



Fiscal Policy and Tax Incidence

Tax Policy and the Enterprise Sector: An Empirical Analysis

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The Logo was kindly provided by the Mozambican artist Nlodzy.

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Abstract

While government policy ostensibly seeks to simultaneously provide a sustainable source of revenues and promote economic growth, there is very little formal analysis of how tax policy is applied in practice or of its subsequent impact at the microeconomic level. This chapter addresses this lacuna by analysing enterprise data relating to tax burdens and undeclared output using results from two manufacturing enterprise surveys carried out in Mozambique in 2002 and 2006. It finds that tax burdens vary considerably with firm size and other specific firm characteristics.

1. Introduction

Despite several major tax policy reforms since independence and implementation of a series of important new taxes in recent years, as documented in chapter three, tax policy in Mozambique has received only limited analytical treatment. Furthermore, where studies have taken place, these have tended strongly to focus on tax revenues from a government and therefore macroeconomic standpoint. As such, while government policy ostensibly seeks to simultaneously provide a sustainable source of revenues and promote economic growth, there is very little formal analysis of how tax policy is applied in practice or of its subsequent impact at the microeconomic level. This chapter addresses this lacuna by analysing enterprise data relating to tax burdens and undeclared output using results from two manufacturing enterprise surveys carried out in Mozambique in 2002 and 2006.

As outlined in chapter two, government tax policy must find a balance between revenue, equity and efficiency by raising sufficient revenue, taxing individuals and firms in an equitable manner, minimising the effects on incentives and administrative costs, and promoting stability and economic growth. Individuals and firms then weigh up the benefits of tax evasion against the costs of detection and punishment, behaving according to the outcome of that trade-off. As Burgess and Stern (1993) point out, developing country economies are generally characterised by a number of factors which hinder governments in the implementation of an effective tax policy, including a large primary sector, economic and social dualism, extreme income inequality, a concentration of economic activity in very small enterprises, extensive uses of permits, licences and rations, weak administrative capabilities and pervasive corruption. As

such, the cost of non-compliance is often relatively low, resulting in higher levels of evasion.

In addition, a lack of productive investment often leads developing country governments to use tax incentives to encourage investments, thus further eroding the tax base. As a consequence, evidence suggests that in developing economies, even broad-based taxes only manage to capture revenues from a small proportion of the statutory tax-base (Gordon and Li, 2005), resulting in what can be termed revenue concentration. Gauthier and Gersowitz (1997) and Gauthier and Reinikka (2001) analyse tax-base erosion and concentration for Cameroon and Uganda, respectively, and find that this is strongly associated with firm size, defined by the number of employees. They find an inverted-U relationship between tax burden and firm-size, with firms at the lower and upper ends of the firm-size distribution experiencing a relatively low tax burden compared to those in the middle of the size distribution. This is interpreted as a result of small firm tax evasion, large firm access to tax exemptions and a lack of means to escape for firms in the middle of the size-distribution.

This revenue concentration violates principles of equity and efficiency with potentially negative economic consequences. By creating an institutional environment which varies according to firm size and/or other firm characteristics, incentives for enterprise growth are potentially distorted, with negative consequences for economic growth, formal employment creation and ultimately poverty reduction. In addition, incentives to comply with tax laws are reduced by a perception that few others are doing so such that tax revenues themselves are affected, potentially resulting in a vicious cycle of higher

and more distortionary taxes and further rounds of revenue concentration on more visible firms to compensate for losses of government revenue from economic activity which goes unreported.¹

Johnson et al. (2000) and Dabla-Norris et al. (2005) use firm-level data to uncover the principal determinants of unreported output. Using data on over 4,000 firms in 41 countries, Dabla-Norris et al. (2005) find that “while firms are affected by financing, corruption, tax and regulatory and legal obstacles, the impact on [hidden output] clearly depends on firm size”(p13). Johnson et al. (2000) carry out a similar analysis for five transition economies in Eastern Europe. They do not analyse firm-size but find that hidden output is positively associated with bribery although the direction of causality is unclear. Thus, size may not be the only factor at work in determining firm behaviour with respect to taxation.

Survey evidence on firm growth and survival in Mozambique reveals some unusual patterns relating to firm size which are potentially related to differential institutional environments among firms, particularly with regards taxation. Anecdotally, Mozambique is also characterised by the factors which hinder effective tax policy as highlighted by Burgess and Stern (1993). The present chapter addresses the issue of tax-base erosion and concentration for Mozambique following two approaches: the first investigates the hypothesis that current Mozambican tax policy leads to an inverted-U

¹ Although not the subject of this study, simultaneous expenditure reforms to improve equity may also be required to reduce public resistance to paying taxes, a problem found for example in Ghana (Addison & Osei, 2001). This also relates to issues such as “the diverse psychological, moral and social influences on compliance behaviour” highlighted by Andreoni et al. (1998) amongst others which clearly also have a role to play in the compliance decision. Kaplow (2006) also points out that even for developed countries, “on average, evasion tends to be worse as a percentage of income at the bottom of the income distribution whereas avoidance tends to be more significant at the upper end, in both cases on account of differential opportunities for tax reduction”.

relationship between tax-burden and firm size following Gauthier and Gersowitz (1997) and Gauthier and Reinikka (2001); while the second analyses the determinants of firms' hidden output following Johnson et al. (2000) and Dabla-Norris et al. (2005).

The results of these analyses suggest that the tax burden indeed varies with firm size, although bribery and corruption are also important. In addition, evidence suggests that bribery and corruption have more influence than firm-size on the under-declaration of sales, suggesting that a combination of these factors is at work in determining the overall outcome of tax policy. The remainder of this chapter takes the following form: Section 2 summarises the principle tax laws to which firms are subject under the Mozambican commercial code. Section 3 provides a description of the survey sample on which the analysis is based, Section 4 provides the results of the regression analysis to explain tax burden while Section 5 provides the results of the analysis of hidden output. Section 6 provides the principal conclusions from the analyses.

2. Principal Enterprise Taxes

As highlighted in Chapter 3, the private sector in Mozambique has been required to adapt to numerous fiscal changes in recent years. Recent reforms have also increased the complexity of the tax system, resulting in relatively high compliance costs, in particular for an economy where 78.5 percent of enterprises have only five employees or less (INE, 2004).²

² According to firm census data (CEMPRE) 27.5 percent of all enterprises have only one employee, 56.4 percent have up to two employees and 68.7 percent have up to three employees (author's calculations based on data from INE, 2004).

The principal tax paid by enterprises is the IRPC (*Imposto de Rendimento de Pessoas Colectivas* – Collective Persons Income Tax) applied at a rate of 32 percent on declared company profits. This applies to all firms except for those in agriculture, which have a rate of 10 percent until 2011. In addition, cases where incomes are taxed at source are subject to a rate of 20 percent while agricultural, handicraft or cultural cooperatives are given a 50 percent reduction (Governo de Moçambique, 2002). Enterprises also provide the principal collection mechanism for IVA (*Imposto de Valor Acrescentado* – Value Added Tax [VAT]) which was introduced in 1999. Firms collect 17 percent on the sale value of their output and deduct the tax paid on their intermediate inputs, transferring the net value to government. Being a destination VAT, enterprises pay IVA on domestic transactions and imports, where it is calculated on the CIF price plus import duties plus consumption taxes where these are applicable (e.g. on imported alcohol) while exports are not subject to IVA. Domestic producers of cigarettes, alcohol and a number of specific goods are also subject to excises on production.

The enterprise fiscal code incorporates an assortment of tax exemptions. Small enterprises with a turnover of up to Mtn100,000 (USD5,000) are exempt from IVA while those with a turnover of between Mtn100,000 (USD5000) and Mtn250,000 (USD12,500) pay a simplified sales tax of 5 percent with no right to deduct IVA paid on inputs (Governo de Moçambique, 1998).³

³ Enterprises with annual turnover of up to Mtn 1,500,000 (approximately USD62,500) are exempt from keeping formal accounts (Governo de Moçambique, 2002),

The Fiscal Benefits Code also provides a number of specific fiscal incentives for enterprises registered under the 1993 Investment Law.⁴ These take the form of deductions from taxable income, accelerated depreciation, tax credits, reduction of tax rates, improved import regimes for capital goods and deduction of the amount of tax assessed (Governo de Moçambique, 2002a), with specific IRPC and import duty exemptions for investments made in so-called “Rapid Development Zones” and those carried out in Industrial Free Zones.⁵

Finally, large investments of over USD500m receive “exceptional incentives” subject to a proposal by the Minister of Finance and approval by the Council of Ministers (Governo de Moçambique, 2002a). Examples of this latter special treatment include the Mozal aluminium smelter which pays a one percent turnover tax on total sales as do the heavy sands mines at Moma and Chibuto, all with renewable contracts of 50 years, as discussed in Chapter 16. While exemptions exist for very small firms and a large number of fiscal benefits are also available for larger firms, there is also anecdotal evidence of a high degree of tax evasion. One study by the IMF reports that, in 2002, 8.8 percent of GDP was collected through income taxes, value-added tax and trade taxes, compared with theoretical potential revenues of 20.9 percent of GDP. In particular, they note a difference of 8.6 percent of GDP between collected VAT and potential VAT (IMF, 2005). Although some of this shortfall is due to the exemptions described, a substantial proportion is due to non-compliance.

⁴ Details on the how a firm can invest under the investment law are provided in Chapter 16. Enterprises carrying out wholesale and retail commerce are not eligible for fiscal benefits.

⁵ Rapid Development Zones include: the Zambeze Valley, Niassa Province, Nacala District, Mozambique Island and Ibo Island. “Rapid Development Zones” benefit specifically from five years of IRPC tax-credits of 20 percent of the value of the investment and exemption from import duties on capital goods in the first three years. Investments in Industrial Free Zones benefit from a 60 percent reduction in their IRPC bill for ten years and exemption from import duties, IVA and Consumption Tax on all goods except alcohol and tobacco (Governo de Moçambique, 2002a).

3. The enterprise sample

Data for the present analysis comes from two enterprise surveys carried out on a sample of Mozambican manufacturing firms in 2002 and 2006 respectively. The first of these took place under the auspices of the World Bank's 2002 Pilot Investment Climate Assessment (ICA) programme, covering 192 manufacturing firms in five sectors in and around the main economic centres (IFC, 2003). The 2006 survey had the objective of revisiting those same 192 firms to form a panel of data such that firm sampling was predetermined by the technique used in 2002 (DNEAP and KU, 2006).⁶

Due to a combination of firm exits, reluctance to participate and difficulties in locating some enterprises, the 2006 survey interviewed a total of 158 firms, providing a panel of 137 firms with data from both 2002 and 2006.⁷ Of the sample collected in 2006, 25 percent of firms were from the food processing sector, 22 percent from the wood and furniture sector, 15 percent from the textiles and garments sector, 22 percent from the metal-mechanics sector and 16 percent from other manufacturing sectors. In terms of location, 65 percent of the sample was based in Maputo, 13 percent in Beira, 11 percent in Nampula, 6 percent in Chimoio, 5 percent in Nacala and less than 1 percent in Gurue. Finally, for the purposes of this study and following the classification used in Gauthier and Gersowitz (1997) and Gauthier and Reinikka (2001), 8 percent of sampled firms are classed as micro (≤ 5 workers), 30 percent as small (6 to 25 workers), 32

⁶ The sample used in 2002 was in turn based on a sample used by the World Bank in 1998, prior to the firm census which took place in 2002, thus making it impossible to carry out random sampling.

⁷ Details of the 2006 survey and initial comparisons with 2002 can be found in DNEAP and KU (2006).

percent as medium (26 to 100 workers), 17 percent as large (101 to 200 workers) and 9 percent as very large (200+ workers).⁸

Although the original sample is not statistically representative at the national level, with a disproportionate concentration of small and medium firms compared to the national census in particular (INE, 2004), it nonetheless comprises a selection of firms of all sizes in the main economic centres of the country and the principal manufacturing sectors, thereby allowing for analysis of empirically relevant patterns and providing a basis for future survey work with more representative datasets. Table 1 highlights some important results from the two surveys regarding firm growth and survival. It presents a growth transition probability matrix which gives the probability of a firm which was in a size category in 2002 (rows), either remaining in the same category, closing or being in a new size category in 2006 (columns). Thus, a firm which was considered micro in 2002 had a 0.87 probability of remaining micro, or 0.13 probability of entering the small category. From our sample, no micro firms exited or grew beyond the small category thus showing high survival rates and low growth rates contrary to a number of studies for developed economies (e.g. Evans, 1987, Dunne et al., 1989, Rossi-Hansberg and Wright, 2004) but in keeping with a small number of studies in developing countries (e.g. McPherson, 1996).

TABLE 1 ABOUT HERE

In the larger size categories, based on our sample there is notably less probability of growth into the larger size categories than for micro to small firms, but a far higher probability of exit, with small firms in 2002 having a 0.29 probability of being only micro in 2006. Even large and very large firms have high probabilities of exiting,

⁸ Three percent of interviewed firms gave no details on worker numbers.

suggesting that something is occurring in the economy which halts the progress of these firms even once they are large, established producers. This is likely to be related to a number of factors, one of which may be the variable tax burden according to factors other than profit levels.

Following Gauthier and Gersowitz (1997) and Gauthier and Reinikka (2001), an enterprise's tax burden is summarised by the *tax-ratio* variable, here defined as the ratio of the total taxes paid to total sales revenue as reported in the surveys.⁹ Summary statistics on the tax ratio and a number of other variables of interest is provided in table 2, which also provides a breakdown of the sample by firm-size category. As the table shows, firms face tax ratios ranging from near zero to 65.0 percent, with a mean of 10.3 percent, close to the median of 7.6 percent.¹⁰ Also, within this range there is considerable variation among firm-size categories, with micro firms having an apparently lower average tax ratio than all other size categories.

TABLE 2 ABOUT HERE

Using the pooled sample of firms with employment data from the 2002 and the 2006 surveys, the mean firm size for the whole sample is of 100.5 employees, well above the manufacturing sector mean of 15.8 as calculated from the national enterprise census (INE, 2004). This reflects the bias in the survey sample towards larger firms, although

⁹ Gauthier and Gersowitz (1997) and Gauthier and Reinikka (2001) use data on specific taxes whereas total taxes paid by the firm are used here due to inability or reluctance to provide a detailed breakdown.

¹⁰ Firms with non-responses were removed from the sample while zeroes had to be considered non-responses due to the difficulty inherent in distinguishing between this and overt admission of evasion. In addition, one firm was removed from the entire analysis as an outlier with a tax-ratio of more than 65% even though it came from the metal-mechanic sector. Tax ratios exist for only 88 firms due to widespread reluctance to report financial data, thus markedly reducing the size of the sample available for analysis as seen in tables 2 and 3.

micro firms are not entirely unrepresented given the number of micro firms and employment figures as low as one worker.¹¹

As a further indicator of the diversity of firms in the sample, table 2 reports firm ages, which have a mean of 26.4 years and a median of 23 years (with a range of 3 to 92 years). Interestingly, micro firms have a mean age of 33.4 years, well above the average and above the mean ages of all other size categories. As micro enterprises are generally considered either to be successful and grow into larger firms or to be unsuccessful and exit (see Evans, 1987, for example) this is an unusual result, potentially related to the higher survival rates of micro firms described above. A further firm characteristic reported in table 2 is whether or not the general manager has secondary education or above. This is often used as a proxy variable for efficiency, assuming a more educated manager will employ more efficient and up-to-date management techniques in the workplace. Approximately 70 percent of surveyed firms have a manager with this level of education, although again this varies with firm size, with micro firms representing the category with least educated managers. A dummy variable for *exemptions* from taxes is created which takes the value one for those firms reporting at least one tax exemption and zero for all others. As table 2 and figure 1 show, the share of firms reporting exemptions increases with size category from 25 percent of micro firms reporting having exemptions, to 27 percent of small firms, 36 percent of medium firms and 57 percent of large firms, although this unexpectedly drops to 38 percent for very large firms.¹² Thus, despite the small sample and in particular the absence of the major

¹¹ Further, more detailed comparisons of the sample with national enterprise characteristics can be found in DNEAP and KU (2006).

¹² The firm-size categories adopted correspond to those utilised by Gauthier and Gersowitz (1997) and Gauthier and Reinikka (2001) and are as follows: Micro (1-5 employees) Small (6-25) Medium (26-75) Large (76-200) Very Large (200+).

very large Mozambican firms, there is an initial indication that access to tax exemption is related to firm size.

FIGURE 1 ABOUT HERE

Table 2 also reports the average number of tax forms completed by firms on a monthly basis. This again varies with firm-size category, from an average of 1.4 forms for micro and small firms to 2.2 for large and 2.4 for very large firms. Despite this variation, the proportion of management time spent on bureaucracy in general, reported by *bureaucracy*, reflects potentially higher compliance costs for micro firms, with more time spent as a proportion of manager time than small firms, although medium and large firms have the highest levels of all size categories.

A firm's "visibility" to the tax authorities might be measured by the number of *inspections* it receives from the authorities in a year, where these include tax, labour, health, environmental and other inspections. Again, micro and small firms have the lowest average number of inspections of 2.5 and 2.6, respectively, while medium and large firms have an average of 3.2 and 3.6, respectively. Interestingly, very large firms receive on average the same lower number of inspections as small firms, again suggesting increased visibility of medium and large firms in comparison with firms at either end of the firm-size distribution. The degree to which a firm can or could be forced to comply with taxation laws is also determined by whether or not it keeps formal *accounts*. Although the sample has a disproportionate number of large firms, the *accounts* variable suggests that only 80 percent of interviewed firms keep formal accounts. As expected, given the legislation discussed above, a high share of micro firms have no formal accounts (73 percent) compared with other size categories

although the fact that any medium, large or very large firms should not have formal accounts is important in itself.

Survey data also include responses relating to potential tax-evasion, as reported in table 2 under *sales declared*. Assuming direct questioning on tax evasion would be fruitless, firms were asked what proportion of sales they believed the “typical” firm of their size and sector declared for tax purposes. Although highly approximate, as in Dabla-Norris et al. (2005), this can be used as a rough proxy for the actual under-reporting of sales and thus a measure of the degree of a firm’s tax evasion. Interestingly, sampled micro firms report the highest declaration of sales for tax purposes at 86 percent of total sales, compared with 74 percent for small, 73 percent for medium, 79 percent for large and 73 percent for very large firms. The determinants of the level of declared sales are given further treatment below.

A factor in developing economies commonly associated with tax evasion is the presence of corruption (e.g. Johnson et al. 2000). Given the sensitivity of the subject, this information is again approached indirectly with firms asked what they estimate the typical firm pays in *bribes* per annum as a percentage of sales. This has a mean value of 4.6 percent of sales and a median of 2 percent, ranging from zero to a very high 50 percent, with 25.8 percent of responding firms estimating that firms pay bribes of at least 10 percent of sales per annum.¹³ As table 2 shows, this again appears to vary with firm size so that micro firms estimate that only 1.6 percent of sales revenues is paid in bribes, while all other size categories estimate an average of more than 4.5 percent of sales.

¹³ Three firms gave a response greater than 20 percent of sales, of 25, 35 and 50 percent of sales.

The final four variables displayed in table 2 report the level of constraint posed to firm growth and development by tax rates, tax administration, customs regulations and administration, and corruption, respectively. These ordinal responses range from a value of zero for no constraint to four for a serious constraint, representing the subjective responses of managers regarding the business environment. By this measure, corruption and tax rates were identified as representing higher constraints to firms than tax administration or customs regulations and administration. Again, these vary across firm-size categories, with micro firms generally taking a less severe view of the constraints posed to their business than larger size categories. This may be due to a lower degree of contact with the authorities rather than ease of compliance or contentedness with the business environment in general.

4. Tax exemptions & evasion

To begin analysis of the relationship between the tax burden and firm size, figures 2 and 3 map tax-ratios against the log of the number of employees in a scatter-plot.¹⁴ A fitted line is also included using fractional polynomial estimation of the log of employment and the tax ratio.¹⁵ The resulting curve displayed in figure 2 provides

¹⁴ Limited reporting of financial data in both surveys means that the present analysis of tax burdens pools the data into one sample, therefore including firms which may have ceased to exist since 2002 and some which were introduced in 2006 (in existence but not interviewed in 2002). Although this implies the forfeiting of a certain amount of useful information, the results are nonetheless considered relevant and insightful, in particular given the relevance for Mozambican tax policy.

¹⁵ This is carried out using the “fpfit” graph option in Stata which produces twoway fractional-polynomial prediction plots. As Royston and Altman (1997) explain, fractional polynomial regressions provide a flexible, parametric approximating equation for a smooth relationship between two variables for which the exact mathematical form may be unknown or complicated. Fractional polynomials are like conventional polynomials but are allowed to include non-integer and negative powers of the explanatory

preliminary evidence that an (albeit shallow) inverted-U relationship does exist for the small sample of manufacturing firms in Mozambique. Figure 3 provides clearer evidence of this relationship by plotting the same graph excluding six firms from the alcoholic beverages sector which is subject to a 65 percent excise tax unlike other sectors in the sample.

FIGURES 2 & 3 ABOUT HERE

As in Gauthier and Reinikka (2001), more concrete evidence of this inverted-U relationship and its determinants are modelled using regression analysis. Due to the lack of reported financial data and thus limited data on tax-ratios, this is carried out using the pooled sample of data from 2002 and 2006, thus ignoring the panel aspect of the data, and using Ordinary Least Squares (OLS).¹⁶ Table 3 provides the resultant estimated coefficients, all of which are estimated with Huber-White variance correction for heteroscedasticity.¹⁷ The first column, OLS1, looks at the simple relationship between tax ratio and the number of employees, with a quadratic term to allow for the inverted-U seen above. It also includes a dummy variable for observations from 2006 to control for any change in macroeconomic circumstances which may have an impact on the explanatory variable, and for firms which produce alcohol and therefore are subject to excises. Although not statistically significant, the signs of the coefficients on log employment and its quadratic indicate the likely presence of an inverted-U relationship between tax-ratio and employee numbers. The dummy variable for firms producing

variables as well as integer powers. The Stata default, employed here, is to use two power terms. The resultant line is selected according to likelihood criteria of goodness of fit.

¹⁶ Although the dependent variable of tax-ratio is bounded by zero and one hundred and OLS potentially predicts values outside the [0,100] region, in practise this occurs only infrequently. Gauthier and Reinikka (2001) also use Ordinalry Least Squares.

¹⁷ The results from an OLS regression without robust standard errors fails the Lagrange Multiplier test for multiplicative heteroscedasticity as implemented in Stata. In addition, it should be noted that sectoral dummies in addition to that for the alcohol firms did not alter the outcome of these results and their coefficients were statistically insignificant in any case.

alcohol is statistically significant at ten percent and implies an increase in the tax ratio for those firms of 23.6 percentage points.

TABLE 3 ABOUT HERE

OLS2 divides the firm-size distribution into the same five categories used above and in Gauthier and Reinikka (2001), allowing that separate segments of the size distribution be dealt with in a separate manner. The results here indicate that all firms with more than five employees have a higher tax ratio than those with five or less, the coefficients of almost all categories appearing as statistically significant once the year and alcohol sector is taken into account. Small firms in particular have the highest tax ratio relative to micro firms, significant at the 1 percent level. Interestingly, the coefficients found for small and medium firms are considerably larger than those found in Uganda by Gauthier and Reinikka (2001), suggesting that the inverted-U relationship may be more pronounced in Mozambique.

OLS3 continues with the division of the firm-size distribution as an explanatory variable for the tax-ratio but includes some additional variables which may impact on a firm's tax burden. In particular the variables for *exemptions*, share of management time spent on *bureaucracy*, *manager education*, estimated *bribe* amount, those who found *tax administration* to be an obstacle and those who found *corruption* to be an obstacle are included in the regression OLS3.¹⁸¹⁹ As table 3 shows, the inclusion of these additional explanatory variables alters the size coefficients such that medium and very

¹⁸ Note that the sample size is greatly reduced with the introduction of these explanatory variables due to missing data which differ by variable and by firm. For 28 firms, this is due to no response to the question relating to estimated bribe payments as a share of sales. These firms are distributed as follows: one is micro, nine are small, eight are medium, six are large and four are very large, representing a minimum of a quarter and a maximum of a third of each size category. The potential implications of this are not given any specific treatment in the present study.

¹⁹ The constraint variables are employed in the regressions as 0/1 dummy variables, where 0 implies no constraint while 1 implies a slight to serious constraint.

large firms have the highest tax ratios relative to micro firms, where the medium-size firm coefficient has increased statistical significance compared with OLS2. This suggests that size is at least in part a proxy for other firm characteristics. The coefficients for *bribe* and *exemptions* are negative, consistent with the definition of exemptions and also the hypothesis that willingness to bribe can reduce a firm's tax burden, a result found in a number of other studies on informality and corruption, such as Johnson et al. (2000) de Soto (1989) and Dreher and Schneider (2006). However, these coefficients are not found to be statistically significant for the small sample under analysis.

On the other hand, the coefficient for management time spent on *bureaucracy* is found to be positively associated with the tax ratio and statistically significant at the one percent level, suggesting that even controlling for firm size, higher tax-ratios are also associated with higher compliance costs in terms of administration. On the other hand, *manager education* is found to be negatively related to tax-ratio, with a relatively large and again statistically significant coefficient, suggesting that higher levels of manager education, commonly associated with a firm's efficiency, allow a firm to reduce its tax burden by 7.4 percentage points.

Finally, the variables for whether or not a firm finds *tax administration* and *corruption* to be an obstacle to the growth and operations of their business are both found to be positively related to tax-ratio and statistically significant. This raises issues with interpretation given the imprecise definition of what these variables represent. One possibility is that these represent unobserved heterogeneity in firm legal abidance, with a greater concern for tax administration and corruption correlating with the individual firm costs inherent in complying with taxes and not succumbing to corrupt officials.

Alternatively they may simply reflect that a firm is more “visible” to the tax administration in ways other than simply through firm size, and thus the subject of more attention with regards their tax return or attempts to elicit bribes. Either way, there is an apparent association with the tax-ratio which also affects the impact of firm-size.

Finally OLS4 removes the size category variables in order to analyse non-size effects only. As table 3 shows, this does little in terms of the statistical significance of the explanatory variables but does have some impact on their magnitude. The negative impact of *bribes* and *exemptions* on tax-ratios is reduced, as it is for *manager education*, and time spent on *bureaucracy*. However, removal of the size dummies increases the impact of concern for *tax administration* and *corruption* suggesting some collinearity with firm-size.²⁰ Although the sample sizes are rather small, particularly when the additional explanatory variables are included in OLS3 and OLS4, the evidence appears consistent with tax ratios which vary with firm-size. The results also suggest that size and other firm characteristics may be themselves related and affect tax ratios through a combination of their effects.²¹ That manager education is apparently associated with a firm’s tax-ratio is of interest given its potential connections with firm efficiency levels. Similarly, the firm characteristics represented by concern for corruption and tax administration which increase a firm’s tax burden also suggest that some unobserved behavioural effects may be at work in determining a firm’s tax ratio,

²⁰ Note that fitted values from all specifications are predicted within the [0,100] range.

²¹ Although the present analysis follows the estimation technique used by Gauthier and Gersowitz (1997) and Gauthier and Reinikka (2001), it is feasible that there is an endogenous relationship between the tax ratio and firm size which would imply dual causality, thus leading to self-selection of firm sizes as a function of tax ratio with a potential bias for the coefficient estimates. Although it would require more data, this issue could be resolved using a two-step Heckman procedure, although the present chapter does not pursue this more complex path. In any case, more attention is paid here to the sign of the estimates rather than the precise estimates obtained.

while the positive association between bureaucratic burden and tax burden imply that firm “visibility” to the authorities may be important and not just related to size.

5. Determinants of hidden output

As pointed out in Gauthier and Gersowitz (1997) and Gauthier and Reinikka (2001), these results raise questions relating to tax administration and the degree to which firms are forced to comply with tax laws. Although complete tax evasion is not identifiable from the present data, tax evasion through under-declaration of sales can be analysed by investigating the determinants of the levels of *sales declared* as in Dabla-Norris et al. (2005) and Johnson et al. (2000).²² As table 2 showed, non-financial data have a higher response rate that therefore allows panel data techniques to be employed. Responses regarding the share of sales which a firm will typically declare for tax purposes are necessarily censored at 100 percent of sales, representing what Wooldridge (2003) calls a corner solution outcome and thus recommending the use of a Tobit model.²³ Using the unbalanced panel of data and a random effects tobit model, Table 4 reports the marginal effects for the probability of *sales declared* (y) being uncensored, $\Pr(y < 100 | x)$, and for the expected value of *sales declared* (y)

²² As explained above, the *Sales Declared* variable is only a rough proxy for actual hidden sales given that the question asked referred to the sales declared by “typical” firm of their size and sector.

²³ Values of sales declared is theoretically also censored at zero. There were 21 observations of zero (mostly from 2002) however these were removed due to ambiguity about whether they really represented zeros or non-responses. Comparison of the coefficients under both methods does not reveal dramatic size differences.

conditional on being uncensored at 100, $E(y | x, y < 100)$, where x represents all independent variables.²⁴

TABLE 4 ABOUT HERE

Tobit1 models the share of sales declared as a function of the size category of the firm and the explanatory variables used to explain *tax ratio* above. Under this specification the average probability of a firm not reporting 100 percent of sales is estimated to be 0.47. The results suggest that all size categories except large have a lower probability of declaring all sales than micro firms although the estimated coefficients on the size variables are not well determined.

A preoccupation with the effects of *corruption* on a firm's growth and performance almost doubles the probability of under-declaring, while increments in the share of *bribes* estimated as being paid marginally increase this probability. Concern with *corruption* appears to be highly significant, as is *bribes* although less so. Contrary to what might be expected, *exemptions* is positively related to the probability of under-declaring sales, as is *manager education* and concern about *tax administration*, although these coefficients are small in comparison with *corruption* and again are not well determined. Tobit1 also gives an expected value of 68.9 percent of sales declared for tax purposes conditional on being less than, at the mean of the explanatory variables. The marginal effects imply that very large firms report approximately 11.8 percentage points less of their sales than micro firms, medium firms report 7.4 percentage points less than micro, small 3.9 percent less, and only large firms reporting 2.7 percent *more* of sales than micro firms. This would suggest that large firms have

²⁴ Random effects is employed due to the limited data which would not allow fixed effects to be carried out. This assumes that unobserved heterogeneity is uncorrelated with the explanatory variables. In any case, the marginal effects are found to be similar for the pooled tobit model with time dummy variable.

less room for manoeuvre in terms of avoiding taxation through hidden sales, although their tax burden was found to be less than medium firms in the previous analysis (potentially due to the higher incidence of exemptions in this category, as shown in table 2) and again their coefficients are not well determined. The reported marginal effects also imply that a one percentage point higher share of sales paid in *bribes* is associated with a 0.5 percentage point lower level of declared sales, while corruption is associated with a reduction in declared sales of 13.3 percentage points. However, as Johnson et al. (2000) state, it is unclear whether bribes are paid in order to hide output or if output is hidden in order to avoid bribes.

Tobit2 reports the marginal effects from an estimated model which removes the size variables as explanatory variables. Their removal leaves the probability of a firm under-declaring sales for tax purposes unchanged, and only marginally reduces the conditional expected value of reported sales. The size and signs of the other coefficients remain broadly as before, again suggesting that the previously included variables had little effect in determining the estimated level of declared sales and, in particular, that size is not a strong determinant of the share of sales declared for tax purposes.

Although firm size is found not to be important for sales declarations in this subsequent analysis, this result may be related to a number of factors. Most importantly, it may result from the indirect manner in which the data on *sales declared* were collected. Although this provided more observations than directly determined data on *tax ratio*, the fact that it is based on manager perceptions of the “typical” firm leaves it open to considerable ambiguity. The same can be said for the variable employed on *bribes*, which again collects an estimate of what “the typical” firm pays but need not be an

indicator of how the firm in question actually behaves.²⁵ This is an unfortunate consequence of the nature of the topic which by definition does not invite easy collection of accurate data.

6. Conclusions

The Mozambican tax system has been subject to some major changes over recent years relating to rates, taxes and their administration. Although some analyses have been carried out regarding the revenue impact of these changes over time, until now little work has been carried out from the enterprise point of view. In particular, little attention has so far been paid to the potentially heterogeneous impact of tax policy and its administration according to firm size and other characteristics. For a country such as Mozambique with a highly skewed firm size distribution, this has the potential to be of great importance.

The available evidence, based on a limited dataset of manufacturing firms, suggests that an inverted-U relationship exists between the size of a firm and its tax-ratio. The level of education of the manager and the share of management time spent on bureaucracy also appear statistically significant in determining the tax ratio, as do concern with corruption and tax administration though to a lesser extent. Although size is therefore not the only factor, the results are consistent with a situation of revenue concentration and administrative pressure on firms caught in the middle of the size distribution. These firms are assumed to be too large to hide but too small to benefit from exemptions.

²⁵ The analysis is limited in this regard by the indirect nature of the questions asked in the 2002 survey.

Subsequent analysis of the determinants of tax evasion through hidden output suggests that size, manager education and bureaucratic burden are less important in than factors relating to corruption and bribery. Although based on indirect evidence only, this would imply that the role of hidden sales in determining the tax ratio is only a small part of the story. The importance of these results lies in their potential negative effect on firm growth and more generally on economic growth and formal employment creation. If tax policy implementation is subject to the distortions suggested by the above results, circumstantial evidence suggests that it may also be creating disincentives to firm growth. This would be consistent with the observation that the majority of micro firms in our sample did not grow between the two surveys. As a consequence, changes to tax policy and its administration potentially have the power to radically alter how firms behave with major effects for economic growth. To be avoided is a vicious circle whereby tax administration becomes more focussed on easier targets thus further increasing the tax burden on medium-sized firms.

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Figures and tables

Table 1: Growth Probability Transition Matrix

	Exit 06	Micro 06	Small 06	Medium 06	Large 06	V.Large 06
Micro 02	0.00	0.88	0.13	0.00	0.00	0.00
Small 02	0.29	0.04	0.63	0.02	0.00	0.02
Medium 02	0.11	0.00	0.09	0.74	0.04	0.02
Large 02	0.17	0.00	0.03	0.11	0.60	0.09
V.Large 02	0.22	0.06	0.06	0.00	0.17	0.50

Note: One very large firm in 2002 was in the process of sale and operating with administrative staff only in 2006, thus appearing as micro.

Table 2: Enterprise Summary Statistics

Variable	Obs.	2002	2006	Mean	Std. Dev.	Median	Min	Max	Micro	Small	Medium	Large	V. Large	Size n/a
TAX RATIO (% of Sales Rev.s)	88	44	44	10.3	10.4	7.6	0.0	65.0	4.2	12.0	9.6	9.2	11.3	
EMPLOYMENT	339	187	152	88.9	150.2	42.0	1.0	1003.0	3.8	14.1	46.8	120.3	445.6	
FIRM AGE (Years)	333	186	147	26.4	16.8	23.0	3.0	92.0	33.4	21.8	24.9	29.7	30.5	44.5
MANAGER EDUC. (SECONDARY+)	348	191	157	0.7	0.5	1.0	0.0	1.0	0.5	0.6	0.8	0.9	0.8	0.4
EXEMPTIONS (YES=1/NO=0)	237	86	151	0.4	0.5	0.0	0.0	1.0	0.3	0.3	0.4	0.6	0.4	0.4
NO. TAX FORMS	292	142	150	1.8	1.7	2.0	0.0	8.0	1.4	1.4	1.9	2.2	2.4	2.2
BUREACRACY (% Management time)	287	141	146	10.3	13.6	6.0	0.0	106.7	9.1	8.7	9.8	14.3	9.4	10.6
NO. INSPECTIONS	343	191	152	3.0	2.9	2.0	0.0	17.0	2.5	2.6	3.2	3.6	2.6	2.4
FORMAL ACCOUNTS (Y/N)	301	161	140	0.8	0.4	1.0	0.0	1.0	0.3	0.5	0.9	0.9	0.9	1.0
SALES DECLARED (% of Sales Rev.s)	220	117	103	74.3	34.9	100.0	0.0	100.0	86.2	73.6	73.0	78.9	72.6	48.3
BRIBES (% Of Rev.s)	185	100	85	4.6	6.7	2.0	0.0	50.0	1.6	4.9	4.6	5.2	4.5	3.3
TAX RATES A CONSTRAINT (0-4)	338	183	155	2.3	1.6	3.0	0.0	4.0	1.2	2.2	2.5	2.6	2.5	1.4
TAX ADMIN A CONSTRAINT (0-4)	337	183	154	2.0	1.6	2.0	0.0	4.0	1.4	2.0	2.2	1.8	2.2	0.8
CUSTOMS A CONSTRAINT (0-4)	308	167	141	1.9	1.6	2.0	0.0	4.0	0.6	1.6	2.2	2.3	2.3	1.3
CORRUPTION A CONSTRAINT (0-4)	314	179	135	2.5	1.6	3.0	0.0	4.0	1.2	2.2	2.9	2.7	2.6	1.7
TOTAL OBS.									22	102	113	68	34	9
OBS. 2002									9	54	63	42	19	4
OBS. 2006									13	48	50	26	15	5

Source: Author's calculations using data from World Bank (2003) and DNEAP (2006).

Table 3: OLS Results for Tax-Ratio

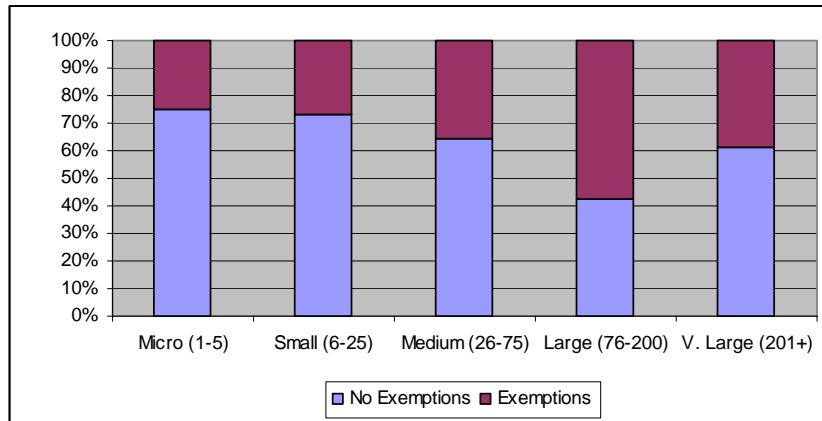
	OLS1	OLS2	OLS3	OLS4
ln(EMPL)	2.468			
	[3.336]			
ln(EMPL)^2	-0.312			
	[0.454]			
SMALL		6.347***	4.782**	
		[2.039]	[2.237]	
MEDIUM		4.255*	6.626**	
		[2.240]	[2.587]	
LARGE		4.998**	4.640*	
		[2.388]	[2.507]	
VERYLARGE		4.900*	5.524	
		[2.605]	[3.344]	
EXEMPTIONS			-1.207	-0.773
			[2.234]	[2.148]
BUREAUCRACY			0.098***	0.085**
			[0.035]	[0.036]
MANAG. EDUCATION			-	-
			7.374***	6.532***
			[2.118]	[1.968]
BRIBES			-0.230	-0.198
			[0.149]	[0.158]
TAX ADMIN. CONSTR.			5.006*	5.549*
			[2.777]	[2.810]
CORRUPTION CONTR.			4.664*	4.924**
			[2.513]	[2.370]
YEAR 2006	-0.989	-1.25	-0.884	-0.947
	[1.726]	[1.767]	[2.237]	[2.390]
ALCOHOL	23.614*	22.997*	19.134	19.176
	[13.516]	[13.260]	[14.689]	[14.133]
Constant	5.375	4.864***	4.605***	8.334***
	[5.751]	[1.512]	[1.672]	[2.244]
Observations	88	88	50	50
R-squared	0.22	0.24	0.46	0.44
F-test: all coeff.s=0	1.05	2.87	6.67	7.54
Prob > F	0.39	0.01	0	0
Robust standard errors in brackets				
* significant at 10%; ** significant at 5%; *** significant at 1%				

Table 4: Tobit Results for Proportion of Sales Declared for Tax Purposes

	TOBIT1		TOBIT2	
	Pr($y < 100$)	E($y/x, y < 100$)	Pr($y < 100$)	E($y/x, y < 100$)
SMALL (d)	0.108 (0.196)	-3.937 (7.434)		
MEDIUM (d)	0.197 (0.188)	-7.338 (7.546)		
LARGE (d)	-0.078 (0.212)	2.674 (7.058)		
VERY LARGE (d)	0.271 (0.196)	-11.793 (10.968)		
EXEMPTIONS (d)	0.118 (0.094)	-4.287 (3.520)	0.089 (0.088)	-3.319 (3.335)
BUREAUCRACY	-0.003 (0.003)	0.097 (0.112)	-0.003 (0.003)	0.121 (0.108)
MANAG. EDUCATION (d)	0.061 (0.109)	-2.1 (3.685)		
BRIBES	0.015* (0.006)	-0.534* (0.212)	0.014* (0.006)	-0.503* (0.206)
TAX ADMIN. CONSTR. (d)	0.023 (0.104)	-0.804 (3.615)		
CORRUPTION CONTR. (d)	0.400*** (0.105)	-13.261*** (3.651)	0.426*** (0.089)	-14.714*** (3.294)
ALCOHOL SECTOR (d)	-0.034 (0.255)	1.166 (8.622)		
Observations	118		119	
Expected Value	0.468	68.895	0.468	67.798
Chi-squared	27.287		22.358	
P-value	0.004		0.000	

Standard errors in brackets
(d): Marginal effect is for discrete change of dummy variable from 0 to 1
Estimated coefficients: * significant at 10%; ** significant at 5%; *** significant at 1%

Figure 1. Reported Tax Exemption by Firm Size Category



Note: Adopted size categories as in Gauthier and Gersowitz (1997) and Gauthier and Reinikka (2001). Total number of firms for each category are: Micro (16) Small (67) Medium (76) Large (47) Very Large (26).

Figure 2: Tax-ratio on Employment with Fractional Polynomial Fit

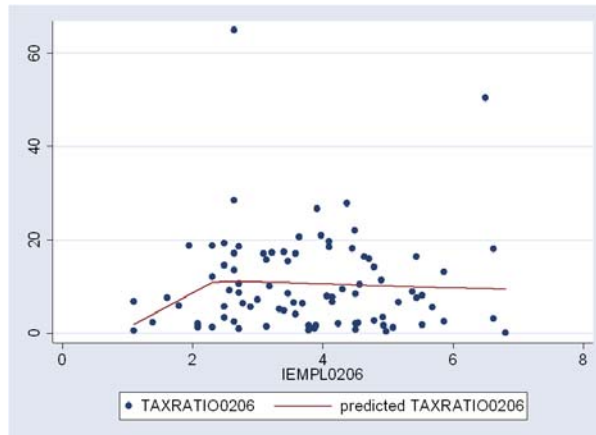


Figure 3: Tax-ratio on Employment with Fractional Polynomial Fit Excl. Alcohol

