-	-	-	-	.064	.047	1.361	0.173
ln (actual income)	-	-	-	-	.222	.161	1.380	0.168
Degree	-	-	-	-	-.500	.273	-1.830	0.067
Tax Ethic	-	-	-	-	-.355	.172	-2.060	0.039
Age	-	-	-	-	-.026	.012	-2.177	0.029
Male	-	-	-	-	.418	.298	1.401	0.161
Single	-	-	-	-	-.078	.220	-0.357	0.721
Number of observations	2335				2183			
Hausman test	$\chi^2(7) = 0.00$							

Again the effect of income on the absolute amount of evasion is positive and significant as it was with the other experiments. Fine multiple is not significant in this model. The other variables with which the effect is negative and significant are non-random audit, tax ethic, age and university degree. An increase in public transfer increases the amount of disposable income, which in turn would increase the evasion activity under the assumption of DARA. However, our findings indicate that if subjects received something from the government in return for their taxes then they increase their compliance, this finding being consistent with the behavioural models.

6.5 COMPARISON OF THE RESULTS, DISCUSSIONS AND CONCLUSION

Table 6.20 presents a summary of the study findings and also those of previous experimental works that investigated the effects of similar variables. In the first page of the table our findings are presented, and this is followed by a chronological listing of previous experimental studies (both impact and judgement). In the table, the sign (+) indicates that an increase in the magnitude of the variable increases the dependent variables (frequency of evasion, degree of evasion or amount of evasion), the sign (-) indicates that an increase in the independent variable is negatively associated with evasion, and (0) indicates that the effect of the variable on evasion is found to be insignificant. Finally, multiple symbols indicate that the relationship with evasion differs for different magnitudes of the variable or for different subjects' characteristics (see Chapter 4 for detailed information about these studies).

Table 6.20 Comparison of the results

Author(s) Date/Country	Subjects	Dependent Variable	The Variables Examined[*]															
			I	t	Pf	f	p	Low p High f	P.T	Non-rand. Au.	Prev.Au.	Risk	Act. I	Edc.	Tax Ethic	Age	Male	Single
Saruc	153 Non-students	Frequency of Evasion	0	+	-							0	-			-	0	+
		Degree of Evasion	-	+	-							0	+			-	+	0
		Amount of Evasion	+	+	-							0	0			0	0	0
	60 Students	Frequency of Evasion	0	0				0				+				-	-	
		Degree of Evasion	0	+				-				+				0	+	
		Amount of Evasion	+	+				0				0				0	+	
	19 Students	Frequency of Evasion	0	+	0							+				-	+	-
		Degree of Evasion	+	+	-							0				0	0	0
		Amount of Evasion	+	+	-							0				0	0	0
	36 Non-students	Frequency of Evasion	+	+		-	+		-	-	-	+	+	-	-	-	-	-
		Degree of Evasion	-	+		-	0		-	-	0	+	+	-	-	-	+	0
		Amount of Evasion	+	+		0	0		-	-	0	0	0	-	-	-	0	0

[*] (I) Experimental income, (t) tax rate, (pf) expected fine, (f) fine multiplier, (p) audit rate, (P.T) public transfers or public goods, (Non-rand. Au.) non-random audits, (Prev. Au.) previous Audits, (Act. I) Actual Income and (Edc.) Education.

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			The Variables Examined[*]															
Author(s) Date/Country	Subjects	Dependent Variable	I	t	Pf	f	p	Low p High f	$P.T$	Non-rand. Au.	Prev.Au.	Risk	Act. I	Edc.	Tax Ethic	Age	Male	Single
Friedland, Maital and Rutenberg (1978) Israel	15 Students	Frequency of Evasion		+	0			-				0				-	-	+
		Degree of Evasion		+	0			-				0				-	+	-
Spicer and Becker (1980) USA	57 Students	Degree of Evasion	0												-	0	+	
Friedland (1982) Israel	13 Students	Degree of Evasion				-	-	+										
Spicer and Thomas (1982) USA	44 Students	Frequency of Evasion					-											
		Degree of Evasion					-											
Benjamini and Maital (1985) Israel	27 Students	Degree of Evasion	0	+			0				-					0	+	
Spicer and Hero (1985) USA	36 Students	Degree of Evasion									-						+	
Baldry (1985) Australia	40 Students	Frequency of Evasion	0	0												-	+	
		Amount of Evasion	+	+													+	
Becker, Buchner and Sleeking (1987) Germany	116 Students	Frequency of Evasion	+	-			-		-									
		Degree of Evasion	0	0			-		0									

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Author(s) Date/Country	Subjects	Dependent Variable	The Variables Examined[*]																
			I	t	Pf	f	p	Low p High f	$P.T$	Non-rand. Au.	Prev.Au.	Risk	Act. I	Edc.	Tax Ethic	Age	Male	Single
Chang, Nichols and Schultz (1987) USA	56 Students	Amount of Evasion						-										
Violette (1989) USA	256 Adult students	Frequency of Evasion			-													
		Amount of Evasion			-													
Collins and Plumlee (1991) USA	120 Students	Amount of Evasion		+		0				-								
Beck, Davis and Jung (1991) USA	112 Students	Degree of Evasion		0		-	-											
		Amount of Evasion		0 -														
Webley, Robben, Elffers and Hessing (1991) 04-UK	46 Students	Frequency of Evasion				0	-	0										
		Degree of Evasion				0	-	0			0							
Webley et al.,(1991) 05-UK	54 Students	Frequency of Evasion									0							
Webley et al.,(1991) 06-UK	48 Non-students	Degree of Evasion									0							
Webley et al.,(1991) 07-UK	72 Non-students	Frequency of Evasion									0							

			The Variables Examined[*]															
Author(s) Date/Country	Subjects	Dependent Variable	I	t	Pf	f	p	Low p High f	P.T	Non-rand. Au.	Prev.Au.	Risk	Act. I	Edc.	Tax Ethic	Age	Male	Single
Webley *et al.*,(1991) 01-NL Netherlands	72 Non-students	Frequency of Evasion									-					-	0	
		Degree of Evasion														-	0	
Webley *et al.*,(1991) 08-UK	48 Students	Frequency of Evasion					0				0							
		Degree of Evasion					0				0							
Alm, Jackson and Mckee (1992a) USA	15 Students	Amount of Evasion	-	+		-	-		- +									
Alm, McClelland and Schulze (1992b) USA	48 Students	Degree of evasion					-		-									
Alm, Sanchez and de Juan (1995) Spain	9 or 10 Students	Degree of Evasion		-		0 -	-		0									
Bosco and Mittone (1997) Italy	60 Students	Frequency of Evasion	+				0											
		Amount of Evasion	+				0											
Alm, McClelland and Schulze (1999) USA	11 Students	Degree of Evasion		0		-	-		-									

Our results indicate very strong positive effect of tax rates upon both the decision to evade income tax, and upon the amount and the proportion of income tax evasion once individuals have decided to evade. In other words, higher income tax rates encourage individuals to become tax evaders and also encourage existing evaders to increase the extent of their evasion. However, the simple economic model (Yitzhaki, 1974) predicts that under the plausible assumption of DARA, an increase in the tax rates decreases the amount of tax evasion; and therefore our results do not support this prediction of the simple model. Nevertheless, as explained in Chapter 2, extensions of the basic model which incorporated factors like stigma costs, fairness, social norms, etc. indicate that under some conditions an increase in the tax rates increases the amount of evasion. Our findings concerning the effect of tax rate is consistent with most of the previous regression, survey and experimental works. Nevertheless, the study by Alm *et al.,* (1995) and Beck *et al.,* (1991) found the opposite effect, contradicting our findings. It should, however, be noted that these studies use neutral terminology (such as contributions, checks and disclosed income) rather than using loaded terms (such as taxes, audits and declared income), which may account for their different findings, although there is one study which found that the instructions used (neutral or loaded) did not effect the findings when complete and precise information is provided about the variables (Alm *et al.,* 1992b), and also one experiment (Alm *et al.,* 1992a) which found a positive effect of tax rates on evasion despite using neutral terms. An important concern with the previous experiments is the use of small groups of student subjects in a laboratory/classroom setting which will be discussed later.

The influence of experimental income in this study appears to be complicated, having a different effect upon the decision to evade (where an increase in income encourages tax evasion, in experiment 7) from its impact upon the degree of evasion (increased income leads

to a fall in the proportion of undeclared income, experimental group 1 and experiment 7).

Moreover, the absolute amount of evasion increases with income (as economic theory would predict under DARA). Note that few experimental works have investigated the effect of both income and tax rate variables on evasion (see Table 6.20). In doing so, we found a positive relationship between income and amount of evasion which implies that IARA can be ruled out and that therefore the positive relationship between tax rates and evasion cannot be explained by simple economic theory (Yitzhaki 1974). These results show that a simple tax evasion theory, one which considers the taxpayer as a selfish utility maximiser who is not concerned with norms, ethics, fairness, etc. fails to explain tax evasion behaviour. Our findings concerning the effects of tax rate and income on evasion are similar to those of Baldry (1985) but contradict Alm *et al.,* (1992a).

The expected fine (*pf*) has a significant deterrent effect on the decision to evade taxes (experimental group 1), and on both the proportion and amount of evasion. These findings are consistent with deterrence theory and the prediction of basic economic theory. The experiment with students that was carried out in classroom settings (experiment 5) indicated that although a large fine with a small probability of detection has no significant effect on the decision to evade, it is more effective in reducing the proportion of income evaded, this latter finding being similar to findings from the experimental studies by Friedland *et al.,* (1978) and Chang *et al.,* (1987), and the theoretical work of Christiansen (1980).

Experiment 5 was carried out in order to replicate most of the previous experiments' methodology, and therefore it was conducted with students in classroom settings. The results showed a very high number of non-compliant students. These findings imply that subjects consider the experiment more like a game when the study is conducted in artificial settings. Another experiment (experiment 6), also carried out with students and using the same

methodology as experimental group 1, does not indicate students to be less compliant than non-student subjects of the same characteristics. On the contrary, while student and non-student evaders have not behaved significantly differently, student subjects in experiment 6 have been significantly more compliant than the employed people in experimental group 1. These findings are important in the sense that they indicate experiments can benefit from incorporating some real world aspects, such as performing out the experiments outside of the classroom/laboratory environment and conducting the experiment with non-student subjects. When a variety of decisions have to be made in a classroom/laboratory setting in a few hours, the experiment may be regarded as a simple game or gambling for the student subjects. The higher compliance by students in experiment 6 can be explained by the fact that students in real life have not experienced an actual loss of income to taxes, while non-student subjects have experienced it and therefore know the displeasure of losing some of their income as direct taxes. As Table 6.20 indicates, some findings of the previous experiments have contradicted each other, which implies that the findings are sensitive to methodology and subjects used in the experiments. Lowering the game aspects of the experiments, by not using computers, by giving subjects the opportunity of completing the tax forms wherever they want, and by employing subjects who are experienced in tax returns and in tax matters generally, increases the reliability of the results. Most previous studies were carried out with small number of student subjects and therefore we should be careful in generalising their results. Also note that some of the previous experiments have not followed the appropriate econometric procedure of separately analysing the effects of various variables on (i) the decision to evade and then on (ii) the evasion amongst the sub-sample of tax evaders.

The fixed-effect logit regression of experiment 7 indicates that the effect of fine multiplier was negative, as expected, on the decision to evade, but we also found that a variable audit

rate had a positive effect. However, when we take the 4 rounds in which the values of the parameters were the same as those for experimental group 1, we find that the effect of the expected fine (*pf*) still holds for experiment 7, indicating a deterrence effect of expected fines on the propensity to evade. Somewhat surprisingly, Table 6.8 indicates that the effect of audit rate is positive and significant on the decision to evade taxes. As can be seen from Table 6.20, this finding contradicts the previous experimental findings and seems to be unique; although there are a few studies that failed to find significant effect, as far as I am aware there is no experimental work which finds a significant positive effect. It may be that these individuals in experiment 7 did not understand the nature of the audit rates or that they did not take their decisions with care. However, I believe, these are unlikely to be explanations for subjects' behaviour here, which can be attributed to a 'spite' effect or the 'crowding out' effect.

The relationship between taxpayers and tax authorities can be regarded as an implicit contract (e.g. Scholz and Pinney 1995; Scholz and Lubell 1998a,b and Feld and Frey 2000). Trust between the taxpayers and the government is an important determinant of compliance (see Chapter 2 especially Sub-section 2.3.1.2 and Chapter 3). An increase in audit rates may damage the trust between the parties which in turn reduces intrinsic motivation to pay taxes in the form of tax morale (Frey 1992,1997 and Feld and Frey 2000). Similarly, Cullis and Lewis (1997) pointed out that 'If we believe taxpayers are selfish utility maximisers, taxpayers will behave like selfish utility maximisers. If we believe taxpayers have a moral nature, a sense of obligation or civic duty, taxpayers will reveal this side of their nature.' (p. 310). An increase in penalties may be welcome amongst honest taxpayers since it shows that authorities are hard on people who do not follow the basic rules of citizen duty and therefore honest people will not feel 'sucked' by evaders (Feld and Frey 2000). Thus, while an increase in audit rates

lowers the trust between the parties (citizens and government), an increase in penalties may not.

Our finding of a positive effect of audit rate on the decision to evade can also be explained by the idea that increased audit rates may cause taxpayers to perceive that many people evade taxes. The perception of a large amount of evasion in the society will lead to higher evasion (see Chapter 2: social norms, multiple selves, and see Chapter 3 for the empirical findings). Thus increasing the audit rate may indirectly increase non-compliance (Sheffrin and Triest 1992). Our experimental findings have several policy implications and they are explained in Chapter 8. However, it is worth mentioning at this point that these findings indicate that the tax evasion decision is more complex than simple deterrence theory would suggest; tax authorities can use the 'carrot' as well as the 'stick' in order to raise tax ethics and hence increase tax compliance amongst citizens. The negative effect of transfer payments on evasion (all three measures) indicates that if subjects receive something from the government in return for their taxes than they increase their compliance. A simple economic theory indicates that an increase in public transfers increases the amount of disposable income of the taxpayer which in turn increases evasion under DARA. However, note that our results are in line with empirical findings as well as behavioural models that indicate the importance of the fairness issue. Some experimental work (e.g. Alm *et al.*, 1992a) incorporated public transfers (goods) in different ways and the results were found to be sensitive to the way it is incorporated (see Chapter 4).

The results of the last experiment also show that non-random auditing has a negative effect on the decision to evade, the degree of evasion and the amount of evasion. So, a non-random audit (cut-off audit) has a deterrent effect, unlike random audits. One can find an intuitive, psychological explanation for such effect, which might be as follows. As explained, an

increase in random audits would destroy the trust between parties and thus intrinsic motivation to pay taxes. However, when individuals are aware that audits are specifically directed towards those who seem to be evading there will not be such a crowding out effect. On the contrary, people will feel that authorities are doing their part in order to foster compliance by auditing those who do not follow the basic rules of citizens' duty. Therefore the price of paying taxes will be lower, since people will not feel so sucked by evaders (see Multiple selves models). When the tax authority incorporates information signals sent by taxpayers, it is more successful in reducing underreported income (and the probability of evasion). This finding is similar to the one found by Collins and Plumlee (1991) and the prediction of the theoretical model by Reinganum and Wilde (1985). Our results also indicate a deterrence effect of the number of previous audits on the decision to evade, this finding being in line with availability heuristic explained in Chapter 2.

Our results also indicate the importance of tax ethics. Higher ethics are associated with increased compliance (all three measures), suggesting that people do not behave as selfish utility maximisers, but rather tax ethics are a determinant of behaviour. Therefore, tax authorities would benefit from policies which are intended to foster higher ethics. The experiments reported in this chapter were set up in such a way that it was always financially worthwhile for participants to engage in tax evasion and yet a substantial number of them declared the whole of their experimental income in each month of each round of the experiments (20 out of 268 subjects never evaded in any month during the experiments, 7.4%). Although, it may be argued that these individuals may have very high degree of risk aversion, or did not understand the nature of the experiment, we believe that these results are better explained by the effect of tax ethics. A tax compliance experiment is different from a simple experiment of gambling or insurance and there seem to be some who would never

evade taxes because it is against their tax ethics. Many non-evaders indicated at the end of experiment that they would not evade taxes simply because it was wrong. One particular self-employed person indicated that, 'In the experiment, as in real life I have not evaded any taxes, cheating is against my personality and therefore, I would not evade even if tax rates were 100%.' Although, we should not be too naive in accepting without question subjects' given reasons for not evading (or indeed for evading), a judgement experiment (discussed in Chapter 7) also points to the importance of ethics in tax compliance behaviour.

Our results also indicate age to be an important determinant of tax compliance. Young people engage in evasion more often and evade larger amounts. This confirms most of the previous survey and regression studies and the few experimental studies that investigated the issue (most experiments used students of similar age and therefore some did not incorporate the effect of age while others understandably found no significant effect (see Table 6.20). Some authors explained the positive effect of age on compliance theoretically as follows. Older people get increased benefits from government (retirement, help of heating cost, etc.) while paying less taxes, whereas it is the opposite for younger people. It may also be that younger people are less risk averse and therefore evade more. Warneryd and Walerud (1982) pointed out that the positive relationship between age and compliance in survey findings could be attributed simply to the honesty of younger people in confessing past evasion. However, experimental findings indicating age as positively associated with compliance make this explanation less likely. One important issue of the effect of age on compliance is to distinguish taxpayer aging from cohort effect, which requires data at the individual level on compliance over time (Schmidt, 1989).

Our findings also show that in general (experiment 5 and experiment 7) females are significantly more likely to evade than males, although women evade a much smaller fraction

of their income. The same results also found by Friedland *et al.,* (1978) and Benjamini and Maital (1985).

There is a difference in our findings concerning the effect of actual income in different experiments, i.e. wealthy subjects appear significantly more law-abiding in experimental group 1, while subjects with higher income evaded more often in experiment 7. One reason for this may be the huge difference in the average actual monthly income of subjects (65 million TL in experimental group 1 and 372 million TL in experiment 7).

The effect of having a university degree on tax compliance is found to be positive; indicating that tax evasion can be reduced by promoting higher education. None of the previous experimental studies investigated the effect of education on compliance (a natural result of recruiting university students as subjects). However, our findings are in line with some survey and regression studies (see Sub-section 3.3.7). Lewis (1982) pointed out that less educated individuals consider taxation only in terms of its burden, while ignoring the goods and services provided as a result of tax revenues. Our findings indicate that it is possible to increase tax compliance by increasing education level and tax ethics. These results show the importance of the multiple selves model (see Chapter 2) and indicate that policies that aim to changes preferences may be successful in reducing tax evasion levels.

CHAPTER 7

SURVEY RESULTS ON ATTITUDES AND INTENTIONS

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7.1 INTRODUCTION

In this chapter we investigate the effect of the perceived audit rate on the likelihood and amount of evasion. A tax evasion scenario was used in order to test the effect of the perceived audit rate, which is the subject of Section 7.2. Subsequent sections analyse subjects' tax ethics and their opinions of the tax system. The Likert type statements and an open-ended question were used to obtain information about tax ethics, perception of equity, trust in the government and what the taxpayers indicate as the reasons for tax evasion. Section 7.3 presents the statements that were used in the questionnaire and measures the reliability and unidimensionality of the tax ethics scales. The differences between evaders and non-evaders as well as those between students and non-students in their tax ethics scores are analysed in section 7.4. For a better understanding of taxpayers' attitudes, Section 7.5 examines the distribution of responses to the statements. In Section 7.6 a multiple response analysis of the reasons given (by subjects) for tax evasion is carried out. Finally, Section 7.7 concludes the chapter.

7.2 THE RELATIONSHIP BETWEEN THE PERCEIVED AUDIT PROBABILITY
AND TAX EVASION

It was explained previously that some theoretical and empirical studies imply a relationship between the perceived audit probability (rather than the actual one) and tax compliance. In order to test this relationship, experiment 7 included an evasion scenario (given in Appendix F), which was similar to that used by Violette (1989) to analyse the effect of legal sanctions and informal sanctions on compliance (See Chapter 3). In this experiment, the aim of the scenario was to try to discover if there is a relationship between the subjects' perceived audit rate and their decision to evade. Moreover, it was aimed to test whether

the amount of undeclared income is correlated with the perceived audit rate. The tax scenario described a self-employed business person who receives cash payments totalling 1 billion TL from several customers in one year. Subjects were told to assume they were the self-employed person in the scenario and asked answer the following three questions. First, they were asked the likelihood that they would declare the total amount (1 billion TL) to the tax authorities. The second question asked was what amount they would choose not to declare, and the third question was what the subjects thought the probability of audit in a year was for a person such as the one described in the scenario. There were no inconsistent responses by subjects to questions 1 and 2 which are used as dependent variables in our analysis. For example, no subjects indicated that they would report all of their scenario income on their tax returns (first question) by responding 'yes' and then expressed that they would evade any positive amount of income (second question).

7.2.1 Method and Basic Data Information

At the end of experiment 7, 38 non-student subjects were presented with the tax evasion scenario. The scenario asked subjects to assume that they were in a business (self-employed), which mostly involved receipts of cash rather than cheques, and that the total amount of cash received from different customers in a year totalled 1 billion TL. Participants were reminded that this amount was not subject to third party declaration (in mentioning this, the aim was to give an opportunity for evasion and prime the subjects to assume that the only way the tax authority would find out if they were underreporting would be through audit). Table 7.1. provides some demographic information about the subjects.

Table 7.1 Demographic Information

Category	Min.	Max.	Mean	Frequency
Age	18	67	37	38
Male				8
Female				30
Single				16
Married				22
Income per month	70 million TL	1.5 billion TL	372 million TL	38

The tax scenario was followed by three questions. The first asked if the subjects would report all of their income on a five-point scale. The responses to this question can be seen in Table 7.2. Since there are only 8 males in the sample, the information for the females only group is also presented in the tables and separate tests have also been carried out for female grouping order to compare the results.

Table 7.2 Subjects' responses to the question if they would declare all of their income.

Responses	Frequency for the whole group	Frequency for females only
Yes	5	3
Most probably	8	7
May be	12	8
Quite doubtful	2	2
No	11	10

The second question asked subjects the amount of income that they would choose not to report. This was measured on an asymmetrical seven point scale, since Yankelovich *et al.,*

(1984) and Chang *et al.,* (1987) reported that the majority of evasion is in the form of small amounts, the point scale allowing participants to choose small amounts of evasion in the form of 10 and 50 million TL.   Table 7.3 shows the overall responses.

Table 7.3 The amount of income a subject would choose not do declare (Evaded income).

Amount of Income Evaded	Frequency for the whole group	Frequency for females only
0 million TL	6	4
250 million TL	7	5
500 million TL	13	10
750 million TL	8	7
1 billion TL	4	4

As can be seen, no subject in our experiment chooses the amounts 10 or 50 million TL. This finding seems to be contrary to some previous findings in the literature, but it provides some evidence that if a taxpayer intentionally chooses to evade taxes by underreporting, then the amount of underreported income should be over a significant threshold.   In other words, hiding too small an amount of income from the tax authorities may not be worthwhile (this would be the case, for example, if the penalty was fixed and not related to the amount of evasion).

Finally, the third question asked the subjects what they thought the probability of audit was for a person like the one in the scenario (subjects were not given choices, they report the numbers themselves).   Table 7.4. shows the distribution of responses.

Table 7.4 The perceived probability of subjects

The perceived audit probability	Frequency for the whole group	Frequency for females only
0	3	3
0.01	5	2
0.04	1	1
0.05	6	4
0.1	10	9
0.125	1	1
0.15	1	1
0.2	3	2
0.25	2	2
0.4	2	2
0.9	1	1
1.0	2	1
Missing	1	1

The average perceived probability of audit is about 0.175, which is much higher than the real audit probability of between 0.03 and 0.05 (Aydemir, 1995). This finding is consistent with the findings of previous and experimental work that individuals in general overestimate probability of audit. However, note that 25 of the subjects do put a value at 0.1 or less. The high average perceived probability of audit seems to be caused by a few subjects estimating high likelihoods. The average perceived probability of audit for the females only group is about 0.174.

7.2.2 Non-Parametric Test Results

7.2.2.1 Test results for the likelihood of evading (responses to question 1)

Figure 7.1 indicates the likelihood of subjects declaring all of their income and their mean

perceived audit probability.

**Figure 7.1 The likelihood of subjects declaring all of their income
with their mean perceived audit rates**
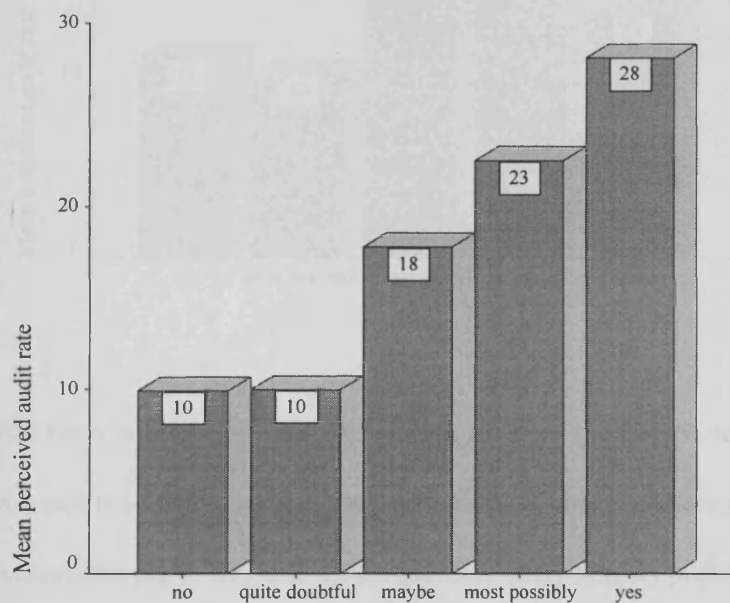
As it is clear from the figure the subjects who responded either 'no' or 'quite doubtful'

have the lowest perceived probability of audit. As the likelihood of a subject declaring all

of his/her income increases so does the mean perceived probability of audit. This result

seems to be in line with the theoretical and empirical findings in the literature. We need to

test whether these differences in perceived audit probability are statistically significant. On

the other hand, for the females only group there is not a clear pattern (see Figure 7.2).

Figure 7.2 The likelihood of females declaring all of their income

with their mean perceived audit rates
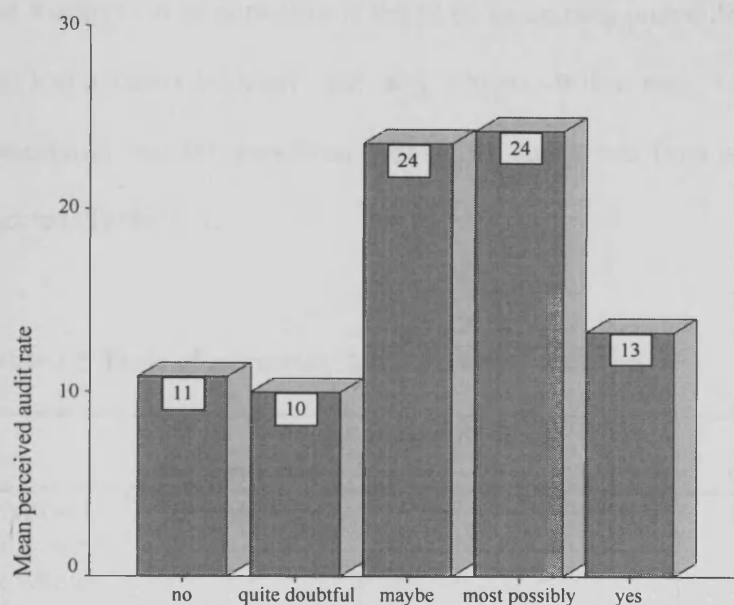
It has been argued that it is appropriate to apply parametric tests (i.e. *t* test) when the data possesses the following two characteristics: (i) there is interval or ratio scaling[1] and (ii) the observations are selected from an approximately normal population distribution with equal or homogeneous variance. Whilst non-parametric tests do not require these assumptions, they are less powerful than parametric tests (when the assumptions needed for the parametric test are met). However, there are also two assumptions required for non-parametric tests, which are that (i) the sample should be random, and (ii) values can be ordered (i.e. an ordinal variable). However, these assumptions are less restrictive than those for the parametric test. There are two commonly used tests for analysing normality:

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[1] Categories associated with a variable can be rank ordered. Moreover, the distances between categories are equal (such as income, age, etc.).

The Liliefors test which is based on a modification of the Kolmogrov-Simirnov test and the Shapiro-Wilks test.[2]

The assumption of normality is tested by examining probability plots and the outcomes of the Kolmogorov-Smirnov test and Shapiro-Wilks test. The results show that the assumption that the perceived probability data come from a normal distribution can be rejected (Table 7.5).

Table 7.5 Tests of normality for perceived audit rate

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistics	df	Sig.	Statistics	df	Sig.
Perceived audit rate for the whole group	0.290	37	0.000	0.616	37	0.010
Perceived audit rate for females only	0.276	29	0.000	0.642	29	0.010

Therefore, in order to test whether the differences are significant in each group, a non-parametric test would need to be applied. (Table 7.6).

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[2] SPSS for Windows Base System User's Guide Release 6.0

Tabel 7.6 Kruskal-Wallis H test for perceived audit rate (decision to evade)

Rank					
		For the whole group		**For females only**	
Would you declare all of the 1 billion TL?		N	Mean Rank	N	Mean Rank
Perceived audit rate	No	11	17	10	13.60
	Quite doubtful	2	20.5	2	15
	Maybe	11	18.64	7	15.71
	Most Probably	8	23.75	7	18.36
	Yes	5	16	3	10.17
	Total	37		29	
		Tests Statistics		**Tests Statistics**	
		Perceived audit rate		Perceived audit rate	
Chi-Square		2.417		2.458	
df		4		4	
Asymp. Sig.		0.660		0.652	

According to the Kruskal-Wallis H test, each case (observations) from each group are combined and ranked from the smallest to the largest value and the average ranks are assigned in the situation of ties. For each group, the ranks are summed and the Kruskal-Wallis H statistic is computed from these sums. Under the assumption that all groups have the same distribution, the H statistic has approximately a chi-square distribution. Since the significance level is greater than 0.05, there are no differences between the responses of subjects in the five groups in the mean ranking of the perceived probability of audit.

For further analysis the respondents were placed into two groups. The 5 subjects who responded 'yes' to the question (would you declare all of your income?) were called 'non-evaders' and grouped together. The remaining[3], 32, are grouped as 'evaders'. Figure 7.3 indicates the groups' mean perceived audit rate.

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[3] One female evader subject had a missing value for perceived audit rate.

in the future period, being audited again. An evader faces a lower perceived audit rate than a non-evader, that is on average, a non-evader, in column 1, indicated the perceived audit

Figure 7.3 Mean perceived audit rate of non-evaders and evaders for the whole group

We need to see if the evaders' perceived audit rate and the non-evaders' perceived audit rate differ significantly enough. In the Mann-Whitney U test is used to compare scores for two groups of scores. Specifically, the Mann-Whitney U test is used to compare scores in two groups. The reason for using these two tests are similar in that the scores have been converted to ranks. The results of the test are shown from Table 7.7.

Figure 7.4 Mean perceived audit rate of non-evaders and evaders for females only group
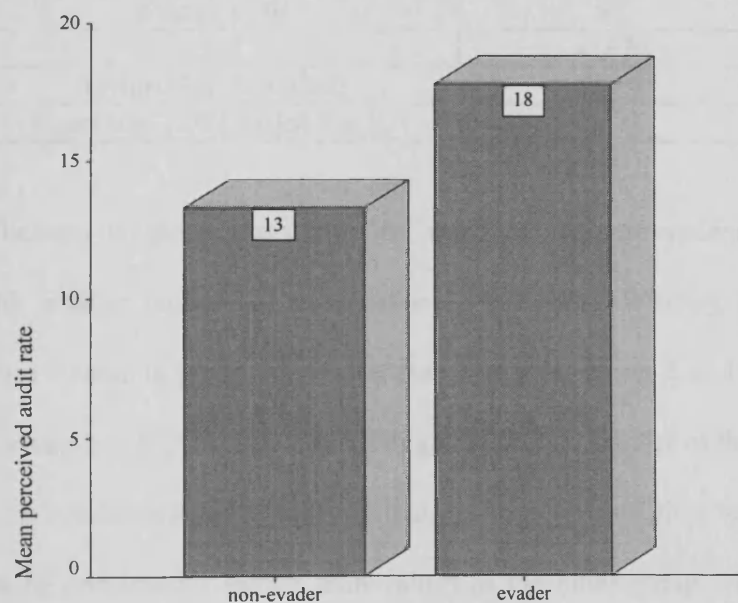
In the females only group, surprisingly non-evaders have a lower perceived audit rate than evaders, and there are only 3 non-evaders of whom 2 interestingly indicated a 0% perceived audit rate (see Table 7.8).

We need to carry out another non-parametric test (the Mann-Whitney U test) to see if these differences are significant. While the Mann-Whitney U test is used to compare scores for two groups (i.e. 'non-evaders', 'evaders'), the Kruskal-Wallis H test is used to compare scores in more than two groups. Otherwise, these two tests are similar in that the observations of groups are ranked together. The result can be seen from Table 7.7.

Table 7.7 Mann-Whitney U test for perceived audit rate (decision to evade)

Rank							
		For the whole group			**For females only**		
	Subjects	N	Mean Rank	Sum of Ranks	N	Mean Rank	Sum of Ranks
Perceived audit rate	Non-evader	5	16	80	3	10	30.50
	Evader	32	19.47	623	26	15.56	404.50
	Total	37			29		
		Tests Statistics			**Tests Statistics**		
		Perceived audit rate			Perceived audit rate		
Mann-Whitney U		65			24.5		
Wilcoxon W		80			30.5		
Z		-0.676			-1.056		
Asymp. Sig. (2-tailed)		0.499			0.291		
Exact Sig. [2*(1-tailed Sig.)]		0.531			.315		

Wilcoxon W shows the sum of the ranks for the non-evaders group since it is the group with smaller number of observations. The Mann-Whitney U calculates the number of times a value in group 1 is higher than a value in group 2, and the number of times a value in group 2 is higher than a value in group 1. The smaller of these two numbers is given as U. It is assumed that if two distributions are the same, then values from one group should not be consistently higher than values in the other group. The results show that the Z

statistic is not significant, and so there is no difference between 'evaders' and 'non-evaders' in the mean ranking of the perceived probability of audit. A closer examination of the non-evader group may explain the above finding. Table 7.8 indicates for two of the five of non-evaders, the perceived audit rate is zero.

Table 7.8 Perceived audit rate of non-evaders

Perceived audit rate in percentage	Frequency for the whole group	Frequency for females only
0 %	2	2
1 %	1	-
40 %	1	1
100 %	1	-

The insignificant finding is understandable in the light of a very small number of non-evaders and the realisation that for 2 female non-evaders the perceived probability of audit is zero and for 1 male non-evader it is only 1%. The perceived probability of audit being zero or very low but subjects not evading may strengthen the result uncovered earlier (see chapters 5 and 6) that there are some factors other than financial ones which may affect the tax evasion decision. People's tax ethics might be one of these non-financial factors; we explore this in section 7.4.

7.2.2.2 Test results for the amount of income evaded (responses to question 2)

The second question tried to quantify the amount of income subjects would not declare (amount of evaded income). Apart from the five subjects who responded 'yes' to question 1 (would you declare all of your income?), a sixth subject who responded to the first question as 'most likely' also indicated that the amount which he/she would not declare

(second question) was zero. Figure 7.3 shows the amount subjects said that they would not declare and their mean perceived audit rate.

Figure 7.5 The amount subjects chose not to declare
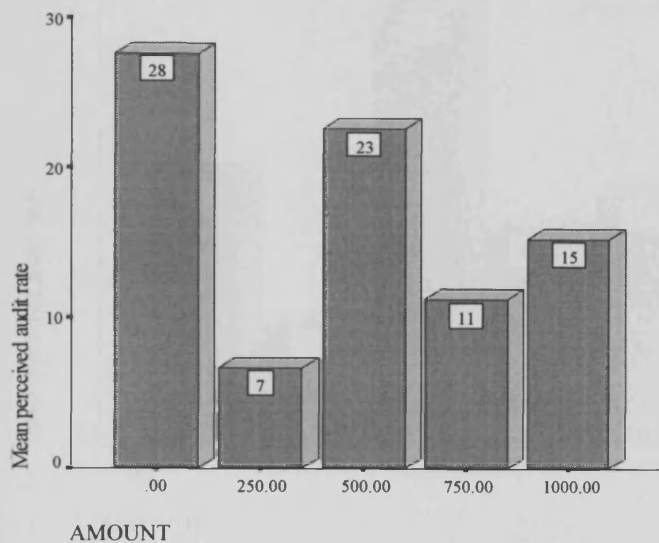
AMOUNT

Table 7.9 indicates the number of subjects who chose to evade each amount of income. Six subjects indicated they would report all their income and their mean perceived audit rate was 28%. Seven subjects indicated they would evade 250 million TL with a mean perceived audit rate of 7%. Thirteen subjects said they would evade half of the taxable income and their perceived audit rate was 23%. Eight subjects[4] said they would evade 750 million TL with mean perceived audit rate of 11%. Finally, four individuals claimed they would evade all of the 1 billion TL and their mean perceived audit rate was 15%. Figure 7.5 fails to show any clear relationship between the perceived audit rate and amount of income evaded, as does Figure 7.6 for the females group only.

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[4] One female subject who indicated that she would evade 750 million had a missing value for the perceived audit rate.

Figure 7.6 The amount females chose not to declare
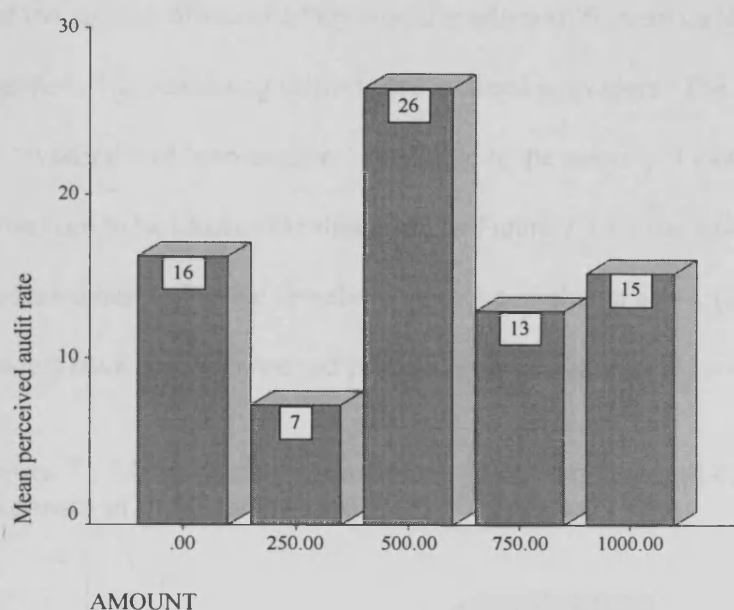
The non-parametric tests show that the differences in the mean ranking of perceived audit rate are not significant (Table 7.9).

Table 7.9 Kruskal-Wallis H test for perceived audit rate (amount of evasion)

Rank					
		For the whole group		For females only	
The amount subjects would evade		N	Mean Rank	N	Mean Rank
Perceived audit rate	00	6	18.58	4	13.75
	250	7	15.21	5	11.60
	500	13	20.50	10	16.20
	750	7	19.71	6	16.50
	1000	4	20.13	4	12.25
	Total	37		29	
		Tests Statistics		Tests Statistics	
		Perceived audit rate		Perceived audit rate	
Chi-Square		1.222		1.316	
Df		4		4	
Asymp. Sig.		0.874		0.859	

Again subjects were placed into two groups (whether they were evaders or not), but this time according to their responses to the second question. Here, the subjects who indicated that the amount of income they would evade was '0' were called non-evaders and grouped together. The remaining subjects are grouped as evaders. The mean perceived audit rates of 'evaders' and 'non-evaders' according to the amount of income they would not declare turned out to be identical to that given in Figure 7.3 for the whole group (therefore it is not presented here). For the females only group as shown below (Figure 7.7), again female evaders have higher perceived probability audit than female non-evaders.

Figure 7.7 Mean perceived audit rate of non-evaders and evaders (according to their responses to the second question) for females only group
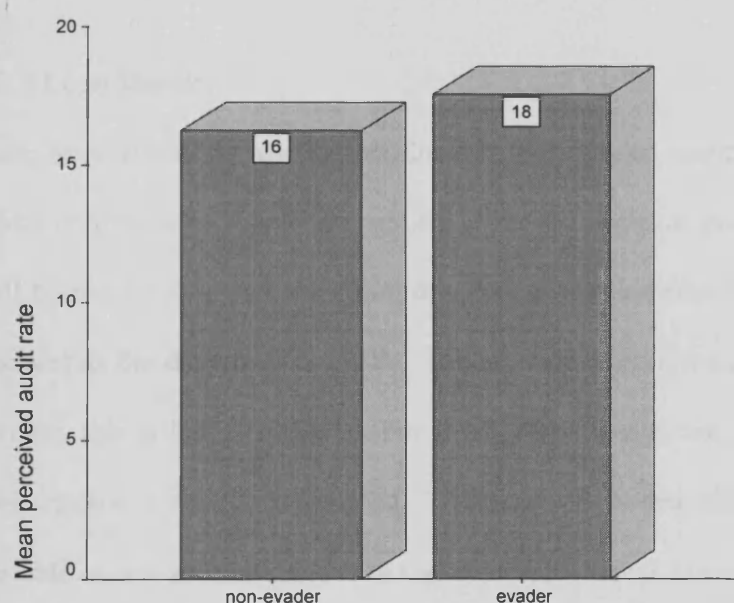
As with question 1, the differences are not statistically significant. (Table 7.10)

Table 7.10 Mann-Whitney U test for perceived audit rate (amount of evasion)

			Rank				
		For the whole group			For females only		
	Subjects	N	Mean Rank	Sum of Ranks	N	Mean Rank	Sum of Ranks
Perceived audit rate	Non-evader	6	18.58	111.50	4	13.75	55
	Evader	31	19.08	591.50	25	15.20	380
	Total	37			29		
		Tests Statistics			Tests Statistics		
		Perceived audit rate			Perceived audit rate		
Mann-Whitney U		90.500			45		
Wilcoxon W		111.500			55		
Z		-0.104			-0.322		
Asymp. Sig. (2-tailed)		0.917			0.748		
Exact Sig. [2*(1-tailed Sig.)]		0.920			0.784		

7.2.3 Logit Results

First, we will look at whether real income, age, gender, marital status, attitude to risk, tax ethics and perceived audit probability affect the decision to evade. The logit regression will be run for this purpose using the second question (the amount people choose not to declare) as the dependent variable. In this framework if a subject chooses not to conceal income, this is indicated by 0. For a subject who says that they would conceal some of their income, a value 1 is assigned. The results show that the only significant independent variable is real income (significant at 10% see Table 7.11). Higher income is associated with an increased probability of non-evading for the whole group. On the other hand, none of the variables is significant for the females only group.

Table 7.11 Logit Regression

Variables	For the whole group				For females only			
	β	S.E.	Wald	Sig.	β	S.E.	Wald	Sig.
Perceived audit rate	-.064	.045	-2.008	0.156	-.028	.057	-.239	.625
Age	-.062	.124	-.249	0.618	-.034	.151	-.051	.821
Male	2.620	2.813	.868	0.352	-	-	-	-
Single	12.829	61.198	.044	0.834	11.788	75.907	.024	.877
Tax Ethics	-1.077	1.391	.599	0.439	-1.676	1.854	-.817	.366
Risk	.628	.431	.044	0.145	.433	.447	.937	.333
Ln (real income)	-5.091	2.786	-3.338	0.068	-3.121	2.955	-1.115	.291
	Number of observations: 34				Number of observations: 27			

In order to test whether the amount evaded is related to the independent variables an OLS regression was estimated. This will only include evaders and the dependent variable is the natural log of the amount of evaded income. There are 32 observations and we want to the test the effect of seven independent variables, some of the observations for which are missing. For a standard regression, the ideal is to have 20 times more cases than predictors and the minimum requirement is to have at least 5 times more observations than independent variables (Coakes and Steed, 1997). If we include all the independent variables in our model we will end up with too few degrees of freedom. It was, thus decided to use the forward selection procedure in the SPSS. According to this, the first variable considered for entry into the equation is the one with the largest correlation with the dependent variable. Then the F test for the hypothesis that the coefficient of the entered

variable is zero is calculated. In order to determine whether this variable is entered the F values are compared to a criterion, which is the probability associated with F statistics. The default value of this criterion is 0.05 in SPSS. If the first variable chosen for entry fulfils the criterion, the forward selection procedure is repeated for the following variables. If not, the procedure stops with no variable in the equation. In our regression we ended up with no variable in the equation using a default value of 0.05 in SPSS. Therefore, the criterion value was increased (to 0.10) until at least one variable was entered into the equation. The model obtained is shown below (Table 7.12).

Table 7.12 OLS Regression in stepwise procedure

	For the whole group				For females only			
Model Summary	R^2= .225 Adjusted R^2= .163				R^2= .536 Adjusted R^2= .463			
Anova	df of freedom of residuals = 25 F=3.620				df of freedom of residuals = 19 F=7.315			
Variables	β	S.E.	t	Sig.	β	S.E.	t	Sig.
Tax Ethic	-136.759	64.064	-2.135	0.043	-197.393	56.556	-3.490	0.002
ln (real income)	-93.659	51.863	-1.806	0.083	-128.094	46.979	-2.727	0.013
Age	-	-	-	-	-8.622	3.673	-2.347	0.030

Increases in tax ethics and real income was associated with a lower amount of income evaded for the whole group. For females, as well as tax ethics and real income, age has also a negative effect on the amount of tax evasion.

Overall, the tax evasion scenario fails to find any relationship between the perceived audit rate and tax evasion behaviour (i.e. the likelihood of evasion and the amount of evasion).

Although Figure 7.1 indicated that the probability of a subject declaring all of his/her income increases with the mean perceived probability of audit, test results show that the differences are not significant. One reason for this finding may be the small number of observations and non-evaders, and the extreme values of perceived audit rates (See Table 7.4). Logit regression revealed that the decision to evade taxes is negatively correlated with income and OLS regression indicated that the amount of evasion is again negatively associated with tax ethics and real income.

7.3 SURVEY DATA

For experimental groups 2, 3, 5, and 6 there were ten survey statements (161 individuals responded) and in experiment 7 there were 22 statements to which 38 individuals responded, all responses being on a five point Likert scale ranging from strongly agree to strongly disagree and responses were scored from to five in answer to each item, the higher scores indicating a higher level of tax ethics. Of the 22 statements used in the last experiment, 10 were those used in experiments 2, 3, 5 and 6. Most of the statements were taken from the tax resistance scale developed by Spicer and Lundstedt (1976) and used by Jackson and Jaouen (1989), and some from Song and Yarbrough (1978). Of the 196 subjects who completed these statements, 117 were professionals and 79 were students. The six statements, which were intended to measure tax ethics, were as follows;

1- Since tax evasion hurts no one but the government, it is not a serious crime. *(Numbered as statement 1 in the questionnaire)*

2- A taxpayer does not need to give voluntary information about others' tax evasion if the tax inspector does not question him on that point. *(Numbered as 2)*

3- Considering the high cost of living today one should not be jailed for tax evasion. *(Numbered as 3)*

4- The main thing is not tax evasion, it is to not get caught. *(Numbered as 4)*.

5- There are too many loopholes for rich people so the average taxpayer should not be expected to obey all the tax laws. *(Numbered as 5).*

6- A person should report to the government anyone who cheats on his taxes, including a family member. *(Numbered as 10).*

In order to measure the perceived effectiveness of public expenditure, trust in the tax system and politicians, and equity, there were four further statements:

1- Government wastes taxpayers' money rather than using it wisely. *(Numbered as 6).*

2- Nowadays the tax system punishes honest taxpayers. *(Numbered as 7).*

3- In general, politicians think only of their own benefit rather than public benefit. *(Numbered as 8).*

4- The tax burdens of the lower class and middle class are heavier than that of the upper class. *(Numbered as 9).*

For the last experiment, we added 12 more statements, which measured tax ethics. These are as follows:

1- Given present tax burdens, one can hardly blame tax evaders. *(Numbered as 11)*

2- Given the easy availability of opportunities to evade taxes, one cannot blame tax evaders. *(Numbered as 12)*

3- If in doubt about whether or not to report a certain source of income, I would not report it. *(Numbered as 13)*

4- Since the IRS gets enough taxes, it does not matter that some people evade taxes. *(Numbered as 14)*

5- Taxes are so heavy that tax evasion is an economic necessity for many to survive. *(Numbered as 15)*

6- Cheating on taxes is justifiable in the light of the unfairness of the tax system. *(Numbered as 16)*

7- I would never pad my deductions. *(Numbered as 17)*

8- Since everybody evades taxes; one can hardly be blamed for doing it. *(Numbered as 18)*

9- I would never evade taxes. *(Numbered as 19)*

10- There is nothing bad about underreporting taxable income on one's tax return. *(Numbered as 20)*

11- If a person intentionally lists less income on his tax return than legally required, this does not diminish his/her respectability. *(Numbered as 21)*

12- I would not feel guilty, if I evaded taxes. *(Numbered as 22)*

7.3.1 Reliability

In any questionnaire, especially one using a multiple item scale, it is important to measure internal reliability. Reliability is defined as the degree to which a questionnaire is free from random errors. It is assumed that random measurement errors vary from one question (item) to another within the same scale. In other words making mistakes, misunderstanding a word in the statement and other random errors would affect some items in the scale but not others. According to this (assuming all the items are measuring same underlying concept), differences (i.e. low correlation) among items would indicate the influence of random errors (Judd, Smith and Rider, 1991). So, if there is a large random effect, scores in some items will be high and others low indicating low item-to-item correlation. On the other hand, a small random effect means each item is measuring a single idea so that the items making up the scale are externally consistent. A number of procedures for estimating internal reliability exist, of which Cronbach's alpha (Cronbach, 1951) is probably the best and certainly the most commonly used.

This method measures the correlation of each item with every other item on the scale. The nearer the result is to 1 the more internally reliable is the scale. In most studies in the literature the scale is considered reliable if alpha statistics are over 0.7.

Another issue to consider for multiple-item scales is whether a series of items all measure a single concept. This is called unidimensionality. In order to measure unidimensionality a correlation coefficient is obtained between an item and the rest of the scale. The scale is considered unidimensional when items correlate well. If this item to scale coefficient is less than 0.3 (the criterion used in previous studies), then the item should be dropped from the scale. Table 7.13 shows the results of the unidimensionality (corrected item-total correlation) and reliability for the Likert scale statements on tax ethics, which were completed by 161 individuals (38 individuals in experiment 7 also completed the same statement, and their responses are analysed below, Table 7.14, with the rest of the tax ethics items). The reliability coefficient for the scale is 0.7358, which suggests that the scale is just reliable. The corrected item-total correlation of all the items in the scale is more than 0.3. Therefore, no item needs to be dropped.

Table 7.13 Reliability Analysis -Scale (Alpha) Item-total Statistics

	Corrected Item-Total Correlation	Alpha If Item Deleted
ETHIC1	0.5468	0.6911
ETHIC2	0.5708	0.6672
ETHIC3	0.5650	0.6690
ETHIC4	0.3879	0.7205
ETHIC5	0.3037	0.7543
ETHIC6	0.5359	0.6806
Reliability Coefficient Alpha = 0.7358		

For experiment 7, 38 subjects responded to 18 statements measuring tax ethics.

Table 7.14 Reliability Analysis -Scale (Alpha) Item-total Statistics for experiment 7

	For the whole group		For Females Only	
	Corrected Item-Total Correlation	Alpha If Item Deleted	Corrected Item-Total Correlation	Alpha If Item Deleted
ETHIC1	0.7604	0.8654	0.7802	0.8762
ETHIC2	0.4808	0.8752	0.5240	0.8844
ETHIC3	0.5703	0.8714	0.5648	0.8829
ETHIC4	0.4684	0.8754	0.4491	0.8872
ETHIC5	0.4946	0.8743	0.5575	0.8832
ETHIC6	0.4559	0.8757	0.5025	0.8851
ETHIC7	0.5281	0.8731	0.5506	0.8834
ETHIC8	0.4514	0.8762	0.4592	0.8869
ETHIC9	0.4585	0.8756	0.5724	0.8831
ETHIC10	0.3985	0.8775	0.3359	0.8896
ETHIC11	0.6313	0.8692	0.6491	0.8804
ETHIC12	0.2961	0.8815	0.2434	0.8935
ETHIC13	0.3104	0.8810	0.3152	0.8917
ETHIC14	0.5499	0.8722	0.5066	0.8850
ETHIC15	0.6114	0.8705	0.7583	0.8773
ETHIC16	0.7737	0.8636	0.7519	0.8763
ETHIC17	0.5708	0.8716	0.6620	0.8797
ETHIC18	0.3232	0.8803	0.3488	0.8903
Reliability Coefficient Alpha	0.8801		0.8901	

The reliability coefficient (alpha) of this scale is high, 0.8801 (0.8901 for females only) and all the item-total correlations apart from *ethic12* is over 0.3. Since the correlation coefficient of *ethic 12*, 0.2961 (0.2432 for females), is lower than the 0.3 criterion, it is dropped from the scale, as a result of which the reliability coefficient of the scale increases to 0.8815 (0.8935 for females).

Four statements aimed at measuring trust and equity had a low alpha coefficient and are therefore not used in the analysis.

7.4 DIFFERENCES IN TAX ETHICS

7.4.1 The Difference in tax ethics between evaders and non-evaders

In this section, we will consider whether there is a difference between evaders and non-evaders in their average tax ethics scores (i.e. of the 6 items, statements 1,2,3,4,5 and 10). Of the 161 subjects who responded to the statements, 144 declared less than their real amount of income one or more times during the experiments. On the other hand, 17 subjects were completely honest throughout. It is interesting to see if there is a difference between these two groups in their tax ethics. The mean value of the tax ethic score for evaders is 3.36, while it is 3.72 for non-evaders. It has been argued above that to apply a parametric test the level of measurement should be more than ordinal. However, it has been noted that parametric tests are routinely applied to variables, which are ordinal in nature, such as attitudes (Bryman and Cramer 1997). Therefore, to decide which test should be applied, we need to test whether the data is normally distributed. (Table 7.15)[5]

Table 7.15 Tests of Normality for tax ethics

	Kolmogorov-Smirnov		
	Statistic	df	Sig.
Tax Ethics	0.090	161	0.003

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[5] The Shapiro-Wilks' statistics are not calculated in SPSS when the sample size exceeds 50.

The Kolmogorov-Smirnov test of normality reveals that the tax ethics score does not come from a normal distribution. It is thus appropriate to use a non-parametric test. Table 7.16 gives the results of applying the Mann-Whitney U test.

Table 7.16 Mann-Whitney U test for tax ethics

Rank		N	Mean Rank	Sum of Ranks
	Subjects	N	Mean Rank	Sum of Ranks
Tax Ethics	Non-evader	17	103.12	1753
	Evader	144	78.39	11288
	Total	161		
Tests Statistics				
		Tax Ethics		
Mann-Whitney U		848		
Wilcoxon W		11288		
Z		-2.075		
Asymp. Sig. (2-tailed)		0.038		

The results of the Mann-Whitney test show that there is a significant difference between the tax ethics of evaders and non-evaders, with non-evaders having 'more positive tax ethics'.

For the last experiment, there were only two completely honest subjects out of 38 and one honest subject's responses to some statements were missing. Therefore, the same analysis could not be carried out for participants in experiment 7.

7.4.2 The differences in tax ethics between students and non-students

Table 7.17 shows the mean value of tax ethic scores for students and non-students according to whether they are evaders or not.

Table 7.17 The Difference in tax ethics between students and non-students

	Non-students	Students
Non-evader	3.95	3.38
Evader	3.39	3.32
Subjects	3.45	3.33

The mean score on tax ethics for non-students is 3.45, while it is 3.33 for students.

However, the difference in their mean ranking is not statistically significant (see Table

7.18).

Table 7.18 Mann-Whitney U test for tax ethics

Rank				
	Subjects	N	Mean Rank	Sum of Ranks
Tax Ethics	Non-students	83	84.27	6994
	Students	78	77.53	6047
	Total	161		
Tests Statistics				
				Tax Ethics
Mann-Whitney U				2966
Wilcoxon W				6047
Z				-0.920
Asymp. Sig. (2-tailed)				0.358

7.5 RESPONSES TO THE STATEMENTS

### 7.5.1 The Distribution of Responses to the Statements

In this section responses to the six tax ethic statements are presented by means of Figures

and percentages.

7.5.2 Tax Ethics Statements

Tax ethic 1 *(Since tax evasion hurts no one but the government, it is not a serious crime).*

An overwhelming proportion (89.8%) disagreed with this statement. Except for a small minority (4.1%), tax evasion is apparently regarded as a serious crime by most people. (Figure 7.8)

Figure 7.8 Responses to tax ethic 1
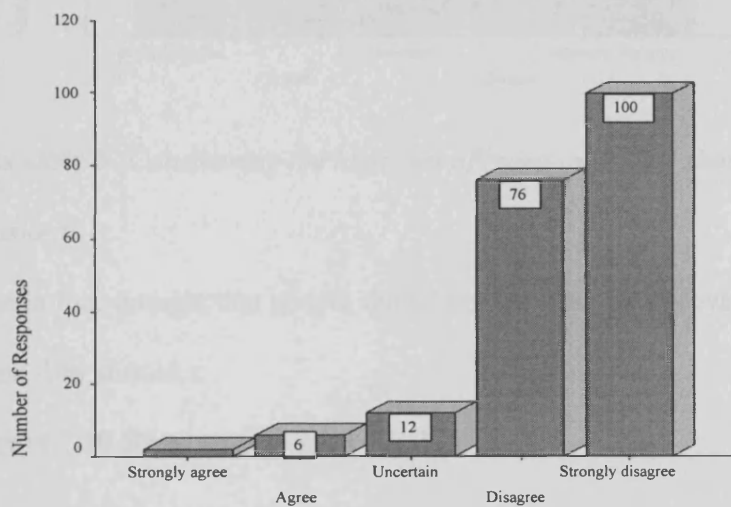
Tax ethic 2 *(A taxpayer does not need to give voluntary information about others' tax evasion if the tax inspector does not question him on that point)*

For this there were mixed responses; 42% thought that taxpayers should not give information about others' tax evasion while 45% thought they should.

Figure 7.9 Responses to tax ethic 2
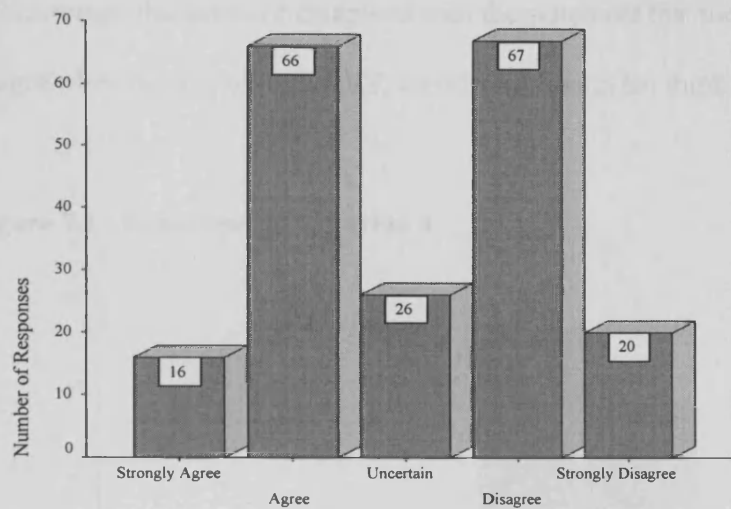
Tax ethic 3 *(Considering the high cost of living today one should not be jailed for tax evasion).*

One in four thought that people should not be jailed for tax evasion but 61% of respondents think they should.

Figure 7.10 Responses to tax ethic 3
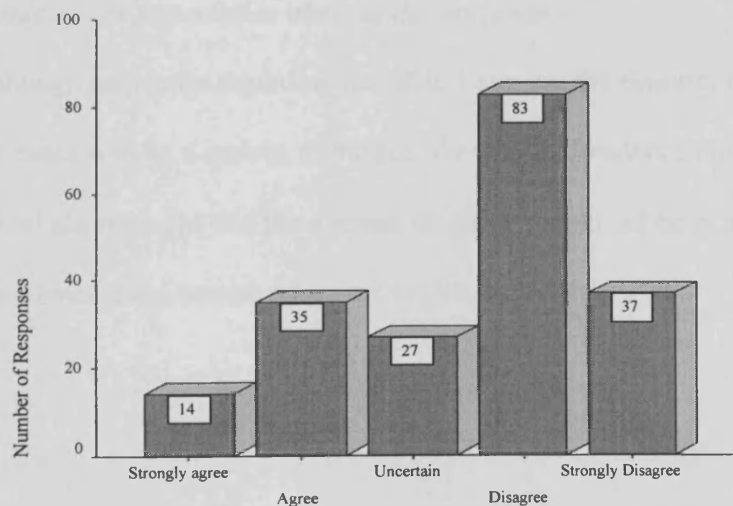
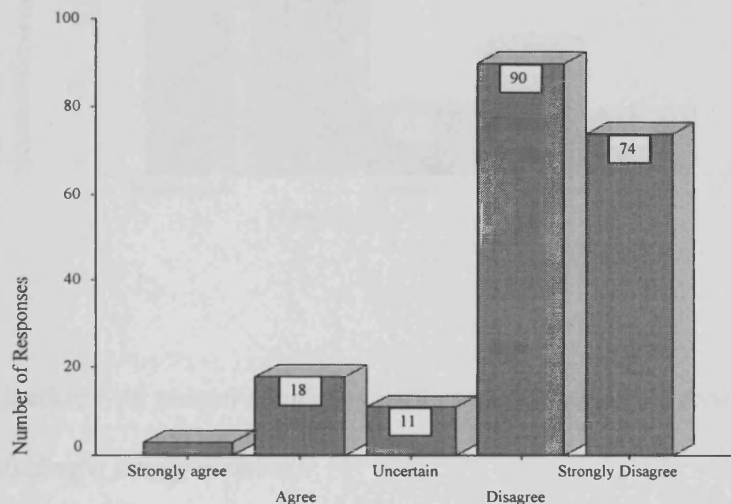**Tax ethic 4** *(The main thing is not tax evasion, it is not to get caught).*

84% strongly disagreed or disagreed with the statement that the main thing is not to get caught when dealing with the IRS, whilst only one in ten think otherwise.

Figure 7.11 Responses to tax ethic 4

Tax ethic 5 *(There are too many loopholes for the rich people so the average taxpayer should not be expected to obey all the tax laws).*

Although responses regarding tax ethic 1 suggest the majority of the respondents consider tax evasion to be a serious crime (i.e. for which offenders should be jailed), the majority (71%) also thought that the average taxpayer should not be expected to obey all the tax laws, since there are too many tax loopholes for rich.

Figure 7.12 Responses to tax ethic 5
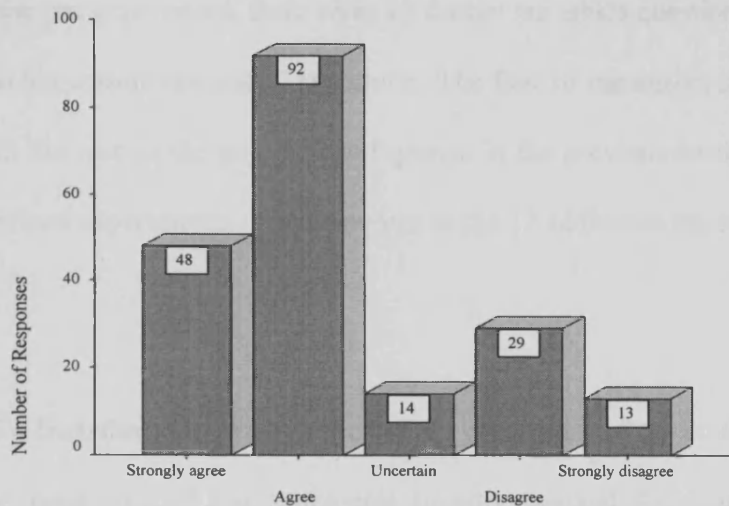
Tax ethic 6 *(A person should report to the government anyone who cheats on his taxes, including a family member).*

Statement 6 implied that taxpayers should report evaders, even if the cheater is a family member. Twenty-eight percent agreed with and 40% were disagreed with this.

Figure 7.13 Responses to tax ethic 6
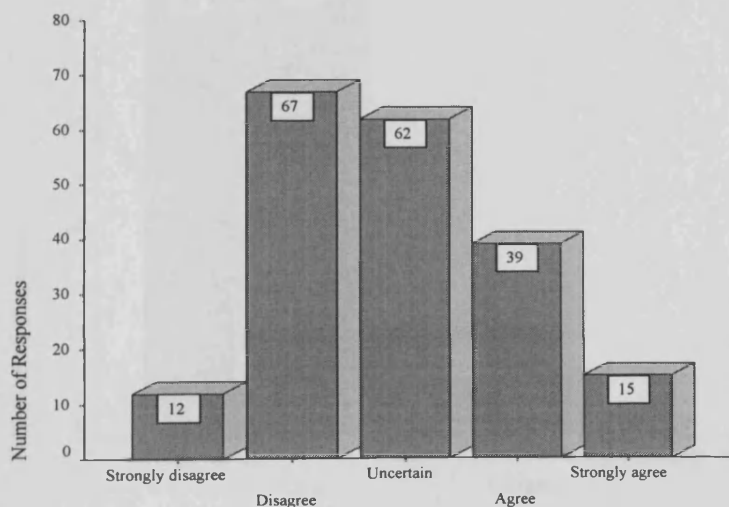
7.5.3 Additional Tax Ethics Statements

In the last experiment, there were 12 further tax ethics questions, the purpose of which was also to measure taxpayers' tax ethics. The first 10 statements in the questionnaire, analysed with the rest of the experimental groups in the previous section, were the same as in the previous experiments. The responses to the 12 additional statements are given in Appendix G.

7.5.4 Distributions of responses to the remainder of the statements

The remainder of the statements broadly covered the issue of trust and confidence, specifically whether and to what degree respondents trusted the government, the tax system, politicians and equity. The results indicate that the overwhelming majority of the sample do not trust the government or the tax system. (See Figures 7.14, 7.15).

Figure 7.14 Trust in government
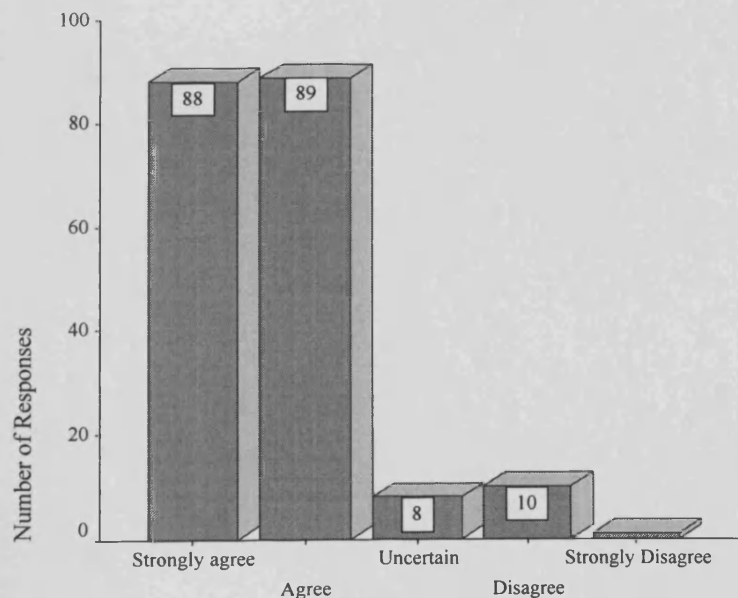
Figure 7.15 Trust in tax system
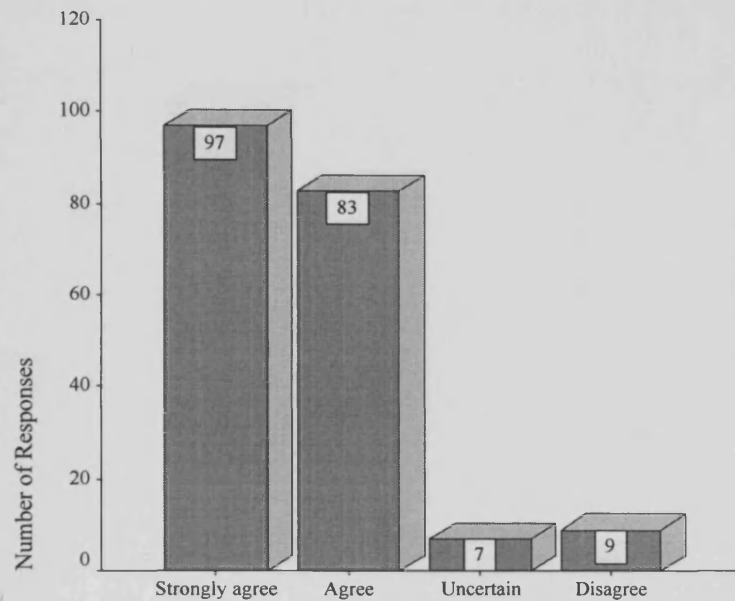
95.5% of the respondents agreed with the statement that politicians think of their own benefit rather then of their citizens, which shows that trust in politicians is very low (Figure 7.16). While only 1.5% (3 people) disagreed. Responses to the statement about equity were similar. (See Figure7.17).

Figure 7.16 Trust in politicians
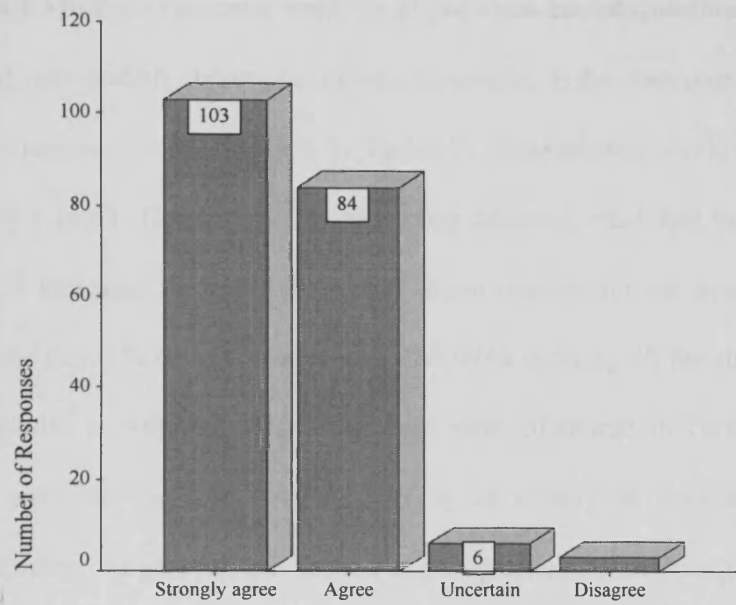
Figure 7.17 Trust in equity
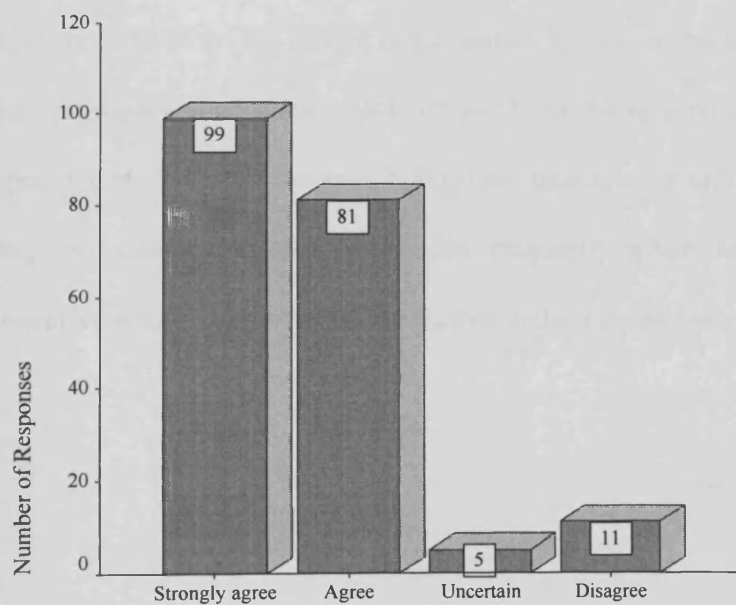
7.6 THE REASONS FOR TAX EVASION

7.6.1 Multiple response analysis of the open-ended question

185 non-student, income taxpayers, responded to the open question, 'What do you think are the reasons for tax evasion in Turkey?' Respondents could suggest as many reasons as they wished. There were 544 responses obtained, classified as 89 different reasons. Table 7.19 indicates the most frequently given reasons for tax evasion, i.e. those counting for more then 1% of total responses. The table showing all the suggested causes of evasion is included as Appendix H. Responses were, of course, in Turkish, and care has been taken to translate these to English keeping as closely as possible to the original, intended meaning. In general, the section of the questionnaire inviting respondents to *explain* their given reasons for tax evasion helped enormously in sorting out exactly the meaning of the suggested reasons (for example, it enabled us to find out what kind of unfairness subjects had in mind).

Examination of the responses listed in Table 7.19 shows that the overwhelming majority of taxpayers focused on the lack of effectiveness in discovering the evaded income (low audit rates, low quality of audits, lack of audit for some groups, lack of education of tax inspectors, etc.) Unfair tax laws that do not take income into account, low fines, high tax rates, too many amnesties were also frequently given answers by subjects. Brief descriptive information about these factors in the Turkish tax system is given in Chapter 1.

Table 7.19 Given reasons of tax evasions

REASONS	COUNT	PERCENTAGE of RESPONSES
1- Low audit rate	98	18.0
2- Unfair tax laws (do not take income into account)	56	10.3
3- Low Fines	31	5.7
4- Tax rates are too high	31	5.7
5- Too many tax amnesties	24	4.4
6- Lack of education of taxpayers	19	3.5
7-Low income of taxpayers	19	3.5
8- Too many loopholes in tax laws	16	2.9
9- Taxes are not returned as services by government	15	2.8
10- The quality of audits is low	13	2.4
11- Tax laws are too complicated	13	2.4
12- Minimum income level is not excempt of taxation	11	2.0
13- Unfair income distribution	10	1.8
14- Low morality and low ethics in the society	9	1.7
15- People's desire to make more money in a short time	8	1.5
16- Lack of understanding citizenship duty	8	1.5
17- Bribery	7	1.3
18- Frequent changes in tax laws	7	1.3
19- Tax system's low ability to capture some sort of income	7	1.3
20- Tax inspectors' lack of education and knowledge	6	1.1
21- Instability of economy	6	1.1
22- Inefficient tax legislation	6	1.1
Total responses	420	77.3

7.7 CONCLUSION

The evasion scenario failed to find any significant effect of the perceived probability of audit upon both the likelihood and the amount of evasion. We believe that the small number of non-evaders and the relatively small numbers of observations might have led to this finding. However, Logit regression indicated a significant effect of real income on the likelihood of evasion, and OLS regression pointed to significant effects of tax ethics on the amount of evaded income. Overall scores on the tax ethics scale also confirm the importance of tax ethics by indicating that non-evaders have significantly higher ethics than do evaders. We suggest that the taxpayers' responses to the direct, open question

asking for their opinion as the reasons for evasion might be helpful for understanding of tax compliance. However, note that we need to be cautious about the given reasons for evasion, since they may represent a justification for evasion rather than a cause of it.

CHAPTER 8

SUMMARY, DISCUSSION AND CONCLUSION

8.1   INTRODUCTION

8.2   OVERVIEW OF STUDY

8.3   CONTRIBUTIONS

8.4   POLICY IMPLICATIONS

8.5   LIMITATIONS

8.6   DIRECTIONS FOR FUTURE RESEARCH

8.1 INTRODUCTION

This chapter consists of 6 sections. While Section 8.2 presents the summary, Section 8.3 indicates the contributions of the study. The policy implications of the findings are discussed in Section 8.4. The potential limitations of the results are the subject of Section 8.5, and finally, suggestions for future research are offered in Section 8.6.

8.2 OVERVIEW OF STUDY

The main purpose of this research has been to test the effect of economic and non-economic variables on income tax evasion behaviour. The variables considered were income, the tax rate, the audit rate, the perceived audit rate, the procedure of audit, previous audits, the severity of punishment, the expected fine, the combination of the expected fine, public transfers, risk measure, actual income, tax ethics and demographic variables. Another purpose has been to investigate whether students behaved differently than non-student subjects in the tax experiments. Most previous experiments have been conducted using student subjects which may be problematic for a number of reasons. Most obviously, students are not experienced in filling in tax returns and in tax matters and the use of only student subjects may therefore limit the generality of the results obtained. Several authors have criticised the previous experimental studies in the subject of tax compliance because of the use of student participants (e.g. Fischer *et al.*, 1992; Andreoni *et al.*, 1998). Our study has been carried out using participants from variety of professions, in addition to groups of students.

In Chapter 1 we gave some background information about the individual income tax system in Turkey as well as some evidence about the underground economy, and indicated

those who have the greatest opportunity to evade income taxes. Objectives, methodology and the significance of the study were also discussed in this chapter.

In Chapter 2 we explained the simple economic model of income tax evasion (e.g. A-S, 1972 and Yitzhaki, 1974), which examines how various factors affect tax evasion behaviour. The model indicates that under the assumption of DARA, tax evasion would increase with income. However, the model is ambiguous as to how evasion as a proportion of income changes as income increases, in fact this depends on the assumption about relative risk aversion. If relative risk aversion increases then the proportion of income evaded will decrease, if it decreases then evasion will increase relative to income, while if there is CRRA the proportion of income evaded will be invariant to changes in income (see Table 2.1 for the prediction of the A-S model and see Table 2.2 for the predictions of Yitzhaki's model under specific utility functions). The effect of the tax rate on compliance according to the simple economic model is also ambiguous. Nevertheless, Yitzhaki's (1974) model show that if the penalties for evasion are imposed on evaded tax (as it is in the USA, the UK, Turkey and many other countries) rather than undeclared income an increase in the tax rate reduces the amount of income evaded under DARA or CARA, a result which seems contrary to the common sense. Basic models of tax compliance all indicate that the penalty rate and the probability of detection are substitutes for each other and increases in either of these variables would lead to a higher compliance rate. The basic theoretical model has been criticised as having unrealistic assumptions. Many economists have therefore tried to relax the more restrictive assumptions and increase realism by introducing such factors as endogenous income, social norms, fairness, etc. These models are also explained in Chapter 2. Other theories and models relevant to tax evasion behaviour, which do not use expected utility theory, are also discussed in this chapter in

order to give a broad picture and lay the groundwork for understanding the findings of previous empirical works as well as those of this study in the area of tax compliance.

The income tax evasion literature consists primarily of three types of empirical studies: (i) survey studies, (ii) regression studies and (iii) experimental studies. In Chapter 3 we summarised the survey and regression works, their methodological issues and findings (see Table 3.1). A weakness of the survey method, which relies upon individuals telling investigators about their participation in tax evasion, is that income tax evaders may either fail to respond or may respond in a dishonest manner to enquiries about their tax affairs. Hessing *et al.,* (1988) have explored the limitations of the survey method in their study. They reported insignificant correlations between respondents' self-reports of tax evasion and officially documented behaviour. In general, results from surveys indicate that many taxpayers tolerate small-scale evasion. It is also found that the probability of audit is overestimated by individuals. Furthermore, opportunities for evasion are indicated to be an important determinant of compliance. Some survey studies reported that the old, married and those who think the tax system is fair evade less. However, higher income groups in general evade larger amount of income.

Many authors have also criticised regression studies. The problem confronting analysis of income tax returns is that reliable inference requires the sample to be random. In many jurisdictions the detailed analysis that has been carried out into taxpayers' fiscal affairs by the internal revenue service (and which might form the basis of researchers' samples) has been of a group who are thought to be tax evaders, and who thus do not constitute a random sample of income taxpayers. One exception to this is the USA data generated as part of the Taxpayer Compliance Measurement Programme (TCMP), which has been analysed by Clotfelter (1983), Dubin *et al.,* (1987) and Witte and Woodbury (1985)

amongst others. However, TCMP data are also not entirely problem free; IRS audits have more ability to detect over-reported deductions than under-reported income where the burden of proof is the responsibility of the IRS. Also, TCMP audits do not include non-reporters. Moreover, these audits measure both taxpayers' intentional evasion and unintentional mistakes, and in determining the voluntary compliance rate, overpayments and underpayments are combined. The results of regression studies indicate that a higher income level leads to more evasion and in general, the effect of the audit rate seems to be negative upon the amount of evasion (however, there are some important concerns about this finding, see Sub-section 3.3.5.1). Self-employed and younger people are found to be less compliant. However, the effect of the tax rate on compliance is not clear from the results of regression studies.

In Chapter 4, we summarised the experimental methodology and its limitations, and reviewed a number of studies. The basic design of experiments in the income tax evasion literature has been similar. Usually, they have been performed as games played with student subjects who are given a 'paper' income (referred to as 'gross income') and then asked to decide how much of that income to report to the 'tax authority'. Participants pay taxes on reported income only, but reported income is audited with some probability usually known in advance by participants. If a participant is subsequently found to have failed to declare everything, then he/she pays a fine at a known predetermined rate. The process of declaring income and auditing declarations continues for a certain number of rounds and at the end of the experiment subjects are rewarded according to their net income minus fines (which is defined as gross income minus taxes and penalties). During the experiment the effect of various factors, such as the tax rate, income, probability of audit and fine rate can be seen by changing their values in certain rounds over the period of

the experiment. A major advantage of the experimental approach is that the possible explanatory variables can be manipulated and controlled directly. A drawback, however, is that individuals involved in the experiment may not behave as they would in real life. For example, participants may try to guess the objective of the experimenter and either behave how they think the experimenter wishes them to or attempt to sabotage the experiment. As a consequence, some investigators have tried to mask the real objective of the experiment within a business game (Webley *et al.,* 1991). Webley and Halstead (1986) found that subjects who perceived the experiment as a tax declaration were almost entirely honest, while subjects who considered the experiment as a game in general declared only part of their income. They criticised previous experimental studies in which the purposes of the experiment were transparent. However, Robben *et al.,* (1990) found no evidence that subjects who guessed the correct purpose of the experiment were more likely to under-report their income. Another potential disadvantage of the experimental approach is that some aspects of the real life evasion decision to are difficult to incorporate into the experiment. For example, how can one mimic the social stigma (or shame) of either failing to declare all of one's income or being exposed as a cheat? Although, there may be some ways to incorporate the stigma effect, successful manipulation seems to be difficult (see the experiment by Bosco and Mittone, 1997). These issues will be evaluated further when the limitations of this study are discussed below.

The majority of experimental works on the subject of tax evasion indicate that people evade more as their tax rate increases. An increase in penalty and audit rate has a positive effect on compliance. Moreover, some experiments have found that there are some individuals who overestimate the probability of audit (e.g. Alm *et al.,* 1992b). In general, subjects decreased evasion with increasing amount of public transfers. It was also found

that tax evasion would increase when individuals feel that they are treated unfairly. Finally, demographic variables such as gender and age seem to affect tax evasion behaviour. Perhaps importantly, however, the above results of experiments in the literature are not always consistent. Some of the experimental results contradict others (see Table 6.20). It is possible that different experiments find different results depending on whether individuals regard the situation as a game or a tax evasion decision.

In chapter 5, the methodology and the objectives of the experiments are explained and some basic information about them is presented. We have carried out seven experiments with Turkish citizens in order to analyse the determinants of tax evasion. In total, 268 subjects successfully participated in the experiments (very few subjects dropped out from the experiments, either because they did not complete all the rounds or indicated that they did not take the experiment seriously enough). Experimental group 1 included experiments 1,2,3, and 4 and a total of 153 non-student subjects successfully completed these experiments. The instructions were read to subjects, who were assured of confidentiality and anonymity. It was explained that the study was for the purpose of academic research. The instructions explained that each subject would receive salary slips for each round of ten months and there would be 4 rounds altogether. Terms such as 'taxable income', 'audit probability' and 'penalty' were used in the experiments. For each 'month', participants had to decide how much of their taxable income to report to the tax authority, on which tax was paid. Audits were conducted randomly according to a predetermined frequency, of which the subjects were informed. When subjects were audited and their income was found to be under-reported, a fine (a predetermined and announced multiple of evaded tax) was imposed.

Envelopes containing the instructions and the tax table for each round were given to each of the subjects at the beginning of one day and collected on the following day. The tax table told them what their income was for each month in that round. Each individual's income was the same as the other individuals, but they received different income amounts each month in order to find any income effect and make the experiment more interesting for the participants. For the first round, the tax rate was 25%, the fine magnitude was 3 times the tax evaded, and audit rate was 10% for each month. In subsequent rounds these parameters were varied. The chosen values were written at the top of the tax tables for each round. Participants entered their 'declared income', the amount of 'income tax' and 'net income' (gross income-income tax) in the appropriate columns of the form. Audit selection was performed upon the receipt of the completed forms for each round, by drawing numbered chips from a container, with one chip for each subject. The columns headed 'audited', 'fine' and 'net income less fine' were completed by the experimenter, and the completed forms for each round were returned to the participants along with tax tables for the next round. The experiments continued in this fashion for four rounds. At the end of the experiment participants were asked to complete a small questionnaire, which provided information about, amongst other things, their age, sex, marital status, number of children. Prizes were given to the participants who had the highest net income less fines at the end of experiments. The main aim of this experimental group was to find out the effect of income, tax rate and expected fine on the decision to evade and the amount of evasion. The fifth experiment was carried out with sixty students in the fourth year undergraduate management course at the Middle East Technical University in Ankara. This experiment was undertaken in a lecture room and lasted about 1 hour. It consisted again of four rounds but this time there were three months in each round. The main purpose of the experiment

was to replicate most of the previous experimental methodology (laboratory/classroom environment, student subjects, etc.). Another aim was to test whether a large fine coupled with a small probability of audit was a more effective deterrent than a small fine with a high probability of audit. In all rounds the expected fine was held constant. The prize was £30 for the subjects who had the highest net income.

Experiment 6 was carried out in Leicester with 19 Turkish student subjects. The method and the parameters used were the same as with the first experimental group. The aim of the experiment was to see if students behaved differently in their tax evasion decisions from non-student subjects when the exact methodology was applied for both groups. A prize of £20 was given to the participant who had the maximum net income at the end of the experiment.

Finally, experiment 7 was carried out with 38 participants who were mostly self-employed business people. The experiment looked at the effects of non-random audit, public transfer, fine multiple, probability of audit, previous audits and tax rate among other things. In this experiment prizes were given to each participant according to his/her net income less fine, the lowest prize won by a participant being (only) £7.50, while the highest was about £18.

Chapters 6 concentrates on an investigation of how various variables affect the decision to evade taxes, the proportion of income evaded and the amount of taxes evaded. The results indicated that the variable tax rate has a very strong positive effect upon both the decision to evade income tax and upon the amount and proportion of income tax evasion, once individuals have decided to evade. On the other hand, the variable expected fine had the positive deterrence effect on both the decision to evade taxes and the amount of taxes evaded. The effect of income was positive upon the decision to evade and upon the

absolute amount of evasion, but negative upon the degree of evasion. This implies that although increases in income lead to a higher amount of evasion, the proportion of undeclared income decreases with income. The results also indicated that public transfers and non-random audit have a positive effect on compliance. The effect of fine multiple was as expected on the decision to evade. We found that the variable audit rate had a positive effect upon the decision to evade, a finding that seems to be against common sense, a result which can, however, be explained by 'spite' and 'crowding out' effects. When we run our models with the four rounds in experiment 7 in which the value of parameters were the same as those for experimental group 1, the results indicated that the effect of expected fine was still positive. So some methodology changes we made in experiment 7 did not seem to affect the results.

The results from experiment 5 did not indicate that a large fine with a small probability of detection were more effective in deterring the occurrence of evasion, but it was more effective in reducing the degree of evasion amongst evaders. We found that students are more compliant than non-students (when the same experimental methodology applied). However, students evaders did not behave substantially differently to employed people of the same age.

Finally, we found that young people in general evade more often and by a larger amount of income. The effect of variable risk tended to be positive while the effect of tax ethics was negative on the decision and the proportion of evasion (see Table 6.20 for a summary of these and the previous experiments' findings).

In Chapter 7, we investigated the effect of the perceived audit rate on compliance by employing an evasion scenario. It failed to show any significant effect of the perceived probability of audit upon either the likelihood or the amount of evasion. We believe that

the reason for this may be the small number of non-evaders and the relatively small numbers of observations. However, logit regression indicated a significant effect of real income (for the whole group) on the likelihood of evasion, and OLS regression pointed to significant negative effects of tax ethics and real income on the amount of evaded income (both for the whole group and for females only). On the other hand age had a negative effect on the amount of evasion for females only group. Overall scores on the tax ethics scale also indicated that non-evaders have significantly higher ethics than do evaders. Finally, a multiple response analysis of the reasons given by subjects for tax evasion indicated that the majority of taxpayers thought low audit rates and unfair tax laws, as well as low fines and too many amnesties were the main causes of evasion. However, note that we need to be careful about the given reasons for evasion, since they may represent a justification for evasion rather than a cause of it.

8.3 CONTRIBUTIONS

This study makes several contributions. First of all, we tried to make some improvements in the experiments and their methodology in order to make decisions made by participants more credible, and thus to improve the reliability of the findings. Unlike most previous experiments in the field of tax evasion, we conducted the main experiments outside of the classroom/laboratory environment. Subjects did not use microcomputers since they may be associated with playing games and this is not how the people fill in their tax declaration in real life. In order to make the experiments closer to the actual tax assessment procedure, and also to protect privacy by giving participants the opportunity to complete the tax forms in their own homes, five of the experiments were conducted over a longer time period. Moreover, the instructions in the experiments did not demand that subjects maximise

income as many previous experiments did. Especially in the early previous experiments the value of the parameters were set without regard to their realistic values and were changed in large, discreet jumps. The values of variables used in our experiments were chosen to be consistent with the actual policy parameters in Turkey. In addition almost all of the previous experiments have involved small numbers of participants, typically fewer than 50 students, and sometimes as few as 10-15. A larger number of subjects should increase the reliability of the experimental findings. In this study there is a total of seven experiments, involving 268 participants, which makes it one of the largest tax evasion experiments undertaken.

As far as I am aware, this is the only experimental study carried out in the subject of tax evasion in a developing country. There have been a number of experiments carried out in developed countries such as the USA, the UK, Italy, Spain, etc. However, it is likely that specific fiscal climate, norms, moral values, religion, etc. in a country will affect participants' behaviour in the experiments. Thus the experimental research that has been carried out into tax evasion here gives specific and valuable information about the taxpayers in a developing country, and specifically, in Turkey.

The experiments have tested a wide variety of factors that are thought to be determinant of tax evasion. We have not only tested the effect of the variables that are considered to be important from a neo-classical perspective (income, the tax rate, the audit rate and the penalty), but also factors indicated as important by bounded rationality and behavioural models (such as previous audits, tax ethics, education, etc.).

The findings of this study provide several major contributions both in the form of new evidence – in the areas of student/non-student experimental behaviour, experimental methodology, education, actual income and audit rate increase – as well as additional

evidence concerning previous experimental findings. It provides evidence that student and non-students subjects behave differently, even when the same experimental methodology and variables are applied. Students are significantly more compliant than non-student subjects of the same characteristics; which implies that employed people being able to refer to their actual loss of income in real life, tend to be less honest in experimental conditions. On the other hand, when the evasion decision has been made, students and non-students do not behave significantly different from each other.

We have found that experiments are very sensitive to the methodology applied. The experiment that carried with students in a classroom/laboratory environment reveals very high and unrealistic amounts of income tax evasion, indicating that when tax declarations decisions have to be made in a classroom/laboratory setting in just a couple of hours, the experiment may be regarded by subjects as a simple game. These findings indicate that experiments can benefit from incorporating some real world aspects of tax declaration decisions. We have also included actual income of the subjects in the analysis and found that in general it is positively associated with tax evasion.

This study is the only experimental work to have investigate the effect of education (university degree). Having a university degree was found to be significant and negative influence on tax evasion.

Finally, we found new evidence that increasing audit rate may actually increase the propensity to be dishonest. This apparently surprising result may be explained by the 'spite' or 'crowding out' effect. Also an increase in the audit rates during the experiment may encourage participants to think that many people are dishonest and they may thus start to evade some of their income. Although I do not suggest that this result be regarded as conclusive, it does serve to caution against the presumption that increasing audit rates

would always increase compliance. Perhaps future research should further investigate this issue.

Only two previous experimental works have investigated the effect of both income and tax rate variables on evasion. Alm *et al.,* (1992a) found higher tax rates lead to improved compliance a finding which contradicts the majority of experimental findings including those found here. Baldry's (1987) results were similar to ours, but because of an experimental defect, however, he introduced the multicollinearity problem between tax rate and income. In Chapter 6, we examined the relationship between income and the amount of evasion which indicated that IARA can be ruled out and thus the positive relationship between tax rates and the amount of evasion cannot be explained by Yitzhaki's (1974) model.

This study also provides additional evidence about the effects of expected fines, fines, the combination of expected fine, public transfers, non-random audit, previous audits, tax ethics, age, gender, and marital status. Although tax evasion scenario failed to find a significant effect of perceived audit rate on tax evasion this finding may be the result of the small numbers of non-evaders and the relatively small numbers of observations obtained by the judgment experiment (tax evasion scenario). As explained previously, impact experiments are more effective than judgment studies; which may be another reason for the insignificant effect of the perceived audit rate. However, the judgment study confirms the finding of the impact experiments that tax ethics has a significant effect on tax evasion behaviour.

We have also asked 185 non-student, income taxpaying participants in the experiments, what they think are the reasons for income tax evasion in Turkey. Participants gave as many reasons as they wanted and there were total 544 responses, the majority of them

indicating either the lack of effectiveness in discovering evaded income or the perceived lack of equity. Although these findings may be important from the tax authorities' perspective, we should not be so naive as to assume the given reasons to be truth. They may represent real causes of evasion or they may be merely a justification for evasion.

8.4 POLICY IMPLICATIONS

Our findings have several policy implications which will be discussed in the section. We found that increases in the tax rate lead to higher frequency, degree and amounts of evasion. These results are not surprising and indicate that subjects consider paying taxes as an exchange relationship with government. They compare their payment of taxes with their benefit in the form of public goods from government. Our finding which indicates that higher public transfers (goods) are associated with lower evasion further strengthens this prediction. On the other hand, we also found that higher tax ethics is positively associated with tax compliance. These results imply that lower marginal tax rates will lead to improved tax compliance in Turkey. Many studies have indicated that income tax rates were too high in Turkey (e.g. Merzi, 1993 Bilici, 1997; Ozel, 1997; Demiroglu, 2000; Frantz, 2000; Ozge, 2001 and Sarisu, 2001). The progressitivity of the individual income tax system[1] in Turkey was found to be higher than countries such as Canada, New Zealand, USA, Spain, Portugal, Mexico, Greece and France (Bronchi, 2001). Our results indicate that a downward revision in tax rates may lead to improved tax compliance. Moreover, the tax authority should start a campaign which informs the (taxpaying) public what has been

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[1] Progressitivity of individual income tax systems are measured as the difference between marginal 'all-in' tax rate faced by a top wage earner and the marginal 'all-in' tax rate for an average production worker. Employees' social security contributions, surcharges and local taxes when applicable are included in the 'all-in' rates.

done with its money and how effectively it has been spent. It should point out all the benefits received by taxpayers as a result of public goods and services. At the same time authorities should try to establish by the use of press and other media that paying tax is the norm and evading is unacceptable and unethical. These policies can be more successful with lower tax rates and fewer loopholes in the tax system, widening the tax base and closing loopholes will facilitate the public recognition that all citizens should and do pay according to their ability. Tax authorities should use considerable resources for this one-off spending of tax reform in order to improve compliance. When the norm has been established, compliance can be kept at a high level at a relatively low cost (compared to the initial campaign). As explained when discussing the multiple selves' models, these investments will lower the price of paying taxes, because of the increased level of compliance; the psychic cost of feeling as 'sucker' by evaders will be lower. Once people recognise that others are paying taxes and this is the normal behaviour, it will cause a compliance epidemic and the stigma costs of evasion will increase significantly.

Tax authorities should strengthen these reforms by higher penalties and expected fines for evasion. Our results indicate the deterrence effect of expected fines and penalty rates while increasing audit rates leads to a lower propensity to be honest. In practice, audits are a costly enforcement alternative from the tax authority perspective and the evidence suggests that the 'spite' or the 'crowding out' effects as well as 'the feelings that increased audit rate is a result of nobody is paying taxes' may effect compliance negatively. Therefore increasing fines are a less costly and more effective option. Moreover, our results also indicate low audit rates coupled with high fines are more effective in reducing the amount of evasion than mathematically equivalent high audit rates with small fines. Although I am not suggesting that evaders should be put to death with a probability of zero, they do need

to be made aware that intentional evasion will be punished harshly and quickly (but democratically in order not to cause a 'spite' effect or, to avoid damaging procedural fairness and the self motivation to obey the tax law). At the moment, the application of fines is delayed for several years through appeals (because of the courts' work-loads), and amnesties are offered too often which provides the opportunity for evaders to pay only the amount of evaded taxes but not the fine or interest on the unpaid taxes. This damages the fairness of the system and increases the price of paying taxes for honest taxpayers.

The effect of non-random audits (cut-off audits) indicates that it is effective in deterring tax evasion. The policy implication of this finding is that when the tax authority incorporates some information signals sent by the taxpayer, it is more successful in reducing underreported income and the probability of evasion. For example, according to Turkish IIT Law self-employed business people; including professionals, have to declare a minimum income to the tax authority each year. It has been widely reported in the press that people declare their income just above this threshold in order to evade taxes. It is possible that if the tax authority announced that it would concentrate on auditing those taxpayers who declared the minimum income which has to be declared by law, then compliance could be increased.

I believe that these changes in the tax system have to be applied as radical reforms all at once in order to get the best results out of it. Nevertheless, it seems to be possible to rank these policy implications in terms of their cost implementations and the extent of the benefits that can be expected to arise. Applying cut-off audits to self-employed professional people and making them aware of these audit strategies would probably be the least costly tool to increase tax revenues, and the expected benefits might be considerably large. Other policy implications can similarly be scaled: reducing loopholes, widening tax

bases, increases in fines, lowering marginal tax rate. Establishing social norm of paying taxes might be the most beneficial one, but it would probably be the most costly instruments as well.

Finally, the effect of education (university degree) is positive on compliance which indicates that the government can benefit from spending on education in the long term by means of a higher compliance rate.

8.5 LIMITATIONS

There are many limitations associated with this study, many of them inherent in an experimental methodology, and we should therefore be cautious in generalising the study's findings. Although we tried to improve our experimental methodology in several ways as explained previously, there are still some potential limitations which may threat the internal validity of the results. First, and probably most importantly, subjects involved in the experiments may not behave as they would in real life. As previously suggested, they may behave in ways which they think the experimenter wishes them to or they might attempt to sabotage the experiment. Moreover, taking decisions about small amount of benefits (prizes at the end of the experiment) may not reflect the real life situation when the stakes are much higher.

Another potential limitation of our study is some aspects of the 'real life' evasion were not (cannot) incorporated into the experiments. The penalties on evasion only include financial ones and it was not possible to incorporate criminal penalties (imprisonment). Although the risk of criminal prosecution for tax evasion is very low in Turkey (see Chapter 1), the threat of imprisonment does still exist in real life which will affect evasion behaviour. On the other hand, although it is possible to mimic the social stigma (or shame) of either

failing to declare all of one's income or being exposed as a cheat, it is very difficult to socially stigmatise evaders in an experiment in an ethically acceptable manner (Long and Swingen, 1991b). The study by Bosco and Mittone (1997) tried to incorporate a stigma effect (in an ethical manner, see Chapter 4) but failed.

Another potential limitation of our study is that in experiments subjects could only evade by under-declaring income but not over-reporting expenditure. This aspect of real life could easily be included into the experiments. However, we refrained from this since it would lead to unintentional evasion (see Robben *et al*'s 1990 experiment) and would introduce significant problem in the data analysis.

A limitation that may affect the external validity of the study is the use of a non-random sample – if a random sample were used, the findings may be different. However, since our study was aimed at investigating the determinants of tax evasion rather than the amount, it was considered more appropriate to choose people experienced in tax matters who also have higher opportunities for tax evasion (such as self-employed business people, doctors, lawyers, etc.).

8.6 DIRECTIONS FOR FUTURE RESEARCH

The question now is where to go from here, what kind of further work should be done in the subject of tax evasion? The biggest obstacle to empirical works is the lack of data. The three main methodologies (survey, regressions and experiments) have all some significant disadvantages, but I believe that further experimental work incorporating important real life aspects would be useful in analysing the determinants of tax evasion behaviour. I intend to replicate the study with sets of audit rates in order to further investigate the effect of audit rate on tax evasion. The replication of the study with

subjects from another developing country (with more or less democracy) and with subjects from a democratic developed country would be very useful, and this cross-cultural study could give some important evidence about the specific effects of fiscal climate, norms, democratic institutions, etc.

Such a study can also extend to include the fairness aspect of tax paying: participants might be manipulated in certain ways so that both the effect of horizontal and vertical equity can be measured. Moreover, the VAT aspect of income tax evasion can also be included in order to analyse in which specific situations, subjects refrain from giving (or demanding) receipts. A possible extension of this study could also involve stigma costs (shame effect of evading), but I have not as yet designed a method to incorporate this in both ethically and efficiently, although it is possible to measure the extent of shame with a questionnaire. The same thing could be applied for the threat of imprisonment – while it cannot be legally incorporated into the experiments (unless some natural experiments are carried out by the tax authority), the potential deterrence effect could be measured with the help of a post-experimental questionnaire (how likely participants think it is that they will be imprisoned for a given set of different amounts of evasion and different evasion offences, for example, and statement can also be used to measure how big a problem it would be if participants faced an imprisonment sentence, etc.).

Another area that I would be keen to investigate is that of the effect of perceived tax evasion on tax compliance. More precisely, I would like to conduct an experiment intended to analyse the effect of press coverage of wide-spread tax evasion in Turkey on individuals. To give some examples – these kinds of news includes headlines such as 'Only %1.2 total taxes are paid' (Zaman newspaper, 26.05.2001), 'Disappointment in tax revenues' (Finansal Forum newspaper, 30.04.2001), 'High tax rates have killed taxes'

(Finansal Forum newspaper, 30.04.2001), and 'Haven for tax evasion (Turkey)' (Radikal newspaper, 04.06.2001). These kinds of news reports appear too often in the Turkish media (interestingly the majority of these news are the results of the comments and press releases by the tax authority) indicating how wide-spread tax evasion is in Turkey, and suggesting that almost everybody evades taxes. This news might affect the price of paying taxes (feelings of being sucker) as well as perceived audit rate and thus the amount of tax evasion in the economy. These effects could be investigated relatively easy with an experimental approach.

APPENDICES

APPENDIX A

Proof of Yaniv (1994)

From (2.2) we get $\quad p.U'(Z) = \dfrac{t(1-p)U'(Y)}{(f-t)} \quad$ substitute this into (2.7)

$$\frac{\partial X}{\partial t} = \frac{1}{D}Xt(1-p)U'(Y)[R_A(Y)-R_A(Z)] + \frac{1}{D}\left[(1-p)U'(Y) + \frac{t(1-p)U'(Y)}{(f-t)}\right]$$

$$= \frac{1}{D}Xt(1-p)U'(Y)[R_A(Y)-R_A(Z)] + \frac{1}{D}(1-p)U'(Y)\left[1 + \frac{t}{f-t}\right]$$

$$= \frac{1}{D}(1-p)U'(Y)\left[tX(R_A(Y)-R_A(Z)) + \frac{f}{f-t}\right]$$

$$= -\frac{1}{D}(1-p)U'(Y)\left[tX(R_A(Z)-R_A(Y)) - \frac{f}{f-t}\right]$$

Since $R_A(Z)-R_A(Y) = \dfrac{R_A(Z)ZY - R_A(Y)YZ}{Z.Y}$ and $\quad R_A(I).I = e, \quad$ if we assume the specific utility function $I^{1-e}/1-e$ which exhibits DARA and CRRA:

$$R_A(Z)-R_A(Y) = \frac{e(Y-Z)}{Y.Z}$$

We can write (2.7) as:

$$\frac{\partial X}{\partial t} = -\frac{1}{D}(1-p)U'(Y)\left[etX\frac{Y-Z}{YZ} - \frac{f}{f-t}\right]$$

Then $\dfrac{\partial X}{\partial t} < 0$ if and only if $\quad e.t.X\dfrac{(Y-Z)}{Y.Z} < \dfrac{f}{f-t}$

$$\Rightarrow \quad e < \frac{YZf}{(f-t)(Y-Z)tX}$$

$$\Rightarrow \quad e < \frac{(I-tX)\,[I-tX-f(I-X)]f}{(f-t)(I-tX-(I-tX-f(I-X)))tX}$$

$$\Rightarrow \quad e < \frac{(I-tX)(I-tX-f(I-X))f}{(f-t)f(I-X)tX}$$

$$\Rightarrow \quad e < \frac{(I-tX)\,[X(f-t)+I(1-f)]}{(f-t)(I-X)\,tX}$$

$$\Rightarrow \quad e < \frac{(I-tX).X(f-t)}{(f-t)(I-X)\,tX} + \frac{(I-tX)I(1-f)}{(f-t)(I-X)\,tX}$$

$$e < \frac{(I-tX)}{t(I-X)}\left[1 + \frac{(1-f)}{(f-t)}\cdot\frac{I}{X}\right]$$

Thus $\dfrac{\partial X}{\partial t} < 0$ if and only if $e < \alpha\left[1+\beta.\dfrac{I}{X}\right]$

where $\alpha = (I\text{-}tX)/t(I\text{-}X)$ and $\beta = (1\text{-}f)/(f\text{-}t)$. Note that $\alpha > 1$ and $I/X > 1$ and $\beta > 0$ if $t < f < 1$. Therefore, if $e \leq 1$ then $\dfrac{\partial X}{\partial t}$ is always negative.

However, it is possible to sharpen this condition:

$$1 + \beta\frac{I}{X} > 1 + \beta \text{ and } 1 + \beta = 1 + \frac{1-f}{f-t} \text{ then } 1 + \beta\frac{I}{X} > \frac{1-t}{f-t}$$

This implies:

$$e < \frac{1-t}{f-t} \Rightarrow \frac{\partial X}{\partial t} < 0. \text{ But since } \frac{1}{f} \leq \frac{1-t}{f-t}, \text{ we find that } \frac{\partial x}{\partial t} \text{ is always negative if } e \leq \frac{1}{f}.$$

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APPENDIX B

Comparative Statics for Yitzhaki's Model (1974)

$$E(U) = (1-p)U(I-tX) + pU(I-tX-ft(I-X))$$

$$Y = I- tX \qquad\qquad Z = (I-tX-ft(I-X))$$

$$\frac{dE(U)}{dX} = (1-p)U'(Y)(-t) + pU'(Z)(-t+ft)$$ 1.b

$t[-(1-p)U'(Y) + pU'(Z)(f-1)] = 0$ Dividing both side of the equation by t^*

$$[-(1-p)U'(Y) + pU'(Z)(f-1)] = 0$$ 2.b

$$\frac{d^2 E(U)}{dX^2} = D = t[(1-p)U''(Y) + (f-1)^2 pU''(Z)] < 0$$ 3.b

$$\frac{\partial X}{\partial I} = \frac{ftR_A(Z) - (R_A(Z) - R_A(Y))}{ftR_A(Z) - t(R_A(Z) - R_A(Y))}$$ 4.b

$$\frac{\partial (X/I)}{\partial I} = \frac{1}{I^2}\frac{1}{D}(1-p)U'(Y)[R_R(Z) - R_R(Y)]$$ 5.b

$$\frac{\partial X}{\partial t} = -\frac{1}{D}(1-p)U'(Y)[(R_A(Z) - R_A(Y))X + f(I-X)R_A(Z)]$$ 6.b

$$\frac{\partial X}{\partial f} = -\frac{1}{D}[pU'(Z) - pU''(Z)(f-1)t(I-X)]$$ 7.b

$$\frac{\partial X}{\partial p} = -\frac{1}{D}[(f-1)U'(Z) + U'(Y)]$$ 8.b

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* I have followed Myles' (1995) way for the first and second order condition.

APPENDIX C

INSTRUCTIONS

Thank you for agreeing to participate in this experiment, which is conducted for the purposes of academic research. You do not need to give your name and we can assure you of anonymity. Each one of you will receive a notional gross income for each of the next ten 'months'. This will be repeated four times. For each month you have to decide how much of your gross income, which is taxable income, to report to the tax authority. You will pay tax on the income that you declare. Audits will be conducted randomly according to given rate. If you are drawn in the random sample, you will be audited and if you have failed to report all of your income, a fine will be imposed on any tax evaded. At the end of the experiment, everybody's net income (i.e. gross income minus taxes paid and any fines imposed) will be calculated and a prize worth TL* will be given to the person with the highest net income.

Now look at the second page. In the first column you will see ten 'months' are listed and gross income you will receive for each month has been entered. Starting from January consider carefully how much of your gross income you want to declare. This is the income upon which you will pay income tax. Write the amount in the column headed 'Declared Income'. Calculate your income tax liability using the appropriate tax rate that is given at the top of the table. For example, if you reported income of 40 million Turkish Lira and if the tax rate is 25 % for this month you pay income tax of TL10 million. Write this sum in the column headed 'Tax Paid'. Deduct this sum from your gross income (not from your reported income), and write the result in the column headed 'Net Income'. Please leave blank the columns headed 'Audited', 'Fine', and 'Net Income minus Fine'.

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* The exact prize and its monetary value was specified in each experiment.

After you have completed the tax table, the papers will be collected. Then a random audit will be conducted according to the audit rate that is given at the top of the table. If for some month, you come up in the draw, then for this month only we will check whether you have underreported your income, and if you did, you will be fined a multiple of the tax you have not paid. The fine multiplier is also given at the top of the table. For example, if you have not paid TL5 million of income tax, which you should have paid and the fine multiplier is 3, then if you are discovered you will pay a fine of TL15 million. After the four rounds total net income for each person will be calculated and the prize will be paid to the person with the highest aggregate net income over the whole experiment.

APPENDIX D

TAX TABLE

FIRST ROUND

Tax rate: 25%

Fine multiplier: 3

Audit rate: 10%

Table 1

MONTHS	INCOME	DECLARED INCOME	TAX AMOUNT	NET INCOME	AUDITED	FINE	NET INCOME MINUS FINE
JAN.							
FEB.							
MARCH							
APRIL							
MAY							
JUNE							
JULY							
AUGUST							
SEP.							
OCT.							

The parameters that were used for each round can be seen in Table 2.

Table 2

	TAX RATE	FINE MAGNITUDE	AUDIT RATE
ROUND ONE	25%	3	10%
ROUND TWO	25%	1.5	15%
ROUND THREE	50%	3	10%
ROUND FOUR	50%	1.5	15%

The parameters in the fifth experiment were as follows;

Table 3

	TAX RATE	FINE MAGNITUDE	AUDIT RATE
ROUND ONE	25%	3	5%
ROUND TWO	25%	1.5	10%
ROUND THREE	50%	3	5%
ROUND FOUR	50%	1.5	10%

The parameters in the seventh experiment were as follows;

Table 4

Numbers of Rounds	Tax rate	Fine rate	Audit rate	Pub. Trans.	Non rand.
1	25%	3	10%	0	1
2	25%	3	10%	1	0
3	25%	3	15%	0	0
4	25%	3	10%	0	0
5	25%	1.5	15%	0	0
6	25%	1.5	10%	0	0
7	50%	3	10%	0	0
8	50%	1.5	15%	0	0

APPENDIX E

Thank you very much for participating in this study. This study investigates the decision taking in economy, and conducted for academic reasons only.

Please read the instructions carefully. The money prize you will obtain for participating in this study depends on the decisions you take.

The study involves a certain number of rounds and there are ten months in each round. Each of you will have same amount of income for each month. You will decide how much of your income to declare. You will pay taxes on the income that you declare.

The tax authority does not know your real income, it will know if there is an audit for this month. If there is no audit for this month your net income will be your real income minus tax paid on your declared income. If there is an audit for this month, the tax authority will know your real income, if you underdeclared your income you will pay a fine that will be some multiple of the amount of tax evaded. For each round the tax rate, audit rate, fine multiplier and public transfer are the same for each participant and these values are given at the top of the tax tables. At the end of the round your 'net income minus fine' will be calculated by adding ten months' 'net income' minus fine if any. Net income will be calculated as real income minus tax amount paid.

At the end of the study, you will draw a round number from a box, which includes all the round numbers. The money you will be paid depends on your total net income minus fines if any on your selected round. Your total net income minus fines on your selected round will be multiplied by 0.01 and that money will be given to you. However, if total net income minus fines is negative, you have to pay this amount out of your own pocket.

Since each round has the same probability to be chosen you should take your decision carefully in each round as if this round was chosen for the payment. The amount of money

you will receive depends on the decision you take in the study. It can be more than 7,000,000 Turkish Lira or it can be negative.

In order to understand the study better, there will be a practice round.

Now please look at the first round. You can see the tax rate, fine multiplier and audit rate on the top of the tax table. Moreover it is also indicated whether there is public transfer payment or not in that round, if there is one, the amount is also given. Now starting from January consider carefully, and decide how much of income to declare. Write the amount in the 'reported income' column. Calculate your income tax liability using the appropriate tax rate that is given in the tax table. Write this sum in the 'income tax' column. Deduct this from your real income (not from your reported income), and write the result in the column headed 'net income'. Please leave blank the columns headed 'audited', 'fine' and 'net income minus fine'.

A random audit will be conducted according to the audit rate that is given in the table. If for some month, you come up in the draw, for this month only it will be checked whether you have underreported your income, and if you did you will be fined some multiple of the amount of tax evaded. Fine multiplier is also given in the tax table.

Please feel free to ask any questions

PS: As explained before, the study is carried out for academic purposes. Although the terms 'tax authority', 'audit rate' etc. were used in the study, there is no connection between this study and the tax authority or any other institutions. Participants do not need to give their names. Data collected from this study will be analysed as a whole group.

APPENDIX F

SCENARIO

Suppose that you are in a business where the receipt of cash income is more likely (self-employed etc.) During a period of a year work, you receive cash payments from different customers, which are totalled to 1 billion TL. Furthermore, assume that there exists no paper evidence of you receiving this income.

1- Would you report all of your earned income to the tax authorities?

a- Yes

b- Most probably

c- Probably

d- Quite doubtful

e- No

2- Which of the following amounts of this 1 billion TL is closest to the amount of income that you would prefer not to report on your tax return? (In other words, the amount you would evade?).

a- 1 billion (100%)

b- 750 million (75%)

c- 500 million (50%)

d- 250 million (25%)

e- 50 million (5%)

f- 10 million (1%)

g- 0 (0%)

3- What do you think the probability of being audited of such a person in the scenario is in a year? (in the percentage term)

APPENDIX G

1- Given present tax burdens, one can hardly blame tax evaders.

Table 1

	Frequency	Percent
Strongly Agree	1	2.6
Agree	10	26.3
Uncertain	3	7.9
Disagree	19	50
Strongly Disagree	4	10.5
Missing	1	2.6
Total	38	100

2- Given the easy availability of opportunities to evade taxes, one cannot blame tax evaders.

Table 2

	Frequency	Percent
Strongly Agree	5	13.2
Agree	10	26.3
Uncertain	1	2.6
Disagree	18	47.4
Strongly Disagree	4	10.5
Total	38	100

3- If in doubt about whether or not to report a certain source of income, I would not report it.

Table 3

	Frequency	Percent
Strongly Agree	3	7.9
Agree	12	31.6
Uncertain	11	28.9
Disagree	12	31.6
Total	38	100.0

4- Since the IRS gets enough taxes, it does not matter that some people evade taxes.

Table 4

	Frequency	Percent
Strongly Agree	3	7.9
Agree	3	7.9
Uncertain	22	57.9
Disagree	10	26.3
Total	38	100.0

5- Taxes are so heavy that tax evasion is an economic necessity for many to survive.

Table 5

	Frequency	Percent
Strongly Agree	3	7.9
Agree	12	31.6
Uncertain	3	7.9
Disagree	18	47.4
Strongly Disagree	2	5.3
Total	38	100.0

6- Cheating on taxes is justifiable in the light of the unfairness of the tax system.

Table 6

	Frequency	Percent
Strongly Agree	2	5.3
Agree	20	52.6
Uncertain	5	13.2
Disagree	8	21.1
Strongly Disagree	3	7.9
Total	38	100.0

7- I would never pad my deductions.

Table 7

	Frequency	Percent
Strongly Agree	3	7.9
Agree	1	2.6
Uncertain	8	21.1
Disagree	17	44.7
Strongly Disagree	9	23.7
Total	38	100.0

8- Since everybody evades taxes; one can hardly be blamed for doing it.

Table 8

	Frequency	Percent
Strongly Agree	5	13.2
Agree	8	21.1
Uncertain	6	15.8
Disagree	16	42.1
Strongly Disagree	3	7.9
Total	38	100.0

9- I would never evade taxes.

Table 9

	Frequency	Percent
Strongly Agree	7	18.4
Agree	10	26.3
Uncertain	14	36.8
Disagree	7	18.4
Total	38	100.0

10- There is nothing bad about underreporting taxable income on one's tax return.

Table 10

	Frequency	Percent
Strongly Agree	2	5.3
Agree	7	18.4
Uncertain	5	13.2
Disagree	18	47.4
Strongly Disagree	6	15.8
Total	38	100.0

11- If a person intentionally lists less income on his tax return than legally required, this does not diminish his/her respectability.

Table 11

	Frequency	Percent
Strongly Agree	2	5.3
Agree	5	13.2
Uncertain	6	15.8
Disagree	19	50.0
Strongly Disagree	6	15.8
Total	38	100.0

12- I would not feel guilty, if I evaded taxes.

Table 11

	Frequency	Percent
Strongly Agree	1	2.6
Agree	13	34.2
Uncertain	9	23.7
Disagree	11	28.9
Strongly Disagree	4	10.5
Total	38	100.0

APPENDIX H

REASONS	COUNT	PERCENTAGE of RESPONSES
1- Low audit rate	98	18.0
2- Unfair tax laws (do not take income into account)	56	10.3
3- Low Fines	31	5.7
4- Tax rates are too high	31	5.7
5- Too many tax amnesties	24	4.4
6- Lack of education of taxpayers	19	3.5
7-Low income of taxpayers	19	3.5
8- Too many loopholes in tax laws	16	2.9
9- Taxes are not returned as services by government	15	2.8
10- The quality of audits is low	13	2.4
11- Tax laws are too complicated	13	2.4
12- Minimum income level is not exempt of taxation	11	2.0
13- Unfair income distribution	10	1.8
14- Low morality and low ethics in the society	9	1.7
15- People's desire to make more money in a short time	8	1.5
16- Lack of understanding citizenship duty	8	1.5
17- Bribery	7	1.3
18- Frequent changes in tax laws	7	1.3
19- Tax system's low ability to capture some sort of income	7	1.3
20- Tax inspectors' lack of education and knowledge	6	1.1
21- Instability of economy	6	1.1
22- Inefficient tax legislation	6	1.1
23- Hyper-inflation	5	0.9
24- Taxpayers' money are not spend wisely	5	0.9
25- Inequity	5	0.9
26- In general, fines are not applied in practice	4	0.7
27- Limited ability of withholding taxes at sources	4	0.7
28- Taxpayers are not informed enough about tax laws	4	0.7
29- Unfairness in fine for different kind of evaders	4	0.7
30- Misuse of duty by tax inspectors	3	0.6
31- Taxpayers do not trust the government	3	0.6
32- Some taxes have to be paid in advance	3	0.6
33- Power of politics may provide not to pay taxes	3	0.6
34- Honest taxpayers are not appreciated by society	3	0.6
35- Taxpayers are not informed about how their tax money is spent	3	0.6
36- Deductible expenditure are not determined realistically	3	0.6
37- Low salary of tax inspectors	3	0.6
38- Lack of patriotism	3	0.6

REASONS	COUNT	PERCENTAGE of RESPONSES
39- Unintentional mistakes in preparation of tax declaration	3	0.6
40- Frequent increases in tax rates	2	0.4
41- Politics encourages tax evasion	2	0.4
42- Court and fine systems do not function	2	0.4
43- Deterrence factors are not enough	2	0.4
44- Imposing taxes according to standard of life system	2	0.4
45- Some group of taxpayers are hardly audited	2	0.4
46- Majority of taxes are imposed on low income workers	2	0.4
47- Inappropriate government and public finance policies	2	0.4
48- Lack of tax inspectors	2	0.4
49- Economic reasons	2	0.4
50- Cost of compliance is high	2	0.4
51- Tax system encourages tax evasion	2	0.4
52- Different opportunities to evade for different taxpayers	2	0.4
53- People earn their money by just their effort without help of government	1	0.2
54- In general, imprisonment punishment are not applied to evaders	1	0.2
55- No deterrent apart from fines	1	0.2
56- Audit procedure do not work	1	0.2
57- Family expenditures are too high	1	0.2
58- Imposing lump-sum taxes on income	1	0.2
59- Difficulties to provide capitals for investment	1	0.2
60- Problems with accounting system	1	0.2
61- Low qualification of accountants	1	0.2
62- Forgiveness of society	1	0.2
63- Not giving a tax number to each taxpayers	1	0.2
64- Not providing receipts	1	0.2
65- Not asking for receipts	1	0.2
66- Accountants' ability to declare lower income than actual	1	0.2
67- Not to pay taxes on time because of expectation of tax amnesties	1	0.2
68- Large number of people who do not declare any income	1	0.2
69- Low audit rate for higher income taxpayers	1	0.2
70- Not taking inflation into account in determining subsistence level	1	0.2
71- Not to allow substitution of education expenditure of family members from income	1	0.2
72- Not imposing high tax rate on interest of saving account	1	0.2
73- Appointing tax inspectors in different duties rather than tax inspection	1	0.2
74- Theft	1	0.2
75- People do not care	1	0.2

REASONS	COUNT	PERCENTAGE of RESPONSES
76- Treason	1	0.2
77- Tax revenues are not used in investment	1	0.2
78- Allowance for cost of living is too low	1	0.2
79- Tax rate is not progressive enough	1	0.2
80- Laws do not work in practice	1	0.2
81- Illegal activities	1	0.2
82- Rich people are respected in the society	1	0.2
83- The country deserves tax evasion	1	0.2
84- People are selfish	1	0.2
85- Rich people are not affected by fines	1	0.2
86- Government approaches softly to the rich	1	0.2
87- Disagreement between taxpayers and government	1	0.2
88- Economic, social and law institutions are not advanced enough	1	0.2
89- Tax rate are too high for the middle class	1	0.2
Total responses	**544**	**100.0**

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