CHARACTERISTICS OF HOUSEHOLDS IN THE INFORMAL SECTOR OF AN EMERGING ECONOMY

Sandra Sookram[a], Patrick Kent Watson[a,1], Friedrich Schneider[b]

[a] Sir Arthur Lewis Institute of Social & Economic Studies, University of the West Indies, St. Augustine, Trinidad & Tobago
[b] Department of Economics, Johannes Kepler University, Linz, Austria

Abstract

Using the case study of Trinidad and Tobago, we investigate the socio-economic, demographic, and attitudinal characteristics of households that participate in the informal sector of an emerging economy and their perception of the risk of detection by tax authorities while doing so. Data are gathered from a cross-sectional field survey covering 570 households. Results using multinomial logit and ordered probit models suggest that households are motivated to participate in the informal sector when members spend little time in formal sector activity, believe that taxes are too high and their incomes are too low, have dependents to support and believe that the resulting tax evasion will go undetected. Their perception of the risk of detection by the tax authority is determined largely by the income they earn in the formal sector and the extent of government bureaucracy prevailing there.

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[1] Corresponding author. Tel: (868) 662-6965, Fax: (868) 645-6329.
E-mail addresses: ssookram@fss.uwi.tt (S. Sookram), pkwatson@fss.uwi.tt (P.K. Watson) and friedrich.schneider@jku.at (Friedrich Schneider).

1. Introduction

Work done on the informal sector[2] in emerging economies has generally concluded that, on the positive side, it is a lifeline to the poor, while on the negative side it is a drain on government revenues (Gërxhani and Schram 2001, Gerxhani 2002, 2003 and Schneider 2005). Formulation of appropriate policies, one way or the other, would surely benefit from detailed information about the characteristics of household sector participants and their attitudes to paying taxes, since that sector is very likely a most significant source of participation in informal sector activity[3].

Using the case study of Trinidad and Tobago, we investigate first the socio-economic, demographic, and attitudinal characteristics of households of an emerging economy to participate in the informal sector and, second, their perception of the risk of detection by tax authorities in doing so. To achieve these objectives, a cross-sectional field survey of private households was carried out in Trinidad and Tobago during the period October-November, 2003 and, in this paper, the data collected are analyzed.

This study differs for several reasons from many previous studies done on the informal sector using Trinidad and Tobago data[4] as well as data from other emerging economies. First, it employs data collected at the micro-level from a direct survey of households. This may be compared to another micro-level study done by Lloyd-Evans and Potter (2002), which focused on certain occupations and on small geographical areas and therefore could not yield samples which could be used to make general conclusions about household participation in the informal sector of Trinidad and Tobago. The questionnaire used in this study was

[2] See Gërxhani and Schram (2001), Gerxhani (2002, 2003) and Schneider (2005).

[3] The term 'informal sector' as used in this paper encapsulates "economic activity that falls outside the purview of government accounting" (Fleming et al. 2000, p. 387). The concept of the informal sector or economy is well known though its definition is subject to some controversy (Schneider and Enste 2000, 2003). Indeed, it is known by various other names like shadow, hidden, black, underground, gray, clandestine, illegal and parallel (Fleming et al. 2000, p. 387). In defining it as we do, we divide the total economy into its *informal* and *formal* components. In this paper we concentrate solely on households participating in the informal sector.

[4] See Rampersad (1987), Lloyd-Evans and Potter (2002) and Maurin et al (2006).

formulated specifically to obtain data from informal sector participants, in the spirit of Kazamier and van Eck (1992): it was strong on assuring the anonymity of the respondents and ensuring that the data requested for all of the sensitive questions (age, income earned etc) were categorized, thus increasing the probability of a truthful response. The current study may also be compared with studies of emerging economies which employ macroeconomic (time series) data and methods to estimate the size of the informal sector (Maurin et al. 2006). Such a study could not yield details about the characteristics of the participants as is done here.

A second distinguishing feature of this study is that it employs a multinomial logit model to explain the level of participation by households in the informal sector, using as 'explanatory' variables a host of socio-economic, demographic and attitudinal attributes. Modeling the decision to participate in such activity is new to the literature. Studies which investigate the informal sector through the direct survey method have generally modeled the participation decision using binomial logit (Schneider et al. 2001) and probit (Kim 2005) specifications and ordered probit specification (Schneider and Savasan 2005). In the few studies that employ the multinomial logit (Hill 1983 and Neitzert 1998) the choices are generally classified as no employment, employment in the formal sector and informal sector employment. More recently, Dimova et al. (2005) use a multinomial logit model with the following choices: public sector employment, private sector employment, informal sector employment and no employment.

A final distinguishing feature of the study is its novel approach to eliciting information about and modeling a person's perception of the level of risk of detection by the tax authorities using an ordered probit model. We know of no study of risk perception in the extant literature although there are quite a few on tax evasion (to which, as we will argue, risk perception is related), which employ ordered probit models. For example, tax morale is

studied by Torgler and Murphy (2005) using an ordered probit model, with the dependent variable scaled for an individual's level of tax morale. Cummings et al. (2005) investigate tax evasion and code the dependent variable according to the amount of times the respondent evades taxes. Even more recently, (Tedds 2006) uses a similar categorization of the dependent variable to examine tax compliance of firms worldwide. In this paper, data are gathered from respondents who are asked directly about their own evaluation of the risk involved in concealing income from the tax authority. It is possible that their answers may reflect their own subjective willingness to taking such a risk themselves so that we may also be measuring the extent of 'risk-averseness' of the respondent.

The rest of this paper proceeds as follows. In section 2 some theoretical considerations are laid out and seven (7) empirically testable hypotheses are put forward. In section 3, a review and discussion of some basic frequency distributions of the data obtained from the survey are presented. This is followed in sections 4 and 5, respectively, by the specification, estimation and analysis of a multinomial logit model of participation in the informal sector and an ordered probit model of the perceived level of risk involved in such participation. Some policy lessons are drawn from these exercises and the paper is then concluded in section 6.

2. Some theoretical considerations

2.1. Model of time allocation

In the traditional theory of labour supply, individuals allocate time between work and leisure activities, according to their personal preferences. In these models, no differentiation is made between work done in the formal and informal sectors. Becker (1965) extends the problem of efficient time allocation to one of deciding between different occupations: time is a scarce good that has to be distributed optimally between work and leisure by the individual. Becker divides work into that carried out in the formal economy and that in the household, which is not quite the same as a differentiation between formal and informal sectors but he at least

distinguishes between the formal sector and the self-sufficiency economy (part of the informal sector).

Other adaptations of Becker`s model explicitly consider 'illicit' labour supply. An example is the model of de Gijsel (1984), which is based on the theory of multiple occupations. Starting from a microeconomic decision problem, de Gijsel investigates the influence of various factors on illicit labour supply. Some of his hypotheses seem questionable, like the one that illicit labour supply decreases when the rates of pay increase in the formal sector, since this only takes into account individual utility. The decline of employment at the macroeconomic level, due to higher wages, and the increasing demand for illicit work resulting from higher costs in the formal sector, are ignored. Therefore, it may seem sensible to take secondary effects into account[5].

In de Gijsel's model, the increased rate of unemployment is a cause for the increase in the supply of labour to the informal sector as, in the formal sector, a higher employment risk is positively correlated with a higher income risk. This induces individuals to engage in informal sector activities. If there is extensive unemployment insurance, the income risk is attenuated, and so too is the influence of the rate of unemployment[6]. This supply-side reaction frustrates the demand for labour in the informal sector that arises, especially in times of full employment and production with long waiting and delivery periods.

2.2. Models of tax evasion

Cowell (1990, p. 6) observed that "evasion is a particular 'economic crime' – one that involves a breach of the laws designed to ensure that people act in the economic interests of the community and not just in their own economic interests". Studies confirming that an

[5] These correlations are illustrated by Neck et al (1989). They emphasize the problems of making policy implications with these models, as one has to consider numerous restrictions when applying these models to reality. See Schäfer (1984), in particular the chapters by Carlberg (1984) and Wiegard (1984).
[6] However, there are incentives for unemployed individuals to abuse the system, depending on the kind of transfer payments.

increase in the tax burden is one of the main causes of the augmentation in the size of the informal sector also provide support to the often hypothesized relationship between the degree of tax evasion and the size of that sector (see for example Schneider 2005 and Giles and Johnson 2000). Since tax evasion is a crime, punishable by heavy fines and even prison sentences, there is an inherent risk involved in such activity: the higher the perception of such risk, the lower is the likelihood of participation in informal sector activity and, consequently, tax evasion. A study of the tax evasion literature is a useful first step in the specification of a model of risk perception.

If the theory of tax evasion is combined with labour supply models, the decision to evade taxes depends on whether to opt for the formal or the informal sector[7]. In a seminal paper, Allingham and Sandmo (1972) suggest that the decision to evade taxes results from the individual utility maximization problem. Under the assumption of insecurity, the authors analyse the decision about which part of the income to conceal. Those involved have to pay the highest tax rate if they declare their whole income. As an alternative, they can reveal part of their income, with the risk of possibly being detected and prosecuted. In this model, the whole income is exogenously given and the declared income is the decision variable. The individuals maximize their "Neumann-Morgenstern utility function" by choosing the optimal taxable income. Allingham and Sandmo come to the – expected – conclusion that the higher the risk of being detected and the greater the punishment, the higher is the taxable part of the income. However, this model cannot clarify completely the correlation between tax rate and declared income.

Anderson (1977) tries to deal with this shortcoming and combines the theory of tax evasion with the neoclassical theory of labour supply. Individuals maximize their Neumann-

[7] See Allingham and Sandmo (1972), Andreoni et al (1998), Mettelsiefen (1984), Petersen (1984) and Sandmo (1981). In crime theory, Becker (1968) additionally considers the probability of being detected as well as the severity of the punishment.

Morgenstern utility function by selecting the taxable income and the labour supply. As the latter is variable, the total income is now determined endogenously. Anderson shows that a rise in the tax burden has a negative effect on the labour supply and the declarable or formal sector income.

Isachsen and Strom (1980) try to model explicitly the informal sector by combining the theory of tax evasion with the model of time allocation. In contrast to Andersen, individuals here can divide their time between formal and informal sector work as well as leisure, which now become the decision variables. Whereas the income gained in the formal sector is taxed directly, work done in the informal sector is not. Therefore, tax evasion results from informal sector work. Isachsen and Strom conclude that a higher marginal tax rate leads to a lower supply of formal sector labour. In this model, the marginal tax burden causes a rise in informal sector activities. However, one has to differentiate between income and substitution effects of the tax burden regarding the labour supply.

Nevertheless, the survey results are ambiguous. Sandmo (1981) illustrates that the results rely strongly on the model's specifications: depending on the structure of the model and its assumptions or the data, the results differ considerably[8]. In some models, higher taxation leads to an increase in informal sector activity, whereas in others that consider the probability of being detected and severity of punishment, it decreases. It is assumed that higher taxation results in a higher undeclared share of income and thus a higher fine. Under the assumption of risk aversion, the costs of the expected punishment outweigh the utility from illicit work, in this case.

2.3. Empirically Testable Hypotheses

[8] See also Bös and Felderer (1989); Cowell (1989, 1990); Hackmann (1984).

In all, seven empirically testable hypotheses, based on the foregoing theoretical discussion, will be elaborated and tested in this paper. The following four relate to the individual's decision to participate in the informal sector:

1. Ceteris paribus, the lower the chance of detection by the tax authority, the more people are apt to demand and supply goods and services in the informal sector;
2. Ceteris paribus, the higher the tax burden, the stronger is the incentive to participate in informal sector activities;
3. Ceteris paribus, the lower the income earned in the formal sector, the higher is the incentive to be engaged in informal sector activities;
4. Ceteris paribus, the lower the amount of hours worked in the formal sector, the higher is the incentive to be engaged in informal sector activities.

The remaining three hypotheses relate to the individual's perception of the risk that his/her non payment of taxes will be detected by the tax authority. They are:

5. Ceteris paribus, the higher the tax burden, the lower the perception of risk of detection of non payment of taxes.
6. Ceteris paribus, the lower the income earned in the formal sector, the lower the perception of risk of detection of non payment of taxes;
7. Ceteris paribus, the lower the amount of hours worked in the formal sector, the lower the perception of risk of detection of non payment of taxes.

Hypotheses 5-7 will make even more sense if the measure of the perception of risk is also a measure of the willingness or unwillingness of the household to attempt cheating the taxman, as was discussed in the Introduction to this paper. All our hypotheses are valid only with respect to 'ceteris paribus'.

3. Data description for the empirical investigation

The sample for this study consists of 570 households, which is equivalent to 0.0005% of the population of Trinidad and Tobago. This percentage compares favourably with similar surveys on the informal sector. A study of the Australian informal sector (Schneider et al. 2001) uses 0.0001% (2,040) of the population, while studies of two emerging economies,

Albania (Gerxhani 2003) and Bulgaria (Vitosha Research 2004), employ 0.0004% (1,340) and 0.0001% (1,080) of the population respectively. The random walk method (Kazemier and van Eck 1992) is employed in this study to assist in the sampling process. With this method interviewers are asked to replace addresses by other addresses when there is non-response from households or when they are uncooperative. See Appendix 1 for further details of the Sample Frame and Design.

Participation in the informal sector is defined at four levels: 'No participation' (household does not participate at all in the informal sector); 'Supply only' (household supplies, but does not demand, goods and services in the informal sector); 'Demand only' (household demands, but does not supply, goods and services in the informal sector) and 'Dual Participation' (household supplies and demands goods and services in the informal sector). A list of socio-economic, demographic and attitudinal attributes, which are assumed to influence the level of participation, and which are, for the most part, reflective of the empirically testable hypotheses stated in the previous section, is shown in Table 1. Each attribute is made up of two or more mutually exclusive components which we shall refer to as 'modalities' (for instance the modalities of the sex attribute are 'male' and 'female'). Table 1 also shows the full listing of the modalities, including a 'reference' modality[9], for each attribute.

[9] The reference modality is the factor that is not used in the estimation of the model.

Table 1
Attributes and their Modalities

Attribute	Reference Modality`	Remaining Modalities
Sex	Female	Male
Age	Over 60 years	15-25 years 26-35 years 36-45 years 46-60 years
Marital Status	Single	Married/Common Law Divorced Separated
Has Dependents	No	Yes
Area of Residence	Rural	Urban Sub-urban
Living Arrangements	Living with relatives	Owns home Renting
Level of Education	Primary	Secondary Tertiary Vocational
Employment Status:	Other[10]	Full Time Part Time
Sector of Employment	Other Sector	Manufacturing Sector Services Sector Construction Sector Agricultural Sector
Employer	Self-employed	Private Enterprise Government
Time spent in the Formal Sector	Over 10 hours per day	Less than 4 hours per day 4-6 hours per day 7-9 hours per day
Household Income earned in formal sector	Over $10,000 per month	Less than $1,000 per month $1,001-$5,000 per month $5,001-$10,000 per month
Opinion on Income Earned in the Formal Sector	High	Very Low Low Acceptable
Perception of Level of Risk of detection by Tax Authority	High Risk	No Risk Low risk Average risk
Opinion on Income Tax Burden	Not too high	Too high
Opinion on Red Tape and Government Regulation	Not Excessive	Excessive

Table A in Appendix 2 shows the frequency distribution of the modalities of each attribute as well as the distribution of these modalities by the level of participation. Of the 570 interviewees, 240 (42%) admitted to 'demand only' activity. The second most popular level was 'No participation', accounting for 174 respondents (31%), followed by 'Supply Only' with 92 respondents (16%) and, finally, 'Dual Participation' with 64 respondents (11%).

[10] Includes all persons not gainfully employed like retirees, full-time students and unemployed.

Households with dependents have a strong tendency to participate in the informal sector at all levels. They account for about 73% of the 'supply only' 'demand only' and 'dual participation' groups, which is quite a high rate. At the same time, they account for only 66% of the sample and for 57% of the 'no participation' group. This means that, relative to the group without dependents, they have a strong tendency to participate in informal sector activity. Similarly, the households who think that there is little or no risk of detection by the tax authority, and who comprise just over 50% of the sample, are involved in over 60% of the 'supply only' and 'dual participation' activities. On the other hand, a person's sex or employment status does not seem to influence participation since participation rates approximately reflect the same proportions that make up the sample.

4. Empirical Investigation of the Decision to Participate in the Informal sector

A multinomial logit model is used to explain the level of activity in the informal sector, which are 'No participation', 'Supply only', 'Demand only' and 'Dual Participation'. Each level is interpreted as a 'category' of the dependent variable in the model and it is assumed that the categories cannot be ordered. The 'no participation' category is designated as the benchmark or base category so that the corresponding vector of coefficients in the model is normalized to zero[11]. The estimated coefficients of the model are listed in Table 2 below:

[11] The purpose of this normalization is to identify the model's parameters. See Greene (2003) for a more detailed discussion of the estimation procedure.

Table 2
Multinomial Logit Model Estimates: Comparison with 'No Participation'

Attributes *(modalities in italics)*	**Supply Only**	**Demand Only**	**Dual Participation**
Sex: *Male*	1.075 (0.662)	0.080 (0.248)	-0.081 (0.379)
Age: *15-25 years*	20.954*** (0.000)	-0.246 (0.781)	-1.719 (1.136)
26-35 years	20.666*** (0.885)	-1.122 (0.744)	-1.919* (1.039)
36-45 years	20.723*** (0.969)	-0.414 (0.715)	-1.203 (0.963)
46-60 years	20.513*** (1.114)	-0.242 (0.713)	-0.686 (0.937)
Marital Status: *Married/Common Law*	-0.903 (0.708)	-0.382 (0.314)	-1.036** (0.466)
Divorced	-0.436 (1.484)	0.679 (0.713)	-0.184 (1.057)
Separated	0.388 (1.415)	-0.121 (0.559)	-0.297 (0.800)
Has Dependents	1.312* (0.700)	0.833*** (0.273)	0.965** (0.433)
Area of Residence: *Urban*	-0.002 (1.060)	0.675 (0.433)	-0.895 (0.806)
Sub-Urban	-1.220** (0.602)	0.461* (0.244)	0.440 (0.373)
Living Arrangements: *Owns Home*	-0.096 (0.677)	0.434 (0.307)	0.663 (0.521)
Renting	-1.200 (0.983)	0.243 (0.366)	1.021* (0.566)
Level of Education: *Secondary*	0.957 (0.710)	0.251 (0.290)	-0.073 (0.436)
Tertiary	0.309 (1.429)	-0.703 (0.591)	0.204 (0.810)
Vocational	-0.065 (1.325)	-0.181 (0.482)	0.079 (0.716)
Employment Status: *Full Time*	15.050*** (0.712)	18.048*** (0.362)	-1.866 (1.855)
Part Time	15.628 (0.000)	17.249 (0.000)	-2.029 (1.904)
Sector of Employment: *Manufacturing*	-36.308*** (6.820)	0.620 (0.687)	0.277 (1.024)
Services	-0.347 (1.250)	0.222 (0.532)	-0.226 (0.777)
Construction	2.049 (1.304)	0.454 (0.664)	0.674 (0.918)
Agriculture	-38.510*** (6.060)	-0.370 (0.669)	-1.296 (1.149)
Employer*: Private Enterprise*	-0.627 (0.658)	0.221 (0.298)	-0.580 (0.461)
Government	-0.608 (0.722)	-0.078 (0.317)	-0.871* (0.478)
Time Spent in the Formal Sector:			
Less than 4 hours per day	2.779 (1.937)	1.273 (1.328)	3.165** (1.564)
4-6 hours per day	0.727 (0.893)	0.286 (0.426)	-0.135 (0.704)
7-9 hours per day	-0.967 (0.591)	-0.032 (0.272)	0.320 (0.435)
Household Income earned in formal sector:			
Less than $1,000 per month	-1.887 (1.570)	-0.126 (0.728)	1.468 (1.369)
$1,001-$5,000 per month	-0.648 (0.974)	0.099 (0.421)	0.159 (0.637)
$5,001-$10,000 per month	0.505 (0.922)	0.412 (0.401)	0.368 (0.612)
Opinion on Income Earned in the Formal			
Sector: *Very Low*	1.135 (1.705)	-0.649 (0.969)	-3.329* (1.712)
Low	-0.167 (1.590)	-0.827 (0.924)	-0.696 (1.321)
Acceptable	-0.667 (1.529)	-0.379 (0.903)	-0.839 (1.295)
Perception of Level of risk of Detection by Tax			
Authority: *No Risk*	0.998 (0.884)	0.094 (0.372)	0.534 (0.589)
Low Risk	1.760** (0.861)	1.035*** (0.327)	1.015** (0.515)
Average Risk	1.044 (0.878)	0.212 (0.314)	-0.110 (0.535)
Opinion on Income Tax Burden: *Too High*	1.708** (0.758)	-0.266 (0.240)	-0.566 (0.358)
Opinion on Red Tape and Government			
Regulations*: Excessive*	-1.079** (0.541)	-0.479** (0.224)	-0.394 (0.348)
Constant	-39.53*** (2.302)	-18.16*** (1.339)	2.524 (2.604)
Hausman Tests of IIA	-278.7301 [1.00]	0.000 [1.00]	0.000 [1.00]
Observations		511	
Likelihood Ratio		194.02 [0.000]	
McFadden's Pseudo-R^2		0.17	

Standard errors in parentheses. p-values in [ ], * significant at 10%; ** significant at 5%; *** significant at 1%.

The Hausman specification test (Hausman and McFadden 1984) provides no evidence that the 'Independence of Irrelevant Alternatives (IIA)' assumption has been violated (p-value =1

in all three cases), which is necessary for the validity of the multinomial logit model. The Likelihood-Ratio test[12] provides more general support for the model (χ^2 statistic of 194.02 and associated p-value=0.000) and McFadden's Pseudo-R^2 is calculated as 0.17, which is an acceptable value.

The estimated coefficients in Table 2 represent the effect of the corresponding attribute's modality, relative to the excluded reference modality, on the probability of selecting any of the three categories of participation shown in the table, relative to the probability of 'no participation' in the informal sector. For example, the value of 0.965 (significant at 5%) attached to the 'Has dependents', 'Dual Participation' coefficient indicates, first of all, that, given the positive sign, people with dependents are more inclined than those without (the reference modality) to participate in the informal sector. It also means, again given the positive sign, that people with dependents prefer 'dual participation' (i.e. as both demanders and suppliers of goods and services in the informal sector) to non participation (the base category). The results show none of the attributes Sex, Level of Education, the Level of Household income explains the level of participation in the informal sector. This is not altogether surprising given some of the tentative conclusions drawn in the previous section. All of the remaining attributes are significant at least at the 10% level in at least one of the modalities.

The results provide reasonably convincing evidence for hypotheses 1-4 and perhaps the most noteworthy is the evidence for hypothesis 1 that households where it is believed that the chance of detection by the tax authority is low, relative to those who think that it is high (reference modality), are more apt to demand and supply goods and services in the informal sector, as opposed to no participation at all (strongly significant positive coefficients). This is

[12] Using the log likelihood of the full model ($\ln L_1$) with the one from the constant only model ($\ln L_0$) the likelihood ratio test statistic is computed as follows: $\chi^2 = -2\ln(\frac{L_0}{L_1}) = 2(\ln L_1 - \ln L_0)$

consistent with the results of other studies (Andreoni et al. 1998, Jackson and Milliron 1986), where it is found that the perceived likelihood of being detected by the tax authorities is a key predictor of tax evasion, arguably the main motivation for participation in informal sector activity (Schneider et al 2001).

Households where it is believed that the income tax burden is too high will, relative to those who believe that it is not too high (reference modality), supply goods and services to the informal sector (coefficient significant at 5%), which is evidence in support of hypothesis 2. Households where it is believed that the income they earn in the formal sector is low are more inclined than those where it is believed that it is high (reference modality) to supply goods and services in the informal sector (positive coefficient significant at 5%). Households whose members spend less than 4 hours per day working in the formal sector tend to prefer participating as both buyers and sellers of goods and services in the informal sector (positive coefficient significant at 5%, which is evidence in favour of hypothesis 4.

Households with persons employed full-time or part-time in the formal sector will either provide goods and services to, or purchase goods and services from, the informal sector in preference to no participation (highly significant positive coefficients in both cases). One possible explanation for the latter finding is provided by Schneider and Enste (2003) who find that some individuals work in the informal sector even during their regular hours in formal sector activity. It is also possible that the rarity of certain skilled labour (electricians, plumbers, doctors, accountants) make such skills demanded in large amounts in both the formal and informal sectors. Even those who do a full day's work in the formal sector are willing to work outside of 'normal' working hours to take advantage of buoyant demand for their skills. They too are attracted by the relatively cheaper cost of goods and services available in the informal sector.

Households with persons employed in the manufacturing and agricultural sectors have a strong tendency to participate less than households from the 'other sector' (reference modality), and are more unlikely to participate as providers of goods and services in the informal sector (highly significant negative coefficients). There is also no evidence that personnel in the services and construction sectors are attracted to formal sector activity (non significant coefficients). This result is at odds with that of Marcelli et al. (1999) and Losby and Edgcomb (2002) who find that households from the services and construction sectors are more likely to supply services in the informal sector. Persons employed by the government are marginally less likely than the self-employed (reference modality) to be involved in the demand for and supply of goods and services in the informal sector (negative coefficient significant at 10%), which seems to be accord with results obtained by Hart (1970, 1973) who observes that self-employed persons tend to be major *suppliers* in the informal sector, since they have more freedom in reporting their incomes and they could under-report or not report their income at all. The government employees tend to no participation at all.

The highly significant positive coefficient attached to the 'Supply only' category of each age modality indicates the strong preference, at any age, for supplying goods and services in the informal sector as opposed no participation at all. This is at odds with studies by Schneider et al (2001) and Gerxhani (2002) conducted in Australia and Albania, respectively, which both confirm that certain age categories are more influential than others in the supply of services to the informal sector. Households with married couples, or people living together in a 'common-law' union, are inclined to participate less than those with single members and seem to prefer not to participate at all in the informal sector (negative coefficient, significant at 5%). This result is similar to that obtained by Anderson (1998) in his study of Mongolia's informal sector, but different to that of Gerxhani (2002), who did not find any relationship between marital status and participation in the informal sector (although our results are

similar to hers in that all other 'Marital Status' modalities are not significant). Households with dependents are more inclined than those without to participate in any capacity rather than not participate at all (significantly positive coefficients for all included categories). This is not surprising: people with 'more mouths to feed' are more likely to attempt to earn (tax-free) income in the informal sector as well as to seek the cheaper goods and services there.

Persons who live in sub-urban areas are more prone to demand goods and services in the informal sector (positive coefficient significant at 10%) but tend to shy away from supplying such goods and services (negative coefficient significant at 5%).

Persons who rent their homes seem to have a strong preference to be both demanders and suppliers in the informal sector rather than not participate at all (the 'dual participation' coefficient is positive and significant at 10%). This seems a reasonable result since individuals who do not own their homes are very likely to be suppliers of services to the informal sector to earn extra income and they are also the ones who would demand services there since this work is usually provided at lower prices than in the formal sector. The result, however, is in contradiction with those of Mirus et al. 1994 and Mogensen et al. 1995, who conclude that homeowners are the key demanders of services in the informal sector, such as construction services.

A seemingly paradoxical result is that households are less likely to participate in the informal sector the greater their perception of the burden of government regulations and red tape (highly significant negative coefficients attached to the 'supply only' and demand only' variables). This result appears counter-intuitive and contrary to some of the findings reported in the literature, for example Friedman et al. (2000) who, in their study of 69 countries, both developed and developing, establish that too much government regulation contributes to an increase in informal sector activity.

The apparent paradox probably may be resolved if a case can be made that some government regulations may have the effect of deterring participation in both the formal and informal sectors. In the case of Trinidad & Tobago, such regulations undoubtedly exist, such as, for instance, the requirement that all food handlers need official 'food badges', a regulation that is vigorously enforced by 'food inspectors'. In the case of activity involving motor vehicles (pirate taxis, heavy-duty lorries), vehicles must be properly licensed and insured, and there are regular road checks to ensure this. Informal sector participants are more likely to be fined for not being properly registered or insured than for carrying out an 'illicit' economic activity. It is also possible that people demanding services in the informal sector will require that the providers, such as plumbers, electricians and even teachers, are 'certified' to carry out the job, which may mean compliance with some official regulation. All of this may explain why bureaucratic regulations and red tape may deter informal sector activity[13].

A word of caution about the estimation procedure used: it is possible that some of the variables in the estimated equation may be simultaneously determined with 'participation' (income and 'hours spent in the formal sector' are obvious candidates)[14]. If this is the case, the estimated coefficients may reflect some amount of simultaneity bias. This means, in particular, that the coefficients may have been over- or underestimated, and that predictions of the probability of participation at one level or another may be correspondingly over- or underestimated. This should be borne in mind when interpreting the results shown in table 2 above.

5. Empirical investigation of the perception of risk of participation in the informal sector

[13] It is also interesting to note that Schneider et al. (2001) did not find any effect of government bureaucracy and red tape on the supply of goods and services to the informal sector.

[14] We owe this observation to an anonymous referee of *Applied Economics*.

It is often argued that tax evasion is a major motivating factor behind participation in the informal sector and, to some extent, this is verified in this study (see above). However, it may also be argued that an individual will be less inclined to such participation if he/she believes that he will be caught by the relevant authorities. What determines his/her perception of the level of risk of detection by the tax authority?

An ordered probit model is employed in this section to investigate the determinants of the perception of the level of risk of detection by the tax authorities ordered, from the lowest to the highest levels of perception, as follows: 'no risk', 'low risk', 'average risk', 'high risk'. The independent variables are the very same modalities of the attributes appearing in Table 1 except that the 'participation' variable, which was the dependent variable in the Multinomial Logit Model, is excluded from the model[15], and that the risk perception attribute is now the dependent variable.

The socio-economic/demographic predictors identified have often been used in tax evasion studies, such as those cited above. In this study it was hypothesized that these would affect the level of risk of participation since other studies have shown that some of these variables do influence an individual's tendency to evade taxes (Warneryd and Walerud 1982). For instance, a person who is employed part-time may experience greater financial strain and may be more prone to taking the risk of tax evasion (Mason and Calvin 1978) through informal sector participation.

Table 3 summarizes the results of the ordered probit model for the perception of the level of risk of detection when participating in the informal sector.

[15] It seems reasonable to suggest that a person's actual participation in the informal sector will not be a factor determining his/her perceived risk of participation, at least in static framework used in this paper. The same caution about possible simultaneity bias in the case of the results shown in Table 2 also apply here, since some of the variables in this equation may be simultaneously determined. This should be borne in mind when interpreting the results shown in table 3.

Table 3
Ordered Probit Results-Perception of Level of Risk of Detection

Attributes (modalities in italics)	
Sex: *Male*	-0.119 (0.110)
Age: *15-25 years*	-0.248 (0.338)
26-35 years	-0.415 (0.321)
36-45 years	-0.526* (0.306)
46-60 years	-0.399 (0.304)
Marital Status: *Married/Common Law*	0.054 (0.138)
Divorced	0.186 (0.302)
Separated	0.083 (0.239)
Has Dependents	-0.025 (0.122)
Area of Residence: *Urban*	0.047 (0.194)
Sub-Urban	-0.157 (0.109)
Living Arrangements: *Owns Home*	-0.013 (0.139)
Renting	-0.191 (0.164)
Level of Education: *Secondary*	0.244* (0.129)
Tertiary	-0.101 (0.263)
Vocational	-0.150 (0.217)
Employment Status: *Full Time*	-1.593* (0.874)
Part Time	-1.514* (0.885)
Sector of Employment: *Manufacturing*	-0.356 (0.306)
Services	-0.408* (0.242)
Construction	-0.215 (0.289)
Agriculture	-0.018 (0.308)
Employer: *Private Enterprise*	0.072 (0.132)
Government	0.118 (0.140)
Time Spent in the Formal sector:	
Less than 4 hours per day	-0.663 (0.481)
4-6 hours per day	-0.317* (0.190)
7-9 hours per day	0.033 (0.121)
Household Income: *Less than $1,000 per month*	-0.134 (0.331)
$1,001-$5,000 per month	0.016 (0.186)
$5,001-$10,000 per month	-0.023 (0.178)
Opinion on Income Earned in the Formal sector:	
Very Low	-0.713* (0.422)
Low	-0.720* (0.403)
Acceptable	-0.524 (0.394)
Opinion on Income Tax Burden: *Too High*	-0.073 (0.107)
Opinion on Red Tape and Government Regulations:	
Excessive	0.321*** (0.099)
Thresholds: μ_0	-3.840 (1.041)
μ_1	-2.811 (1.037)
μ_2	-1.836 (1.034)
Observations	513
Likelihood Ratio	56.51 [0.012]
McKelvey & Zavoina's R^2	0.12

Standard errors in parentheses. p-value in [ ], * significant at 10%; ** significant at 5%; *** significant at 1%

The likelihood ratio statistic, a measure of the overall goodness of fit of the model, provides evidence of a strong fit (p-value of 0.012). The McKelvey-Zavoina R^2 is 0.12, an acceptable value in (cross-sectional) studies like these[16]

The estimated coefficients in Table 3 measure the influence of the corresponding attribute's modality, relative to the reference modality, on the perception of risk involved. For example, the value of -0.526 (significant at 10%) attached to the 36-45 age-group coefficient indicates that people in this age group feel, relative to those in the over 60 group (the reference modality), that it is less risky (because of the negative sign) to participate in the informal sector.

Hypothesis 5 appears to be rejected: there is no evidence that the size of the tax burden tends to influence risk perception since the estimated coefficient is not significant. This is a somewhat surprising result and it is possible that it is reflecting the fact that many of the households involved in the informal sector, because of the size of their incomes, are to a large extent exempt from paying taxes anyway. In fact, more than 55% of the sample earned incomes that are less that TT$5,000.00 per month, or TT$ 60,000.00 per annum (Table A, Appendix I), and most of these will have been required to pay very little or no taxes at the time the survey was conducted.

The data provide some support for hypotheses 6 that low and very low incomes earned in the formal sector tend to lower the perception of risk (negative coefficients significant at 10%). These results may simply be reflecting the households' general lack of concern about the risk involved for at least four reasons. First, the belief that income is low may encourage a certain amount of risk-taking, and the view that the risk is low may really be a subjective measure of the informal sector participant's risk averseness (or the lack of it). Second, participants may

[16] Several authors (see Long 1997, Long and Freese 2006) prefer the McKelvey-Zavoina to the McFadden R^2 on the grounds that it more closely approximates the R^2 obtained from regressions on the underlying latent variable.

believe that income earned in the informal sector may not necessarily put them in an income bracket where they will be required to pay considerably more taxes. Third, they may not believe that the tax authorities will waste time auditing them as the gains in doing so may far outweigh the costs involved (including the political costs). Fourth, they may have little faith in the 'compliance' mechanism given the generally widely held view that much better off people than themselves evade taxation with impunity. Indeed, the authors know offhand of no case of anyone being prosecuted and convicted on tax evasion charges notwithstanding the anecdotal evidence that such evasion is widespread.

There is also support for hypothesis 7 since persons working less than a full day in the formal sector (4-6 hours per day) tend to believe, marginally more than those who spend more than 10 hours (negative coefficient significant at 10%), that the risk of detection is low. It is probably true that for many informal sector participants their real full-time job is in that sector and they supplement their income by taking a job in the formal sector. Perhaps many years of successful participation in the informal sector, by themselves and their associates, have convinced them that there is precious little risk involved, especially if they have never had any encounter with the tax authority (which is very likely). In fact, this view may have spread even to those declaring themselves to be employed full-time (and part-time) in the formal sector since they too believe that the risk of detection is relatively low (which probably explains their significant participation in the informal sector established in the previous section).

Those in the 36-45, age group also believe that the risk of detection is low, which again is no surprise since this group has already been shown to participate significantly in the informal sector. This group is likely to be the one with the highest expenses, like first-time mortgages and children receiving full-time education, up to and including the tertiary level. Again, their attitude to risk may really be a measure of their willingness to take risks, given the pressures

of living that they face. They may also feel quite convinced that the compliance mechanism is unlikely to single them out for special attention.

Persons with a secondary education seem to believe marginally more than those with only a primary education (reference modality) that the risk of detection is high (positive coefficient, significant at 10%). This may be due to a sense of civic responsibility inculcated at that level of education, although this is difficult to substantiate. The strength of government red tape and regulations seem to be the strongest deterrent to participation (highly significant positive coefficient), a result that would normally be surprising but not altogether unexpected in the current context, given the fact that it has already been established that such an opinion negatively affects participation in the informal sector.

The results also show that none of the modalities of the following attributes was significant: Sex, Marital Status, 'Has Dependents', 'Area of Residence', Living Arrangements, Employer, and Household Income. But the more interesting observation is that, for households in Trinidad & Tobago, it seems 'natural' to participate in the informal sector. Moreover, participants may not even think that there is risk involved or that there is anything wrong in the non declaration of income. Perhaps one of the best illustrations of this is the so-called PH Taxis (private vehicles that ply themselves for hire), whose 'illegal' activity is done in the full glare of the authorities and even with their approval[17].

6. Policy Lessons and Conclusion

In this paper, we establish the socio-economic, demographic and attitudinal characteristics of households participating in the informal sector of an emerging economy like that of Trinidad & Tobago. We also determine the extent to which some of these same characteristics influence the perception of the risk of detection by tax authorities of involvement in informal

[17] Not long ago, there was a rowdy protest by commuters who objected to the raising of fares by the PH drivers. This was reported in the national media as it would have been done if the PH drivers were a legal entity.

sector activity. Household members are motivated to undertake informal sector activity because they believe that taxes are too high and that their incomes are too low, they have dependents to support, and they believe that the resulting tax evasion will go undetected. They are further motivated by other socio-economic circumstances, such as the number of dependents they have to support. Their perception of the risk of detection by the tax authority is determined largely by the income they earn in the formal sector and the extent of government bureaucracy prevailing there.

In emerging, and even in developed economies, it is recognized that there are both negative and positive features of the informal sector. Any effort to regularize the informal sector cannot ignore both these aspects and the fact that the factors motivating participation in it reflect genuine concerns about malfunctioning of the official system. Policy recommendations, therefore, should aim to support the positive aspects and suppress the negative ones. Negative aspects include the loss of government revenue and, more generally, the misallocation of public funds because the size and structure of the informal sector are unknown. On the positive side, there is the creation of income and employment, and even, eventually, an increase in government revenues resulting through the application of largely indirect taxes to such activity. Policies should therefore be dynamic and must contain a wide variety of tools and instruments, which can be used in different situations and circumstances as they appear.

There is clearly low tax morale in Trinidad & Tobago, and probably in most emerging economies. Individuals believe they are paying too much tax, relative perhaps for what they receive in return, and relative to what they perceive as low incomes. They also believe that non payment of taxes goes undetected (and therefore unpunished), something that they have probably observed to be true and to benefit the wealthier members of society. Any policy measure should start with a strengthening of trust in government and government institutions.

Tax-payers must believe that they are getting value for their tax dollars, that the tax net is all-inclusive so that they are not being unduly punished by the tax authority. Changing of attitudes is a very important factor in the effort to reduce such activity, since control measures (and these are always implemented in the midst of inadequate resources) cannot achieve this by themselves.

At the same time, measures may be put in place by the tax authority to deal with the perception that the tax rate might be too high. If this is indeed true, the tax take may increase as a result of lower taxes but greater compliance. Measures must also be put in place to detect tax evasion (including increasing audits and penalties) across the board and to deal with it when discovered. The aim should be to transform informal sector activity into legal activity by reducing the administrative burden, simplifying legislation and reducing the tax burden for households.

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APPENDIX 1

Sample Frame and Design

The sample frame used in this paper is the list of enumeration districts (ED) obtained from the Central Statistical Office (CSO) of Trinidad and Tobago. To facilitate the selection of the cluster of households to be enumerated within an ED, each ED is given a measure of size that is a multiple of approximately five households. Based on the 1990 Census of Population and Housing (Trinidad and Tobago), approximately 48,600 clusters were obtained, which were allocated among nine domains proportional to the size of the population in each domain.

The sample design for the survey of the informal sector is a two-stage stratified cluster sample consisting of EDs (primary units) at the first stage and non-compact clusters of households (ultimate sampling units) at the second stage. The first stage involves the selection of a 'grand sample' of clusters of households with the primary sampling units, which consists of nine replicates chosen with an overall sampling fraction of 1/25. Systematic selection of the primary sampling units is done with the probability of selection proportionate to size. From this grand sample, one-third of the nine replicates constitute the second stage sample, which is used to obtain survey data. From each sample ED, a non-compact cluster of households is selected systematically with a random start and an interval equal to the number of clusters allocated to the ED. From these selected clusters, households are randomly selected for interview.

In the event of absence or non-response from a household, a substitution was made from the same cluster. This is the so-called random walk method commonly used by commercial research institutes. The use of this method ensures a less expensive survey since non-responses are replaced by responses and no recalls are necessary.

Appendix 2
Table A
Frequency Distributions (%)

Attributes (Modalities in Italics) No. of Households →	Sample Frequencies (570)	No Participation (174)	Supply Only (92)	Demand Only (240)	Dual Participation (64)
Sex: *Male*	56.5	55.5	63.164	55.76	57.81
Age: *15-25 years*	12.3	15.2	9.47	10.30	7.81
26-35 years	22.3	29.4	21.05	16.67	15.63
36-45 years	33.1	28.0	32.63	34.85	32.81
46-60 years	28.6	23.7	31.58	32.42	35.94
Marital Status: *Married/Common Law*	58.6	56.67	54.74	60.61	57.81
Divorced	3.3	1.90	3.16	4.24	3.13
Separated	4.7	4.29	5.26	5.15	6.25
Has Dependents: *Yes*	66.1	56.94	72.63	72.73	73.02
Area of Residence: *Urban*	11.1	9.00	9.47	12.42	7.81
Sub-Urban	52.3	47.39	54.74	56.36	60.94
Living Arrangements: *Owns home*	52.1	45.50	53.68	56.97	56.25
Renting	19.1	18.01	21.05	20.91	28.13
Level of Education: *Secondary*	55.8	52.61	51.58	57.27	45.31
Tertiary	5.4	5.69	7.37	5.15	10.94
Vocational	8.2	9.48	8.42	7.88	7.81
Employment Status: *Full Time*	78.9	76.78	73.91	82.01	78.13
Part Time	15.3	18.96	20.65	11.59	15.63
Sector of Employment: *Manufacturing*	6.1	5.00	4.7	7.5	6.67
Services	73.3	72.00	70.7	75.0	73.33
Construction	8.5	6.00	17.4	7.4	11.48
Agriculture	7.10	6.96	4.90	4.60	5.24
Employer: *Private Enterprise*	38.2	37.19	35.6	39.5	34.43
Government	30.2	29.65	28.7	31.1	29.51
Time Spent In the Formal Sector:					
Less than 4 hours per day	1.1	0.49	3.4	1.9	3.28
4-6 hours per day	11.4	13.79	9.1	9.8	8.20
7-9 hours per day	56.2	54.68	56.8	58.5	63.93
Household Income:					
Less than $1,000 per month	3.3	4.43	2.3	2.6	1.64
$1,001-$5,000 per month	52.2	55.17	50.0	51.1	52.46
$5,001-$10,000 per month	31.9	27.09	31.8	34.6	31.15
Opinion on Income Earned in the Formal Sector: *Very Low*	14.0	16.26	9.1	11.6	3.28
Low	39.2	41.87	48.9	37.4	52.46
Acceptable	44.9	40.39	38.6	49.0	40.98
Perception of Level of Risk of detection by Tax Authority: *No Risk*	18.1	17.96	21.7	16.4	20.31
Low risk	32.5	21.84	41.3	39.1	42.19
……..*Average Risk*	32.5	39.0	32.1	31.2	23.44
Opinion on Income Tax Burden: *Too high*	67.2	71.43	67.4	62.5	57.81
Opinion on Red Tape and Government Regulation: *Excessive*	49.1	57.89	44.0	43.7	42.19