

## **FIRM COMPLIANCE WITH SOCIAL INSURANCE OBLIGATIONS WHERE THERE IS A WEAK SURVEILLANCE AND ENFORCEMENT MECHANISM: EMPIRICAL EVIDENCE FROM SHANGHAI\***

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*Abstract.* This article examines why firms in Shanghai comply or over-comply with social insurance obligations in a regulatory environment where the expected punishment for non-compliance is low. Our first finding is that firms found to be in non-compliance in the first audit in 2001 were moved into a separate violation category and the probability of being reaudited in 2002 was significantly higher if the firm was in that category. Our second main result is that, across the board, firms which were reaudited continued to underpay in 2002 but the extent of underpayment was significantly reduced.

### 1. INTRODUCTION

One of the central tenets underpinning China's market reforms is the need to establish a social insurance system where the cost is financed jointly by enterprises, individuals and the government. For the social insurance system to work, enterprises need to make those contributions to the fund as a proportion of their wage bill as prescribed by law. The problem China faces, however, is that its surveillance and enforcement regime for identifying and punishing employers who do not make their prescribed social insurance contributions is weak. As a consequence, the rate of non-compliance with social insurance obligations among firms is high. This article employs a unique data set containing information on the social security payments of firms in Shanghai from two successive audits conducted in 2001 and 2002 by the Bureau of Labour and Social Security (BOLSS). We use the audited data to examine how the surveillance and enforcement mechanism as well as firm characteristics affect social insurance compliance behaviour.

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In Shanghai if firms do not comply with social insurance obligations, the probability of being caught is low and, if caught, the penalty structure is lenient. As a consequence, the rate of non-compliance with social insurance obligations among firms in Shanghai is 70–80%. However, rather than focus on why firms do not comply we address the question: why do 20–30% of firms comply or over-comply with social insurance obligations, given that the expected punishment for non-compliance is so low? Harrington (1988) developed a model where firms may have an incentive to comply with regulations even though their compliance cost each period exceeds the expected penalty if caught. According to this model, compliance occurs if, in a multi-period repeated game, the regulator can segment its enforcement policies into two categories, where firms that are in non-compliance in one period are placed into a separate category in the next period and subjected to closer scrutiny. Drawing on Harrington (1988), we test two hypotheses. First, based on the first audit, the BOLSS will segment firms into low (non-aggressive) and high (aggressive) categories and those firms in the high category will be more likely to be re-audited in 2002. The second hypothesis is that if the identified non-complier is re-audited, it will be more likely to comply with its social insurance obligations in order to be returned from the aggressive category into the non-aggressive category.

## 2. EMPLOYER COMPLIANCE WITH SOCIAL INSURANCE IN SHANGHAI

### 2.1. *Social insurance reform and regulations in Shanghai*

There are five principal social insurance schemes covering industrial injury, maternity, medical, pension and unemployment. In Shanghai, employer social security obligations are governed by three sets of regulations, depending on the location of the enterprise and the type of employee. Employer social insurance contributions for those employees with an urban registration are prescribed by Measures of Shanghai for Contribution to Social Insurance, No. 117 Order of the Government of Shanghai, which was passed in April 2002, but the formalised policy was first implemented in 2001. These regulations specify minimum required employer contributions for urban residents as a percentage of the previous year's payroll. The actual required contributions have varied slightly since 2001 and, as of 2004, employers were required to contribute 22% for pension insurance, 12% for medical insurance, 2% for unemployment insurance and 0.5% each for maternity and industrial injury insurance. If average wages in the enterprise are less than 60% of average wages in Shanghai, the enterprise's social insurance obligations are levied on 60% of average wages in the city. If average wages in the enterprise are greater than three times the average wage in Shanghai, the enterprise's social insurance obligations are capped at three times the average wage.

Employer obligations to migrant workers are prescribed by the 'Interim Procedures on Comprehensive Insurance for External Labour Forces in Shanghai'. The social insurance premiums for migrant workers for each firm are levied on a base which is 60% of the average previous year's monthly wage of all

workers in Shanghai, multiplied by the number of migrant workers employed by the firm. Employers of migrant workers in Shanghai are required to pay 12.5% of this base, while for outside construction teams the comparable rate is 7.5%. This provides migrant workers with coverage for work related injuries, hospital treatment and pensions on retirement, but not coverage for maternity or unemployment insurance. Employer contributions in firms located in the towns of the greater Shanghai region (that is, the towns outside the city proper) are prescribed by the 'Interim Social Insurance Procedures for Small Cities and Townships within Shanghai Municipality'. Colloquially known as the '25 + X' scheme, employers are required to pay 25% of payroll and whether any contribution greater than 25% is made in practice, is determined by negotiation between employer and employee, although both are offered tax incentives to induce them to lift their total contribution.

## 2.2. *Government attempts to enforce compliance in Shanghai*

In China employer non-compliance with social insurance obligations is a major problem. Saunders and Shang (2001; p. 282) stated: 'Although reliable data on the extent of non-compliance are difficult to obtain, particularly at the national level, there are concerns that many enterprises are not complying with the new arrangements.' Of the audited Shanghai firms analysed in this study for 2001, 72% of the firms paid less than the prescribed social insurance, 5.8% of firms paid the prescribed amount and 22.2% of firms paid more than the prescribed minimum requirement. In 2002, 81.8% of firms paid less than the prescribed social insurance, 1.9% of firms paid the prescribed amount and 16.3% of firms paid more than the minimum amount.

Since 2001, the BOLSS has engaged independent auditors to conduct an annual audit of the total payroll and the numbers of workers employed by a random sample of firms in Shanghai. One likely reason for low compliance rates is that the prospect of a firm getting caught in the annual audit if it is not complying with the regulations is quite low. This is because the annual audit only covers a small percentage of the 100 000 firms registered in Shanghai. In 2001, 2600 firms were audited and in each year from 2002 to 2004, 5000–6000 firms were audited (the empirical study below uses the data from 2001 and 2002).<sup>1</sup> An interesting aspect of the auditing process which we build on in the modelling below is that a percentage of the firms which are audited each year are re-audited the following year. Of the 2600 firms audited in 2001, 25% were re-audited in 2002.

A second reason for the high default rate is the lack of an effective enforcement mechanism if firms are audited and found not to have paid. If a firm is found to have paid less than the prescribed minimum social insurance in one of these annual audits, it will be given 15 days to make the outstanding payment. If the firm makes the payment within this period, that is the end of the matter

<sup>1</sup> The data for 2003 and 2004 have not yet been made available. Hence we are restricted to using data from the first two survey years (2001 and 2002) only.

and there is no further penalty. If the firm does not pay outstanding monies after 15 days, the BOLSS charges interest of 0.02% per day and the BOLSS has the power to mortgage property to cover the debt if the firm does not pay after a period of ten months. However, most firms which are in non-compliance do in fact have the ability to pay and make the payment within 15 days. In addition to the annual audit the BOLSS operates an employee hotline, which allows employees to report to the BOLSS if they suspect that their firm is evading social insurance, prompting the BOLSS to the issue. If the complaint is investigated and proven to be true, the employer could be penalized with a fine of 30 000–50 000 RMB.<sup>2</sup>

### 3. INCENTIVES FOR VOLUNTARY REGULATORY COMPLIANCE

While the rate of non-compliance is high, based on the audited data in Shanghai, 20–30% of firms do in fact comply or over-comply in a regulatory environment where there is a real lack of an effective enforcement mechanism. To provide a theoretically based explanation for the kind of firm behaviour that we have observed, it is useful to examine explanations from the literature on compliance with tax and environmental standards. There are, of course, a number of alternative explanations for compliance behaviour (at least in the context of environmental regulations). Decker (1998) argued that firms might agree to voluntary compliance in one policy area in order to obtain reductions in monitoring intensity or enforcement severity in other policy areas, or to convince the regulator to transfer scrutiny to other firms. For example, Welch *et al.* (2000) argued that in the case of CO<sub>2</sub>, firms could volunteer to reduce CO<sub>2</sub> emissions in order to gain regulatory ease in other areas such as SO<sub>2</sub>. Sergerson and Miceli (1998) on the other hand argued that firms engage in voluntary compliance to forestall future, more stringent, regulations. Lutz *et al.* (1998) showed that a firm adopting voluntary compliance might be seeking to reduce rather than pre-empt future regulation.

Alternatively, Salop and Scheffman (1983) and Barrett (1991) argued that firms comply in order to encourage regulatory agencies to set higher standards for the industry, therefore increasing their rivals' costs. In the literature on environmental regulation, evidence exists that firms in Europe and the USA that comply with green standards are submitting themselves to voluntary environmental audits of the entire production process (Kirchhoff, 2000) or lobbying for stricter environmental standards (Smart 1992). Buchanan and Tullock (1975) and Maloney and McCormick (1982) showed that tighter regulation may paradoxically increase profits for a regulated industry with restricted entry. Thus, Maloney and McCormick (1982) argued that an industry might lobby for tighter legal standards if tighter controls represent a barrier to entry.

It has also been argued that firms voluntarily over-comply with environmental regulations to nurture a reputation for being environmentally conscious. Surveys suggest that consumers who care about the environment are willing to pay

<sup>2</sup> The renminbi (RMB) is the Chinese currency. In June 2005 US\$1 = 8 RMB.

more for environmentally friendly products (see, e.g., Cairncross, 1992). Arora and Gangopadhyay (1995) developed a model of over-compliance that relies on the fact that consumers value environmental quality. These authors showed that firms will over-comply with environmental regulations when two conditions are satisfied: (i) consumers are able to perfectly distinguish between clean and dirty firms based on their respective levels of cleanup; and (ii) the income differential among consumers is sufficient to support demand for cleaner products at higher prices. Arora and Cason (1996) and Videras and Alberini (2000), who examined participation in the US Environmental Protection Agency's (EPA's) 33/50 program, a voluntary pollution prevention program designed to elicit improvements in environmental performance, found that public recognition of environmental friendliness is important to the success of voluntary regulation.

However, none of these explanations fit the peculiarities of compliance with social insurance regulations in Shanghai. The kind of firm behaviour observed in Shanghai cannot be explained using a static model; instead one needs a dynamic repeated game model in which the firm and the regulatory agency can react to the previous actions of each other, to explain the observed behaviour of firms. One such model is developed by Greenberg (1984) who modelled tax avoidance using a dynamic repeated game framework. Greenberg (1984) is a precursor to Harrington (1988), which is best suited to form the theoretical basis for the observed compliance behaviour of firms in Shanghai.

According to Harrington (1988), firms may have an incentive to comply with regulations even though their compliance cost each period might exceed the expected penalty if caught. This incentive exists if the regulator can segment its enforcement policies into low and high categories. Firms that are found to be in violation in period one are moved into a separate group in period two and subjected to more frequent inspections and/or heavier fines. This strategy makes sense from the regulator's perspective because it implies that given that regulation is costly, regulators would be using information available to them in order to target certain kinds of firms. Because inspections are costly to the firm, firms have an incentive to comply in period one to avoid being moved into the high category in period two and firms in the high category have an incentive to comply, regardless of compliance costs, in order to be returned to the low category. The theoretical model developed by Harrington (1988) has been used to study over-compliance of environmental regulations (see, for example, Scholz and Gray 1996; Helland 1998), but not compliance with social insurance regulations. As we argue below, the behaviour of the BOLSS regarding auditing of firms and the response of firms appears to follow the pattern predicted by the Harrington model.

#### 4. DATA AND HYPOTHESES

In 2001 the BOLSS engaged independent accountants to audit 2600 firms in Shanghai to ascertain whether they were making their prescribed social insurance payments. In 2002 a corresponding audit was implemented for 5400 firms. The

firms audited form a representative sample of enterprises in terms of industry and ownership type and number of employees drawn by stratified random sampling from the population data available to the BOLSS in Shanghai. In both years, firms in Shanghai were not required to contribute to industrial injury insurance, but were required to contribute to the other four insurances – maternity, medical, pension and unemployment. Firms in Shanghai were required to pay the prescribed contribution for the four categories of social insurance in one lump sum. Therefore, there is no separate information on firms' contribution to the four insurances. We obtained the audited information for 2001 and 2002 from the BOLSS once the identities of the firms had been removed to protect anonymity. Of the 2600 firms audited in 2001, there was complete information for 2234 firms and of the 5400 firms audited in 2002, there was complete information for 5212 firms. There were 643 firms which had been audited in 2001, which were also included in the 2002 audit and we were able to identify the firms in the 2002 audit which had been audited the year before.

For each year of the audit, we have data on whether the firm paid less than the prescribed social insurance contribution, paid the exact prescribed social insurance contribution or paid more than the prescribed social insurance contribution. In the case of firms which did not pay the prescribed social insurance contribution, we have data on the amount of underpayment or overpayment as a percentage of the firm's total wage bill. We also have data on the firm's ownership type, industry type and the number of employees for each of the two years of the audit. Descriptive statistics and *t*-tests for differences across the two survey years are presented in Table 1 for industry type and Table 2 for ownership type.

Table 1 contains information for the 12 industries for 2001 and 2002.<sup>3</sup> Taken together, firms in three industries (manufacturing, wholesale and retail and social services) constitute approximately three quarters of the firms audited in both years. Over the two years, firms in electricity, gas and water, real estate and scientific research had the highest rates of non-compliance. The rate of non-compliance among firms in the banking sector was relatively high in 2001, but did not increase much in 2002 when the rate of non-compliance among firms in other industries increased. In 2001 there were no industries in which the rate of non-compliance exceeded 80%; however, in 2002 the rate of non-compliance exceeded 80% in ten of the 12 industries.

Table 2 contains data for five ownership categories: state-owned enterprises (SOEs), collectively-owned enterprises (COEs), shareholding firms, private firms and foreign invested enterprises (FIEs). For FIEs, the data set allowed us to distinguish between firms from 'Greater China' (Hong Kong, Macau and Taiwan) and firms from either Europe or the USA with firms from all

<sup>3</sup> Note that we have not altered the industry groupings in the data provided to us by the BOLSS, for example, by grouping some industries and not others. The break-up of industries in Table 1 reflects how the BOLSS classifies industries in Shanghai and is consistent with the official classification adopted by the State Statistical Bureau of China.

Table 1. Descriptive statistics for sample firms by industry

<i>Industry</i>	<i>Firms in sample</i>	<i>Percentage of firms in sample</i>	<i>Paid less than prescribed amount</i>		<i>Paid the prescribed amount</i>		<i>Paid more than prescribed amount</i>	
<b>2001</b>								
Electricity/gas/water	27	1.21	21	77.78	1	3.70	5	18.52
Real estate	161	7.21	125	77.64	10	6.21	26	16.15
Construction	89	3.98	67	75.28	7	7.87	15	16.85
Transportation, logistics, post and telecommunications	129	5.77	90	69.77	12	9.30	27	20.93
Education, arts and broadcasting	13	0.58	9	69.23			4	30.77
Banking	80	3.58	61	76.25	2	2.50	17	21.25
Scientific research	63	2.82	46	73.02	4	6.35	13	20.63
Wholesale and retail	416	18.62	284	68.27	19	4.57	113	27.16
Social services	243	10.88	175	72.02	12	4.94	56	23.05
Manufacturing	992	44.40	715	72.08	61	6.15	216	21.77
Geology	2	0.09	1	50.00	1	50.00		
Agriculture	9	0.40	7	77.78	0		2	22.22
TOTAL	2234	100.00	1609	(72.02)	130	(5.82)	495	(22.16)
<b>2002</b>								
Electricity/gas/water	58	1.11	51	87.93			7	12.07
Real estate	391	7.50	340	86.96	8	2.05	43	11.00
Construction	202	3.88	169	83.66	4	1.98	29	14.36
Transportation, logistics, post and telecommunications	367	7.04	289	78.75	10	2.72	68	18.53
Education, arts and broadcasting	42	0.81	35	83.33	1	2.38	6	14.29
Banking	68	1.30	53	77.94			15	22.06
Scientific research	113	2.17	99	87.61	1	0.88	13	11.50
Wholesale and retail	1033	19.82	828	80.15	24	2.32	181	17.52
Social services	564	10.82	481	85.28	9	1.60	74	13.12
Manufacturing	2324	44.59	1878	80.81	40	1.72	405	17.43
Geology	20	0.38	16	80.00			4	20.00
Agriculture	20	0.38	16	80.00			4	20.00
TOTAL	5212	100	4262	(81.77)	99	(1.90)	851	(16.33)

*Table 1. Continued.*

<i>Industry</i>	<i>Firms in sample</i>	<i>Percentage of firms in sample</i>	<i>Paid less than prescribed amount</i>	<i>Paid the prescribed amount</i>	<i>Paid more than prescribed amount</i>
<b><i>t</i>-test of difference across the two time periods</b>					
Electricity/gas/water			-1.211	1.474	0.795
Real estate			-2.731***	2.504**	1.663*
Construction			-1.683*	2.425**	0.548
Transportation, logistics, post and telecommunications			-2.066**	3.121***	0.596
Education, arts and broadcasting			-1.111	-0.561	1.347
Banking			-0.244	1.313	-1.119
Scientific research			-2.437**	2.092**	1.637
Wholesale and retail			-4.845***	2.277**	4.129***
Social services			-4.433***	2.736***	3.518***
Manufacturing			-5.576***	6.794***	2.938***
Geology			-0.965	3.237***	-0.699
Agriculture			-0.137	.	0.137

*Note:* Figures in parenthesis are percentages.



Table 2. Descriptive statistics for sample firms by ownership

Ownership	Firms in sample	Percentage of firms in sample	Paid less than prescribed amount		Paid prescribed amount		Paid more than prescribed amount	
<b>2001</b>								
SOEs	979	43.82	662	67.62	36	3.68	281	28.70
COEs	316	14.15	215	68.04	13	4.11	88	27.85
Shareholding	64	2.86	52	81.25	1	1.56	11	17.19
Private	174	7.79	108	62.07	51	29.31	15	8.62
Firms from HK/Macau/Taiwan	93	4.16	76	81.72	6	6.45	11	11.83
Firms from Europe/USA	139	6.22	105	75.54	6	4.32	28	20.14
Other FIE	469	21.00	391	83.37	17	3.62	61	13.01
TOTAL	2234	100.00	1609	(72.02)	130	(5.82)	495	(22.16)
<b>2002</b>								
SOEs	2025	38.85	1599	78.96	48	2.37	378	18.67
COEs	769	14.75	579	75.29	18	2.34	172	22.37
Shareholding	155	2.97	129	83.23			26	16.77
Private	516	9.90	430	83.33	6	1.16	80	15.50
Firms from HK/Macau/Taiwan	301	5.78	266	88.37	4	1.33	31	10.30
Firms from Europe/USA	425	8.15	359	84.47	10	2.35	55	12.94
Other FIE	1021	19.59	900	88.15	12	1.18	109	10.68
TOTAL	5212	100	4262	(81.77)	99	(1.90)	851	(16.33)
<b>t-test of difference across years</b>								
SOEs				-6.754***		2.036**		6.230***
COEs				-2.451**		1.593		1.922*
Shareholding				-0.351		1.560		0.074
Private				-5.853***		11.663***		-2.279**
Firms from HK/Macau/Taiwan				-1.656*		2.745***		0.418
Firms from Europe/USA				-2.393**		1.210		2.081**
Other FIE				-2.519**		3.179***		1.314

Notes: Significance: \*\*\* = 1%; \*\* = 5%; \* = 10%. Figures in parenthesis are percentages.

Table 3. Ownership and industry type of re-audited firms ( $n = 643$ )

<i>OWNERSHIP</i>	<i>Number</i>	<i>Percentage</i>
SOEs	274	42.61
COEs	64	9.95
Shareholding	19	2.95
Private	45	7.00
Firms from HK/Macau/Taiwan	32	4.98
Firms from Europe/USA	38	5.91
Other FIE	171	26.59
<b>INDUSTRY</b>		
Electricity/gas/water	7	1.09
Real estate	55	8.55
Construction	32	4.98
Transportation, logistics, post and telecommunications	38	5.91
Education, arts and broadcasting	4	0.62
Banking	9	1.40
Scientific research	18	2.80
Wholesale and retail	99	15.40
Social services	52	8.09
Manufacturing	167	36.30

other countries lumped together as ‘other FIEs’.<sup>4</sup> SOEs and FIEs (from Greater China, Europe, the USA and ‘other’) constituted approximately three quarters of the sample in both audits. The rates of non-compliance were highest among FIEs. In 2001 shareholding firms, firms from Greater China and ‘other FIEs’ had the highest rates of non-compliance, while in 2002 firms from Greater China, firms from Europe or the USA and ‘other FIEs’ had the highest rates of non-compliance. The low rates of compliance for FIEs is consistent with newspaper reports that municipal governments are turning a blind eye to FIEs which do not contribute to social insurance in order to attract foreign direct investment (see, for example, *Workers’ Daily*, 25 February 2005). In both audits COEs and SOEs had the lowest rates of non-compliance, though the rate of non-compliance among SOEs in particular showed a marked increase over the two years from 67.2% in 2001 to 78.96% in 2002 (this difference is statistically significant with a  $P$ -value = 0.0000).

Table 3 classifies the 643 firms which were re-audited in 2002 according to industry and ownership type. In terms of ownership, SOEs and COEs which had the lowest rate of non-compliance in 2001 accounted for around half of the firms which were re-audited, while FIEs accounted for 37.5% of re-audited firms. If the BOLSS was targeting ownership categories with high default rates, one would expect to see a much higher proportion of FIEs among those firms re-audited rather than COEs or SOEs. Firms in manufacturing and wholesale and retail constitute approximately 52% of those re-audited in 2002. Consistent with the general story which emerged from the ownership breakdown, firms in manufacturing and wholesale and retail had among the lowest rates

<sup>4</sup> These are the categories in the BOLSS data set. The BOLSS data set did not allow us to distinguish between firms from Europe or the USA, nor did it separate out other Asian countries.

of non-compliance in 2001. Among industries with the highest default rates in 2001, real estate firms made up 9% of the re-audited firms, but electricity, gas and water and scientific research together constituted just 4% of re-audited firms.

We used this information to test whether or not, if the regulatory process occurs in the context of a repeated game, firms have an incentive to comply with regulations even though their compliance cost each period exceeds the expected penalty if caught. Specifically, we use the Harrington (1988) conceptual model to test the following two hypotheses.

*HYPOTHESIS 1: Based on the first audit in 2001, the regulator segments firms into low and high categories in terms of their social security contributions, with those in the high category being more likely to be re-audited in 2002.*

*HYPOTHESIS 2: If the firm is found to be in non-compliance in 2001, it will be more likely to comply with its social insurance obligations in 2002 due to increased likelihood of being placed in the high category in 2001 and being re-audited in 2002.*

We test the first hypothesis through examining whether the probability of being re-audited in 2002 is higher if the firm paid less than the prescribed social insurance in 2001. To test the second hypothesis, for those firms which were re-audited we undertake a repeated measures analysis of variance in underpayment from 2001 to 2002. The Harrington (1988) model suggests that a firm would be motivated to return from the high to the low category because firms in the low category are less likely to be audited and therefore less likely to be caught if in non-compliance. In Shanghai, while the monetary penalties if in non-compliance are low provided the firm pays when caught, there are nonetheless substantial non-monetary costs from being in the high category. The BOLSS has an Inspections Department which contains 138 employees. It consists of four sections and each is assigned a district of the city. The Inspections Department makes random audits of firms on a daily basis and, because staff numbers are limited, it targets firms which are in the high category. Repeated inspections between audits represent substantial transaction costs for the firm. In such cases management needed to make available sizeable blocks of their time to allow for the Inspections Department to look through their books, which diverted time from other activities.

Before undertaking more systematic tests of the two hypotheses, we provide in Table 4 a broad overview of the compliance behaviour of the re-audited firms, which gives a more accurate indicator than just relying on the broad industry and ownership classifications in Table 3. In terms of the first hypothesis, Table 4 suggests that, contrary to the general picture in Table 3, the BOLSS did target firms that were not complying in 2001 for re-audit in 2002. Of the 643 firms which were re-audited in 2002, 80.56% of those paid less than the prescribed social insurance in 2001, compared with 68.57% of those that were not re-audited and the difference in proportion is statistically significant at the 1% level. This is an indicator of segmentation into high and low categories. In terms of the second hypothesis, the rate of non-compliance in 2002 did not

Table 4. Compliance behaviour of re-audited firms

2002	2001			TOTAL
	Underpaid	Paid right amount	Overpaid	
Underpaid	435	13	70	518
Paid right amount	22	0	2	24
Overpaid	76	1	24	101
TOTAL	533	14	96	643

improve among re-audited firms. The rate of non-compliance among firms re-audited in 2002 was 82.87%, which was similar to the non-compliance rate of 81.63% among the newly audited firms in 2002 and this difference is not statistically significant. Note that 67.65% of those firms which were re-audited underpaid in both years, while 78.4% of the re-audited firms (98 out of 125) which paid the prescribed amount or overpaid in 2001 underpaid in 2002.

## 5. METHOD AND RESULTS

### 5.1. *Is there systematic selection of firms for re-auditing?*

A subset of the firms that were audited in 2001 was re-audited in 2002. The question that immediately arises is whether firms were randomly chosen to be re-audited in 2002. This is an important issue because it enables us to examine whether the BOLSS indeed segments firms into low and high categories. The first column in Table 5 examines the probability of firms being re-audited in 2002 (remember that the sample here is restricted to firms that were audited in 2001). We use a probit model where the dependent variable is 1 if re-audited in 2002 and zero otherwise. The explanatory variables are the firm specific characteristics in 2001 and the firm's social insurance payments in 2001:  $pay2001\_1 = 1$ , if the firm paid the prescribed social insurance in 2001 and  $pay2001\_2 = 1$ , if the firm paid more than the prescribed social insurance in 2001. The reference category is that the firm paid less than the prescribed social insurance in 2001. If the re-audited firms constitute a random sample, none of the firm characteristics in the 2001 sample should have a statistically significant effect on the probability of being re-audited. The picture that emerges in column 1 of Table 5 is that firms which are re-audited are not a random sample of all firms that were audited in 2001. In particular, the probability of being re-audited is significantly lower for firms that paid more than or equal to the prescribed social insurance payment in 2001. The marginal estimates show that relative to firms that contributed less than the prescribed amount in 2001, the probability of re-audit is lower by 13.8 percentage points for firms that paid the prescribed amount of social insurance and is lower by 10.5 percentage points for firms that paid more than the prescribed amount of social insurance. Other results that are worth noting: relative to SOEs, the probability of being re-audited is significantly lower for COEs and relative to

Table 5. Is there systematic selection of firms for re-auditing?

	<i>Probability of re-audit</i>	<i>Are re-audited firms different (probit)</i>	<i>Are re-audited firms different (ordered probit)</i>
COEs (2001)	-0.266*** (0.094)	-0.067 (0.097)	-0.062 (0.097)
Shareholding firms (2001)	0.039 (0.174)	-0.530** (0.220)	-0.533** (0.222)
Hong Kong, Macau and Taiwanese firms (2001)	0.110 (0.144)	-0.547*** (0.192)	-0.606*** (0.182)
European and US firms (2001)	-0.096 (0.127)	-0.343** (0.148)	-0.351** (0.146)
Other FIEs (2001)	0.118 (0.079)	-0.605*** (0.105)	-0.617*** (0.103)
Private firms (2001)	0.047 (0.118)	0.159 (0.123)	-0.152 (0.097)
Electricity, gas and water (2001)	-0.200 (0.270)	-0.361 (0.312)	-0.280 (0.327)
Real estate (2001)	0.044 (0.112)	-0.226 (0.143)	-0.225 (0.139)
Transportation, logistics, post and telecommunications (2001)	-0.051 (0.126)	0.006 (0.148)	-0.022 (0.139)
Education, arts and broadcasting (2001)	-0.008 (0.380)	-0.075 (0.429)	-0.008 (0.446)
Banking (2001)	-0.769*** (0.195)	-0.387** (0.184)	-0.293 (0.186)
Scientific research (2001)	-0.090 (0.174)	-0.068 (0.206)	-0.093 (0.198)
Wholesale and retail (2001)	-0.208** (0.084)	-0.057 (0.095)	-0.014 (0.092)
Social Services (2001)	-0.304*** (0.102)	-0.119 (0.112)	-0.079 (0.110)
Construction (2001)	0.159 (0.146)	-0.262 (0.184)	-0.277 (0.178)
Number of employees (2001)	0.068 (0.070)	-0.205** (0.092)	-0.219** (0.091)
pay2001_1	-0.475*** (0.139)		
pay2001_2	-0.333*** (0.073)		
Constant	-0.390*** (0.067)	-0.214*** (0.074)	
$\tau_1$			0.201*** (0.073)
$\tau_2$			0.392*** (0.073)
$\chi^2$ test for re-audit		33.88***	32.02**

Notes: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Robust standard errors in parentheses.

firms in the manufacturing sector, the probability of being re-audited is significantly lower for firms in the banking, wholesale and retail and social services sector.

The second and third columns of Table 5 examine whether firms from the 2001 sample, which were re-audited in 2002 differ from those 2001 firms which

were not re-audited. In column 2 we present the estimation results from a probit model where the dependent variable is set equal to one if the firm paid greater than or equal to the prescribed amount in 2001 and is zero otherwise. In column 3 in contrast, we present the results from an ordered probit model where the choices are: (i) the firm paid less than the prescribed amount in 2001; (ii) it paid the prescribed amount in 2001; or (iii) it paid greater than the prescribed amount in 2001. The explanatory variables in each case are industry and ownership dummy variables and number of employees for 2001. In addition, we include a dummy variable (*AUDIT2001*) which is set equal to one if the firm was re-audited in 2002 and is zero otherwise and interact *AUDIT2001* with each of the explanatory variables. We compute a  $\chi^2$  test for the joint significance of *AUDIT2001* and the interaction terms to test whether there are significant differences between the re-audited and non-re-audited sample of firms. This is essentially a test of whether the coefficients of the set of explanatory variables and the constant differ for those firms that are re-audited versus those that are not re-audited. The joint  $\chi^2$  tests (with 17 degrees of freedom) show that the re-audited and non-re-audited firms do differ in their initial behaviour. Of course it is worth noting that this statistical significance is pretty much driven by the statistical significance of the *AUDIT2001* dummy because none of the difference estimates (the interaction terms) are statistically significant. But it is clear just by looking at the coefficient estimate of *AUDIT2001* that these firms were indeed the poor performers in 2001: for example, the marginal effects, corresponding to the probit estimates presented in column 2, show that a firm that was re-audited in 2002 was nearly 12% more likely to have paid less than the prescribed amount of social insurance.

### 5.2. *Does re-auditing of firms make a difference to compliance behavior?*

While the results presented in the previous section show that re-auditing was not random and that the BOLSS used re-auditing as some form of 'punishment' for poor performance in terms of social insurance contributions in 2001, the question that arises is: did this have any effect on the compliance behaviour of firms? Our second hypothesis is that if the firm is re-audited, it will be more likely to comply with its social insurance obligations in order to be returned from the high into the low category.

In order to assess whether assignment of a firm to the aggressive category impacted upon future compliance with social insurance obligations, we undertook a paired samples *t*-test of underpayment percentages using firms who underpaid in 2001 which were re-audited in 2002. A significant difference was present in the mean degree of underpayment from 2001 to 2002 ( $t$  (df = 642) = -6.25,  $P < 0.001$ ). In 2001, firms which were later re-audited that underpaid social insurance did so, on average, by approximately 10.5%, whereas in 2002, mean underpayment by these same firms dropped, on average, to approximately 6.6%. Hence, while assignment to the aggressive category did not, on average, result in either future exact compliance or future over-compliance, it did significantly lessen the degree of future under-compliance.

Table 6. Mean underpayment by firm size

<i>Firm size</i>	<i>Mean</i>
Small	-12.13
Medium	-10.16
Large	-9.39

Table 7. Mean underpayment by ownership form

<i>Ownership form</i>	<i>Mean</i>
SOE	-6.99
COE	-10.53
PR1	-13.54
FIE	-11.17

Table 8. Mean Underpayment by Industry

<i>Industry</i>	<i>Mean</i>
Real estate	-14.201
Wholesale/retail	-7.23
Social services	-12.00
Manufacturing	-8.79

We then undertook a 3 (firm size)  $\times$  4 (ownership form)  $\times$  4 (industry) between-subjects repeated measures analysis of variance to determine the location of significant mean group differences in degrees of underpayment from 2001 to 2002. These analyses yielded a significant within-subjects effects of payment year ( $F_{484}^1 = 12.44$ ,  $P < 0.001$  (sphericity assumed)) and significant between-subjects effects of firm size ( $F_{484}^2 = 4.02$ ,  $P < 0.05$ ), ownership form ( $F_{484}^3 = 10.04$ ,  $P < 0.001$ ) and industry ( $F_{484}^3 = 8.14$ ,  $P < 0.001$ ).

Supporting our paired-samples *t*-test, a Least Significant Difference (LSD) pair-wise comparison showed a significant difference of 3.90 ( $P < 0.001$ ) in the estimated marginal means of payment year, with underpayment significantly improving in 2002. The results are presented in Tables 6–8. Bonferroni post-hoc comparisons of observed means showed significance group mean differences between small firms and large firms ( $P < 0.01$ ) such that small firms underpaid significantly more than did large firms. Significant group differences were also observed between SOEs and privately owned firms ( $P < 0.01$ ), such that privately owned firms underpaid significantly more than did SOEs, and between SOEs and FIEs ( $P < 0.001$ ), such that FIEs underpaid significantly more than did SOEs. Finally, significant group differences were observed between the real estate and wholesale/retail industries ( $P < 0.001$ ), such that firms in the real estate industry significantly underpaid more than those in the wholesale/retail industry; between the real estate and

manufacturing industries ( $P < 0.01$ ), such that firms in the real estate industry significantly underpaid more than those in the manufacturing industry; and between the wholesale/retail and social service industries ( $P < 0.01$ ), such that firms in the social services industry underpaid significantly more than did those in wholesale/retail.

### 5.3. *Do re-audited firms perform better than firms first audited in 2002?*

Finally, to add strength to our argument that it is in fact assignment to the aggressive category that accounts for temporal changes in degrees of under-compliance, we examined the compliance behaviour of firms first audited in 2002 with those firms which were re-audited. We began by computing an independent *t*-test between those firms re-audited in 2002 as a result of being found in non-compliance and those audited for the first time in 2002. We expected that if re-auditing, and its associated surveillance, were sufficiently inconvenient to prompt improvement in social insurance payment that re-audited firms would pay significantly better in 2002 than would newly audited firms. Our results confirmed this expectation, with re-audited firms paying approximately 8.15% below the prescribed payment as opposed to newly audited firms paying 13.54% below the prescribed payment ( $t(df = 397.69) = -6.26$ ,  $P < 0.001$ ).

To further compare the behaviour of firms first audited in 2002 with those firms which were re-audited, we applied the five models (probit over compliance, Tobit over compliance, probit violation, Tobit violation and ordered probit) to the 2002 sample. The results are reported in Table 9. The explanatory variables are dummy variables for industry and ownership type, number of employees in 2002 and *AUDIT2001*, which is the dummy variable indicating whether the firm was re-audited. We will discuss the ordered probit and probit and Tobit estimates for over compliance, because in a sense they are the most interesting. The estimates presented in columns 1–3 of Table 9 show that COEs were statistically more likely to comply relative to SOEs (which differs from 2001) and also paid more in terms of the percentage of their wage bill, while FIEs were statistically still less likely to comply with social insurance obligations relative to SOEs and also paid less in terms of the percentage of their wage bill. They also show that firms in construction and real estate were still statistically less likely to comply relative to manufacturing and also paid less. In addition, firms in social services and scientific research were also statistically less likely to pay social insurance than firms in manufacturing and also paid less as a percentage of their wage bill – firm size has no effect on compliance. Interestingly, while being re-audited does not have a significant effect on the probability of over-compliance, firms that are re-audited pay more social insurance as a percentage of their wage bill: *AUDIT2001* is positive and statistically significant in the Tobit regression. This implies that those re-audited firms which over-comply, do so by a large amount, supporting the hypothesis that re-audited firms use over-compliance as a signalling device to the regulator to be returned to the low category.



Table 9. Do re-audited firms exhibit different compliance behaviour to firms first audited in 2002?

	1	2	3	4	5
	<i>Ordered probit</i>	<i>Probit: over-compliance</i>	<i>Tobit: over-compliance</i>	<i>Probit: violation</i>	<i>Tobit: violation</i>
COEs (2002)	0.108* (0.059)	0.114* (0.061)	19.195*** (7.404)	-0.105* (0.059)	-2.720*** (0.933)
Shareholding firms (2002)	-0.090 (0.127)	-0.031 (0.126)	16.191 (14.643)	0.115 (0.125)	-9.686*** (1.800)
Hong Kong, Macau and Taiwanese firms (2002)	-0.411*** (0.102)	-0.401*** (0.105)	-39.440*** (13.168)	0.415*** (0.102)	-5.888*** (1.338)
European and US firms (2002)	-0.288*** (0.082)	-0.307*** (0.086)	-27.078** (10.638)	0.273*** (0.083)	-8.497*** (1.178)
Other FIEs (2002)	-0.428*** (0.063)	-0.411*** (0.065)	-37.520*** (8.136)	0.434*** (0.063)	-7.022*** (0.867)
Private Enterprises (2002)	-0.154** (0.073)	-0.126* (0.075)	-8.838 (9.269)	0.166** (0.073)	-4.967*** (1.068)
Geology (2002)	-0.087 (0.323)	-0.043 (0.319)	-9.194 (39.526)	0.107 (0.319)	-4.041 (4.840)
Electricity, gas and water (2002)	-0.411* (0.221)	-0.355 (0.219)	-41.533 (27.775)	0.431** (0.218)	-2.722 (2.877)
Real estate (2002)	-0.324*** (0.088)	-0.350*** (0.093)	-35.977*** (11.449)	0.315*** (0.089)	-7.735*** (1.188)
Transportation, logistics, post and telecommunications (2002)	-0.011 (0.080)	-0.029 (0.083)	-9.323 (10.293)	0.000 (0.080)	-3.223*** (1.230)
Education, arts and broadcasting (2002)	-0.238 (0.230)	-0.260 (0.243)	-36.292 (31.190)	0.229 (0.233)	-1.764 (3.375)
Banking (2002)	0.024 (0.179)	0.070 (0.177)	-4.625 (21.594)	0.000 (0.176)	-11.747*** (2.695)
Scientific research (2002)	-0.420*** (0.156)	-0.408*** (0.158)	-3.822 (18.351)	0.425*** (0.156)	-6.132*** (2.081)
Agriculture (2002)	-0.074 (0.333)	-0.025 (0.329)	-0.295 (38.138)	0.096 (0.329)	-0.713 (4.858)
Wholesale and retail (2002)	-0.091 (0.057)	-0.105* (0.059)	-13.709* (7.088)	0.085 (0.057)	-1.747** (0.846)
Social services (2002)	-0.262*** (0.073)	-0.267*** (0.076)	-27.134*** (9.317)	0.259*** (0.074)	-8.052*** (1.027)

Table 9. Continued.

	1 <i>Ordered probit</i>	2 <i>Probit: over-compliance</i>	3 <i>Tobit: over-compliance</i>	4 <i>Probit: violation</i>	5 <i>Tobit: violation</i>
Construction (2002)	-0.240** (0.111)	-0.250** (0.115)	-21.069 (14.393)	0.235** (0.111)	-2.630 (1.607)
Number of employees (2002)	0.032 (0.033)	0.031 (0.034)	0.367 (4.636)	-0.033 (0.034)	1.571*** (0.556)
AUDIT2001	-0.039 (0.062)	-0.054 (0.065)	138.452*** (13.091)	0.029 (0.063)	0.384 (0.964)
Constant		-0.777*** (0.047)	-112.315*** (6.509)	0.702*** (0.046)	-2.875*** (0.700)
$\tau_1$	0.702*** (0.046)				
$\tau_2$	0.777*** (0.046)				
$\mu$			120.586*** (3.122)		20.854*** (0.231)

Notes: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%.  
Robust standard errors in parentheses for the probit and ordered probit regressions.

One might argue that we can only find an effect of re-auditing if the firm was paying less than the prescribed amount in 2001. To investigate this point, it is necessary to separate the re-audited firms which complied and those which did not comply in 2001. To do this, we re-estimated the Tobit model for over compliance, but we added an interaction term  $AUDIT2001 * PAY2001$  where  $PAY2001$  is a dummy variable set equal to one if the firm paid greater than or equal to the prescribed amount in 2001. Doing this, the difference estimate (the coefficient on the interaction terms  $AUDIT2001 * PAY2001$ ) was negative, though not statistically significant.  $AUDIT2001$  continued to remain positive and statistically significant.

## 6. CONCLUSION

Before proceeding to a formal discussion of the results, let us briefly summarize the main results that relate auditing and compliance behaviour. First, re-auditing does not appear to be random: the regression results show that firms that were in violation in terms of their social insurance contributions in 2001 were statistically more likely to be re-audited in 2002. It is as if the firm is found to be in violation in 2001 it is moved into a separate (violation) category and the probability of being re-audited in 2002 is higher if the firm is in that category. Second, firms which were re-audited continued to underpay in 2002 but the degree of underpayment is significantly reduced. Third, when we compare the behaviour of firms first audited in 2002 with those which are re-audited in 2002, we find that the group of re-audited firms significantly increase the amount of over-compliance though the probability of over-complying is not significantly different.

How do we explain the compliance behaviour of these firms? While violation rates are quite high, it is really surprising that 20–30% of firms do actually comply or even over-comply, even though the frequency of surveillance (monitoring) is quite low, and even when violations are discovered, fines and other penalties are not large. This kind of firm behaviour cannot be explained in a static model. However, one can apply the Harrington (1988) dynamic model to explain the behaviour of firms and the BOLSS (the regulatory agency). What we have here is a dynamic repeated game model in which the firm and the regulatory agency can react to previous actions of each other. Suppose the regulatory agency classifies firms into two groups, one of which faces more severe enforcement compared with the other. Each firm can move from one group to the other based on its performance. One could argue that the BOLSS is using the audit results from 2001 to initially classify firms into the bad or the good group. The fact that poor performers in 2001 are more likely to be re-audited in 2002 tends to support this argument. Firms that performed poorly in 2001 (and are hence in the 'bad' group) over comply in 2002 possibly to provide a signal to the BOLSS about their intentions and their desire to comply with the regulations in the future. It remains to be seen (from future surveys) how the BOLSS reacts to this kind of compliance behaviour by these firms.

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