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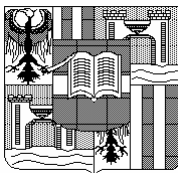
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**Characteristics of the Household Sector of the Hidden
Economy in an Emerging Economy**

by

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CHARACTERISTICS OF THE HOUSEHOLD SECTOR OF THE HIDDEN ECONOMY IN AN EMERGING ECONOMY

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Abstract

Using the case study of Trinidad and Tobago we investigate for an emerging economy the socio-economic, demographic, and attitudinal characteristics that influence the propensity of individuals in the household sector to participate in the hidden economy and their perception of the risk of detection by tax authorities in doing so. To this end we analyze data gathered from a unique cross-sectional field survey covering 570 households. Our econometric results using multinomial logit and ordered probit models suggest that individual household members are motivated to undertake hidden economic activity because they believe taxes are too high, their incomes are too low, they have dependents to support, and they believe that the resulting tax evasion will go undetected.

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1. Introduction

Work done on the hidden economy² 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. 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 hidden economic activity.

There are two major objectives of this study. The first is to determine the socio-economic, demographic and attitudinal characteristics that influence an individual household member's propensity to participate in the hidden economy of an emerging economy using the case of Trinidad & Tobago. The second objective is to find out whether and to what extent some of these same features play a role in influencing that person's perception of the risk of detection by tax authorities of involvement in hidden economy activity in an emerging economy. 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.

The concept of the hidden economy is well known though its definition is subject to some controversy (Schneider and Enste 2000, 2003). In this paper we concentrate solely on the 'household sector' of the hidden economy, a notion borrowed from Fleming et al. (2000), who divide the hidden economy into four (4) sectors as follows:

"The criminal sector is defined as illegally produced goods and services, such as the production and trade of illicit narcotics. The irregular sector is defined as legally produced goods and services

² See Gërkhani and Schram (2001) and Gerxhani (2002, 2003).

which evade legal reporting requirements, such as tax evasion. The household sector is defined as household production. And the informal sector is defined as 'economic activities that circumvent the costs and are excluded from the benefits³ of law, such as unregulated microenterprise.' (Fleming et al., 2000, p. 390-1)

This study differs for several reasons from previous studies done on the hidden economy using Trinidad and Tobago data⁴ as well as data from other emerging economies. First, it employs data collected at the micro level from a direct survey of the household sector. This may be compared to another micro-study 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 sector participation in the hidden economy of Trinidad and Tobago. The questionnaire used in this study was formulated specifically to obtain data from hidden economy participants. It was therefore 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 hidden economy (Maurin et al. 2005). 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 hidden economy activity, 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

³ Feige (1990) adds to this exclusion from the 'rights incorporated in the laws and administrative rules covering property relationships, commercial licensing, labor contracts, torts, financial credit and social security systems'.

⁴ See Rampersad (1987), Lloyd-Evans and Potter (2002) and Maurin et al (2005).

investigate the hidden economy 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 economy and hidden economy employment. More recently, Dimova et al. (2005) uses 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 similar study in the extant literature. Most of the studies on tax evasion which employ ordered probit models model various areas in tax evasion, but not risk perception. 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.

The rest of this paper proceeds as follows. In the next section 3 some theoretical considerations are done and five empirical testable hypotheses are developed.. In sector 4 a review and discussion of some basic frequency distributions of the data obtained from the survey are presented. Following this, in sector 5 a multinomial logit model of participation in hidden economic activity is specified, estimated and analyzed. In sector 6, this in turn is followed by the

specification estimation and analysis of an ordered probit model of the perceived level of risk involved in hidden economy participation. Some policy lessons are drawn from these exercises and the paper is then concluded.

3. Some Theoretical Considerations of the Participation for People in the Shadow Economy

3.1. Model of time allocation

In the traditional theory of labour supply, individuals can merely spend their time at work and pursue leisure activities, according to their personal preference. In these models, there is no differentiation between regular and illicit work. Becker (1965) extends the problem of efficient time allocation by the problem of deciding between different occupations. Thus, time is a scarce good that has to be distributed optimally between work and leisure by the individual. The author divides work into that carried out in the official economy and that in the household. This is not yet a differentiation into official and unofficial sectors. However, Becker at least distinguishes between the official sector and the self-sufficiency economy (part of the underground economy). Other adaptations of Becker's model explicitly consider illicit labour supply. An example here is the model by de Gijssel (1984), which is based on the theory of multiple occupations. Starting from a micro-economic decision problem, de Gijssel investigates the influence of various factors on illicit labour supply. However, these hypotheses have not yet been proven either in theory or empirically⁵. A few of the statements seem questionable. The thesis, that illicit labour supply decreases when the official rates of pay increase, only considers individual utility. The decline of employment on the macro-economic level due to higher wages, and the increasing demand for

⁵ The hypotheses are not proven analytically here. Numerous models exist, which, under different presumptions, come to contradictory conclusions. See Trockel (1987); Werner (1990). For an extensive overview on model variations, empirical results, and further literature, see Andreoni, Erard, and Feinstein (1998).

illicit work resulting from higher costs in the official economy, are ignored. Therefore, it may seem sensible to take secondary effects into account⁶.

In de Gijsel's model, the increased rate of unemployment is a cause for the rise in shadow economy work as, in the official economy, a higher employment risk is positively correlated with a higher income risk. This induces the individuals to engage in shadow economic activities. If there is extensive unemployment insurance, the income risk is negligible; indeed, the influence of the rate of unemployment is negligible too.⁷ This supply-side reaction contradicts the demand for shadow economy work that arises, especially in times of full employment and production with long waiting and delivery periods.

3.2. Models of tax evasion

Another way to model deviant behaviour is via the theory of tax evasion. If this theory is combined with labour supply models, the decision to evade taxes depends on whether to opt for the official or the unofficial sector.⁸ In the pioneering approach by Allingham and Sandmo (1972), the decision to evade taxes results from the individual utility maximization. Under the assumption of insecurity, the authors analyse the decision on which part of the income should be concealed. 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

⁶ These correlations are illustrated by Neck, Schneider, and Hofreither (1989). They stress the problems of making policy implications with these models, as one has to consider numerous restrictions when applying these models to reality. See the omnibus volume by Schäfer (1984); Carlberg (1984); Wiegard (1984).

⁷ However, there are incentives for unemployed individuals to abuse the system, depending on the kind of transfer payments.

⁸ See also, e.g., Allingham and Sandmo (1972); Andreoni, Erard, and Feinstein (1998); Mettelsiefen (1984); Petersen (1984a: 132ff.); Sandmo (1981); Shishko and Rostker (1976). In crime theory, Becker (1968) additionally considers the probability of being detected as well as the severity of the punishment.

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 eradicate this deficit and combines the theory of tax evasion with the neoclassical theory of labour supply. The individuals maximize their Neumann-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 official income.

Isachsen and Strom (1980) try to model explicitly the shadow economy by combining the theory of tax evasion with the model of time allocation. In contrast to Andersen, individuals here can divide their time between official and unofficial (shadow economy) work as well as leisure. Thus, these now become the decision variables. Whereas the income gained in the official economy is taxed directly, shadow economy work is not. Therefore, tax evasion results from unofficial (shadow economy) work. Isachsen und Strom conclude that a higher marginal tax rate leads to a lower supply of official labour. In this model, the marginal tax burden causes a rise in shadow economic 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.⁹ Depending on the structure of the model and its assumptions or the data, the results differ considerably. In some models, higher taxation leads to an increase in shadow economy work, 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

⁹ See also Bös and Felderer (1989); Cowell (1989, 1990); Hackmann (1984).

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.

3.3. Empirically Testable Hypotheses

From these theoretical consideration we formulate the following empirically testable hypotheses, using our data sample.

1. The lower the chance of detection by the tax authority is, the more people are able to demand and supply services in the shadow economy, *ceteris paribus*, that means, the higher is the participation in shadow economy activities of those people.
2. The higher the average and or marginal tax burden, the stronger is incentive to participate or being engaged in shadow economy activities, *ceteris paribus*.
3. The lower the income earned in the official economy is, the higher is the incentive to be engaged in shadow economy activities, *ceteris paribus*.
4. The more people are unemployed, the higher is the incentive to be engaged in shadow economy activities, *ceteris paribus*.
5. The lower the amount of hours (per week) the work in the official economy is, the higher is the incentive to be engaged in shadow economy activities, *ceteris paribus*.

These hypotheses will be tested in the following sections 4, 5 and 6.

4. Data Description for our 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 hidden economy. A study of the Australian hidden economy (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.

The level of participation in the hidden economy is defined over four levels: ‘No participation’ (respondent does not participate at all in the hidden economy); ‘Supply only’ (respondent supplies, but does not demand, goods and services in the hidden economy); ‘Demand only’ (respondent demands, but does not supply, goods and services in the hidden economy) and ‘Dual Participation’ (respondent supplies and demands goods and services in the hidden economy). A list of socio-economic, demographic and attitudinal attributes, which are assumed to influence the level of participation, 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’ modality¹⁰, for each attribute.

¹⁰ 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 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:	Unemployed	Full Time Part Time Retired Full Time Student
Sector of Employment	Agricultural Sector	Services Sector Construction Sector Manufacturing Sector Other Sector
Employer	Self-employed	Government Private Enterprise
Time spent in the Formal Economy	Over 10 hours	Less than 4 hours 4-6 hours 7-9 hours
Household Income	Over \$10,000	Less than \$1,000 \$1,001-\$5,000 \$5,001-\$10,000
Opinion on Income Earned in the Formal Economy	High	Very Low Low Acceptable
Perception of Level of Risk of detection by Tax Authority	High Risk	No Risk Low risk
Opinion on Income Tax Burden	Not too high	Too High
Opinion on Red Tape and Government Regulation	Not excessive	Excessive

Table A1 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%). Respondents with dependents have a strong tendency to participate in the hidden economy 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 hidden economy activity. Similarly, the respondents who think that there is little risk of detection by the tax authority, and who comprise 32% of the sample, provide 49% of the ‘supply only’ activity and as much as 53% of ‘dual participation activity’. 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.

5. Empirical Investigation of the Decision to Participate in the Shadow Economy

A multinomial logit model is used to explain the level of activity in the hidden economy (‘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 ‘dual participation’ category is designated as the benchmark so that the corresponding vector of coefficients in the model is normalized to zero¹¹. 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 'Dual Participation'

Attributes (modalities in Italics)	No Participation	Supply Only	Demand Only
Sex: <i>Male</i>	0.088 (0.379)	1.047 (0.707)	0.161 (0.367)
Age: <i>15-25 years</i>	1.705 (1.131)	22.270*** (0.000)	1.418 (1.061)
<i>26-35 years</i>	1.915* (1.036)	22.287*** (1.072)	0.766 (0.965)
<i>36-45 years</i>	1.207 (0.961)	21.702*** (1.119)	0.766 (0.881)
<i>46-60 years</i>	0.686 (0.933)	20.966*** (1.254)	0.409 (0.852)
Marital Status: <i>Married/Common Law</i>	1.041** (0.466)	0.087 (0.774)	0.662 (0.450)
<i>Divorced</i>	0.164 (1.055)	-0.318 (1.545)	0.838 (0.948)
<i>Separated</i>	0.325 (0.799)	0.483 (1.496)	0.193 (0.749)
Has Dependents	-0.974** (0.433)	0.343 (0.776)	-0.139 (0.423)
Area of Residence: <i>Urban</i>	0.898 (0.805)	0.913 (1.241)	1.558** (0.780)
<i>Sub-Urban</i>	-0.443 (0.373)	-1.612** (0.653)	0.026 (0.363)
Living Arrangements: <i>Owns Home</i>	-0.665 (0.522)	-0.773 (0.779)	-0.237 (0.515)
<i>Renting</i>	-1.019* (0.567)	-2.284** (1.079)	-0.782 (0.560)
Level of Education: <i>Secondary</i>	0.077 (0.437)	0.965 (0.770)	0.331 (0.416)
<i>Tertiary</i>	-0.171 (0.804)	0.126 (1.536)	-0.841 (0.794)
<i>Vocational</i>	-0.069 (0.715)	-0.151 (1.423)	-0.242 (0.696)
Employment Status: <i>Full Time</i>	1.884 (1.873)	17.507*** (0.799)	19.960*** (0.510)
<i>Part Time</i>	2.044 (1.923)	18.197*** (0.000)	19.324*** (0.000)
Sector of Employment: <i>Manufacturing</i>	-1.570 (1.104)	-21.464*** (0.000)	-0.558 (1.053)
<i>Services</i>	-1.053 (0.881)	23.075*** (1.388)	-0.452 (0.870)
<i>Construction</i>	-1.942* (1.033)	24.533*** (1.469)	-1.134 (0.997)
..... <i>Other</i>	-1.267 (1.146)	22.840*** (0.000)	-0.919 (1.132)
Employer: <i>Private Enterprise</i>	0.570 (0.460)	-0.028 (0.742)	0.788* (0.444)
<i>Government</i>	0.859* (0.477)	0.232 (0.800)	0.776* (0.459)
Time Spent in the Formal Economy:			
<i>Less than 4 hours</i>	3.174** (1.567)	-0.479 (1.806)	-1.889 (1.299)
<i>4-6 hours</i>	0.140 (0.704)	0.758 (1.054)	0.411 (0.685)
<i>7-9 hours</i>	-0.318 (0.434)	-1.304* (0.677)	-0.361 (0.416)
Household Income: <i>Less than \$1,000</i>	1.465 (1.372)	-0.384 (1.959)	1.343 (1.349)
<i>\$1,001-\$5,000</i>	-0.143 (0.635)	-0.756 (1.073)	-0.026 (0.613)
<i>\$5,001-\$10,000</i>	-0.347 (0.611)	0.126 (1.019)	0.064 (0.589)
Opinion on Income Earned in the Formal Economy: <i>Very Low</i>	3.334* (1.711)	4.538** (2.197)	2.685 (1.652)
<i>Low</i>	0.692 (1.319)	0.684 (1.834)	-0.122 (1.251)
<i>Acceptable</i>	0.833 (1.295)	0.437 (1.772)	0.464 (1.229)
Perception of Level of risk of Detection by Tax Authority: <i>No Risk</i>	-0.607 (0.483)	-0.196 (0.782)	-0.648 (0.476)
<i>Low Risk</i>	-1.087*** (0.386)	0.019 (0.672)	-0.190 (0.364)
Opinion on Income Tax Burden: <i>Too High</i>	0.584 (0.357)	2.211*** (0.782)	0.311 (0.340)
Opinion on Red Tape and Government Regulations: <i>Excessive</i>	0.391 (0.346)	-0.613 (0.590)	-0.071 (0.333)
Constant	-1.212 (2.572)	-64.824*** (2.687)	-19.62*** (1.816)
Hausman Tests of IIA	-585.234 (1.000)	19.125 (1.000)	0.0001 (1.000)
Observations		511	
Likelihood Ratio		192.1 (0.000)	
McFadden's Pseudo-R ²		0.17	
McKelvey-Zavoina R ²		0.13	

Standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

First of all one should note that the Likelihood-Ratio test¹² provides general support for our model (χ^2 statistic of 192.1 and associated p-value=0.000). Moreover, the McFadden's Pseudo-R² is calculated as 0.17 and the McKelvey-Zavoina R² as 0.13, which are acceptable values¹³. More importantly, the Hausman specification test (Hausman and McFadden 1984) provides no evidence that the IIA assumption has been violated (p-value =1 in all three cases), which is necessary for the validity of the multinomial logit model.

The estimated coefficients in Table 2 represent the effect of the corresponding attribute's modality, relative to the excluded modalities, on the probability of selecting any of the three categories of participation shown in the table, relative to the probability of dual participation in the hidden economy. The results show none of the attributes Sex, Level of Education, Household income and 'Opinion on Red Tape' helps to explain the level of participation in the hidden economy. 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.

Perhaps the most noteworthy finding is that persons who believe that the chance of detection by the tax authority is low are more apt to demand and supply services in the hidden economy, as opposed to no participation at all (strongly significant negative coefficient). This is consistent with 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, which is arguably the main motive for participation in hidden economic activity

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: $\chi^2 = -2 \ln\left(\frac{L_0}{L_1}\right) = 2(\ln L_1 - \ln L_0)$

¹³ Several authors (see Long 1997, Long and Freese 2006) prefer the McKelvey-Zavoina to the McFadden R² on the grounds that it more closely approximates the R² obtained from regressions on the underlying latent variable.

(Schneider et al 2001). In fact, we also verify that people are very likely to supply services in the hidden economy because they believe the tax burden is too high and that the income they earn in the formal economy is very low (highly significant positive coefficient in both cases). If the perception that the risk of detection is low, then it is easy to understand why such a perception leads to intensified activity in the hidden economy. We look at this phenomenon in more detail in the next section.

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 hidden economy as opposed to both demanding and supplying. 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 hidden economy. Married respondents are inclined not to participate (positive coefficient, significant at 5%). This result is similar to that obtained by Anderson (1998) in his study of Mongolia's hidden economy, but different to that of Gerxhani (2002), who did not find any relationship between marital status and participation in the hidden economy (although our results are similar to hers in that all other 'Marital Status' modalities were not significant). Persons with dependents are more apt to dual participation than no participation, given the significantly negative coefficient. This is not surprising: people with 'more mouths to feed' are more likely to attempt to earn (tax-free) income in the hidden economy as well as to seek the cheaper goods and services there.

Persons who live in sub-urban areas are more prone to dual participation in the hidden economy, in preference to 'supply only' activity (significant negative coefficient), while those who live in urban areas tend toward 'demand only' (significant positive coefficient). Studies

done on the influence of 'area of residence' on the hidden economy (Portes and Sassen-Koob 1987, Sassen-Koob 1989) provide evidence that hidden economic activity is likely to emerge in areas where particular industries make up a substantial portion of the regional economy since these industries permit hidden activity to thrive. In Trinidad and Tobago, geographical distances are never too much to cover, and people – especially professionals – prefer to live in suburbia and travel to work in the urban and rural centres, where most of the industrial areas (for example the Point Lisas Industrial Estate) are located. Indeed it should not be a surprise that sub-urban dwellers both buy and, especially, sell in the hidden economy. Many of them are professionals whose services are easily saleable there, and the activity goes undetected by the government. Possibly good motives for doing so include high mortgages, the cost of children's education, and other similar compelling expenses.

Persons who rent their homes seem to have a strong preference to be both demanders and suppliers in the hidden economy¹⁴ rather than be suppliers only (the 'supply only' coefficient is significantly negative), and there is also some evidence that they are inclined to 'dual participation' rather than not participate at all (coefficient is negative but significant only at 10%). This is a reasonable result since individuals who do not own their homes are very likely to be suppliers of services to the hidden economy 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 official economy.

Persons of all sectors of economic activity will participate in the hidden economy. However, personnel belonging to the non manufacturing sectors are strongly inclined toward

¹⁴ The extant literature (Mirus et al. 1994 and Mogensen et al. 1995) suggests that homeowners are the key demanders of services in the hidden economy, such as construction services. See in their study of Denmark's shadow economy

'supply only' activity (highly significant positive coefficients) while those in the manufacturing sector are more likely than persons of the other sectors to 'dual participation' in the hidden economy (highly significant negative coefficient). This result is consistent with the findings of Marcelli et al. (1999) and Losby and Edgcomb (2002) who found that respondents from the services and construction industries were more likely to be involved in the supply of hidden work. Persons employed by private enterprise are marginally more likely to be involved in the demand for services in the hidden economy, which seems to be at odds with results obtained by Hart (1970, 1973) who observes that self-employed persons tend to be major *suppliers* in the hidden economy, since they have more freedom in reporting their incomes and they could under-report or not report their income at all. There is some ambiguity in the results for government employees who seem, marginally, not to want to participate and also demand services in the hidden economy (positive coefficient in both cases, but significant only at 10%).

Hypothetically, the amount of time individuals spend at their formal jobs impacts negatively on their participation in hidden activity, since it is likely that individuals with more time on their hands may spend that time in the hidden economy. Yet we find here that persons who spend less than 4 hours per day tend not to participate (significant positive coefficient) while those that spend between 7 to 9 hours per day at their formal jobs are marginally more likely toward dual participation (as opposed to supply only) in the hidden economy (negative coefficient, significant at 10%). One possible explanation is provided by Schneider and Enste (2003) who find that some hidden economy workers work in the hidden economy even during their regular hours in the official economy. 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 hidden economies. Many such persons work outside of 'normal'

working hours to take advantage of buoyant demand for their skills. Those who work less than 4 hours per day in the formal economy may be skills demanded and supplied in both the hidden and formal economies.

6. Empirical Investigation of the Perception of Risk

It is often argued that tax evasion is a major motivating factor behind participation in the hidden economy 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 involved? 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 perceived risk of detection
- Low perceived risk of detection
- Average perceived risk of detection
- High perceived risk of detection
- Risk of detection perceived as certain

The independent variables are the very same modalities of the attributes appearing in Table 1 except that the risk perception attribute is now the dependent variable, and the 'participation' variable, which was the dependent variable in the Multinomial Logit Model, appears as an independent attribute in this model with the modalities shown in Table 3 below:

Table 3
Participation Attribute and its Modalities

Attribute	Reference Modality`	Remaining Modalities
Nature of Participation in Hidden Economy	Dual Participation	No Participation Supply only Demand only

The socio-economic/demographic predictors have often been used in tax evasion studies. 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 hidden economy participation.

Table 4 summarizes the results of the ordered probit model for the perception of the level of risk of detection when participating in the hidden economy.

Table 4
Ordered Probit Results-Perception of Level of Risk of Detection

Attributes (modalities in italics)	
Sex: <i>Male</i>	-0.125 (0.109)
Age: <i>15-25 years</i>	-0.239 (0.336)
<i>26-35 years</i>	-0.416 (0.320)
<i>36-45 years</i>	-0.502* (0.304)
<i>46-60 years</i>	-0.353 (0.302)
Marital Status: <i>Married/Common Law</i>	0.045 (0.137)
<i>Divorced</i>	0.139 (0.296)
<i>Separated</i>	0.226 (0.239)
Has Dependents	-0.044 (0.123)
Area of Residence: <i>Urban</i>	-0.024 (0.194)
<i>Sub-Urban</i>	-0.182* (0.109)
Living Arrangements: <i>Owns Home</i>	-0.028 (0.138)
<i>Renting</i>	-0.209 (0.163)
Level of Education: <i>Secondary</i>	0.274** (0.128)
<i>Tertiary</i>	-0.157 (0.265)
<i>Vocational</i>	-0.080 (0.216)
Employment Status: <i>Full Time</i>	-1.957** (0.846)
<i>Part Time</i>	-1.908** (0.857)
Sector of Employment: <i>Other</i>	0.017 (0.302)
<i>Manufacturing</i>	-0.303 (0.278)
<i>Services</i>	-0.322 (0.205)
<i>Construction</i>	-0.101 (0.274)
Employer: <i>Private Enterprise</i>	0.037 (0.131)
<i>Government</i>	0.064 (0.138)
Time Spent in the Formal Economy: <i>Less than 4 hours</i>	-0.562 (0.484)
<i>4-6 hours</i>	-0.356* (0.188)
<i>7-9 hours</i>	0.016 (0.120)
Household Income: <i>Less than \$1,000</i>	-0.202 (0.328)
<i>\$1,001-\$5,000</i>	-0.055 (0.185)
<i>\$5,001-\$10,000</i>	-0.063 (0.178)
Opinion on Income Earned in the Formal Economy: <i>Very Low</i>	-0.572 (0.427)
<i>Low</i>	-0.609 (0.407)
<i>Acceptable</i>	-0.420 (0.399)
Opinion on Income Tax Burden: <i>Too High</i>	-0.055 0.107)
Opinion on Red Tape and Government Regulations: <i>Excessive</i>	0.267*** (0.098)
Participation in Hidden Activity: <i>No Participation</i>	-0.244 (0.287)
<i>Supply Only</i>	-0.128 (0.163)
<i>Demand Only</i>	0.120 (0.266)
Thresholds: μ_0	-4.258 (1.006)
μ_1	-3.213 (1.001)
μ_2	-2.216 (0.999)
μ_3	-1.363 (0.999)
Observations	509
Likelihood Ratio	62.11 (0.008)

Standard errors in parentheses. * 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 0.008). The results show none of the modalities of the following ten attributes was significant: Sex, Marital Status, 'Has Dependents', Living Arrangements, Sector of Employment, Employer, Household Income, Opinion on Income Earned in the Formal Economy, Opinion on Income Tax burden and Participation in the Hidden Economy. All of the remaining attributes are significant at least at the 10% level in at least one of the modalities.

Coefficients of the following attributes all have a negative sign: Age, Area of residence, Employment status, Time Spent in Formal Economy. The negative signs in the model are an indication that respondents view participation the hidden economy as a low risk activity. The significant age group is the 36-45 age group, the largest participants in the hidden economy, both as demanders and suppliers of services (see Table 1). Sub-urban residents, who in the Logit model were prone to dual participation, clearly believe that the risk of so doing is low. The positive coefficients are attached to the Education attribute (secondary level) and to the 'opinion on Red Tape' modality. The latter result is easy enough to explain: those who do not participate do so because they believe that dodging the burdensome government regulations more than compensates for their fear of detection by the Tax Authority.

7. Policy lessons and Conclusion

In this paper, we establish the socio-economic, demographic and attitudinal characteristics that influence an individual household member's propensity to participate in the hidden economy of an emerging economy using the case of Trinidad & Tobago. We also determine the extent to which some of these same features influence that person's perception of

the risk of detection by tax authorities of involvement in hidden economy activity. Individual household members are motivated to undertake hidden economic activity because they believe taxes are too high, 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.

In emerging, and even in developed economies, it is recognized that there are both negative and positive features of the hidden economy. Any effort to formalize the hidden economy cannot ignore both these aspects and the fact that the factors motivating participation in it reflect genuine concerns about malfunctioning of the formal 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 hidden economy 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.

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 must be put in place by the tax authority to detect tax evasion (including increasing audits and penalties). The aim should be to transform

hidden economic 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 hidden economy 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 A1

Frequency Distributions (%)

Attributes (Modalities in Italics) No. of Respondents →	Sample Frequencies (570)	No Participation (174)	Supply Only (92)	Demand Only (240)	Dual Participation (64)
Sex: <i>Male</i>	56.5	55.5	63.164	55.76	57.81
Age: <i>15-25 years</i>	12.3	15.2	9.47	10.30	7.81
<i>26-35 years</i>	22.3	29.4	21.05	16.67	15.63
<i>36-45 years</i>	33.1	28.0	32.63	34.85	32.81
<i>46-60 years</i>	28.6	23.7	31.58	32.42	35.94
Marital Status: <i>Married/Common Law</i>	58.6	56.67	54.74	60.61	57.81
<i>Divorced</i>	3.3	1.90	3.16	4.24	3.13
<i>Separated</i>	4.7	4.29	5.26	5.15	6.25
Has Dependents: <i>Yes</i>	66.1	56.94	72.63	72.73	73.02
Area of Residence: <i>Urban</i>	11.1	9.00	9.47	12.42	7.81
<i>Sub-Urban</i>	52.3	47.39	54.74	56.36	60.94
Living Arrangements: <i>Owns home</i>	52.1	45.50	53.68	56.97	56.25
<i>Renting</i>	19.1	18.01	21.05	20.91	28.13
Level of Education: <i>Secondary</i>	55.8	52.61	51.58	57.27	45.31
<i>Tertiary</i>	5.4	5.69	7.37	5.15	10.94
<i>Vocational</i>	8.2	9.48	8.42	7.88	7.81
Employment Status: <i>Full Time</i>	78.9	76.78	73.91	82.01	78.13
<i>Part Time</i>	15.3	18.96	20.65	11.59	15.63
<i>Retired</i>	3.0	1.42	2.17	4.27	3.13
<i>Full Time Student</i>	0.35	0.47	0	0.30	0
Sector of Employment: <i>Services</i>	73.3	72.00	70.7	75.0	73.33
<i>Construction</i>	8.5	6.00	17.4	7.4	11.48
<i>Manufacturing</i>	6.1	5.00	4.7	7.5	6.67
<i>Other</i>	5.0	10.04	2.3	5.5	3.28
Employer: <i>Government</i>	30.2	29.65	28.7	31.1	29.51
<i>Private Enterprise</i>	38.2	37.19	35.6	39.5	34.43
Time Spent In the Formal Economy:					
<i>Less than 4 hours</i>	1.1	0.49	3.4	1.9	3.28
<i>4-6 hours</i>	11.4	13.79	9.1	9.8	8.20
<i>7-9 hours</i>	56.2	54.68	56.8	58.5	63.93
Household Income: <i>Less than \$1,000</i>	3.3	4.43	2.3	2.6	1.64
<i>\$1,001-\$5,000</i>	52.2	55.17	50.0	51.1	52.46
<i>\$5,001-\$10,000</i>	31.9	27.09	31.8	34.6	31.15
Opinion on Income Earned in the Formal Economy: <i>Very Low</i>	14.0	16.26	9.1	11.6	3.28
<i>Low</i>	39.2	41.87	48.9	37.4	52.46
<i>Acceptable</i>	44.9	40.39	38.6	49.0	40.98
Perception of Level of Risk of detection by Tax Authority: <i>No Risk</i>	18.1	17.96	21.7	16.4	20.31
<i>Low risk</i>	32.5	21.84	41.3	39.1	42.19
Opinion on Income Tax Burden: <i>Too</i> <i>high</i>	67.2	71.43	67.4	62.5	57.81
Opinion on Red Tape and Government Regulation: <i>Excessive</i>	49.1	57.89	44.0	43.7	42.19

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