

Tax System Obstacles to Business Operations in Transition Countries

Junpyo Park
University of Northern Colorado

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This study examines how tax system characteristics affect firm behavior in transition economies using panel data from the BEEPS survey. Generalized ordered probit models show that tax administration practices significantly influence firms' perceptions of tax burdens. To address endogeneity, the analysis estimates unexplained tax obstacles using methods from happiness economics. Results reveal that firms previously reporting tax administration as an obstacle later spent more time on tax compliance, made slightly fewer payments, and experienced more frequent tax inspections. The findings offer insights into how evolving business conditions and tax practices shape firm operations over time.

Keywords: tax administration, tax system obstacles, business operations, transition economies, Environment and Enterprise Performance Survey (BEEPS)

INTRODUCTION AND BACKGROUND

Since the dissolution of the Soviet Union in the early 90's, the countries of Central and Eastern Europe and the former Soviet republics, commonly referred to as transition countries, have experienced profound political, institutional, and economic transformations (Murrell, 1991). The International Monetary Fund (IMF) identifies transition economies as those undergoing this shift from centrally planned systems to more decentralized, market-based ones. The list of transition economies is classified by IMF (see Appendix). These countries have transitioned from centrally planned to market-oriented or mixed economies through reforms such as privatization, trade liberalization, and the development of legal and fiscal institutions (Libman, 2006 and Svejnar, 2006). While the initial stages of transition were marked by economic contraction and institutional instability, many of these countries rebounded impressively in the following decades. After implementing market reforms in the late 1990s, the collective Gross Regional Domestic Product (GRDP) of transition countries grew at an average rate of seven percent in the early 2000s (Mitra and Stern, 2003). By the early 2010s, the United Nations Department of Economic and Social

Affairs (DESA) ranked these economies second globally in GDP growth, surpassed only by rapidly expanding Asian economies such as China and India. This economic momentum has elevated the role of transition countries in the global economy, particularly in manufacturing, resource extraction, and services (Abdixhiku et al., 2017 and Engelschalk, 2004).

Despite notable progress, the long-term sustainability of growth in these regions remains uneven and often constrained by institutional inefficiencies, particularly in the design and administration of tax systems. Tax policy and administration are central to shaping the business environment. In many transition countries, however, firms continue to face complex and burdensome tax procedures, weak enforcement, high levels of informality, and inconsistent regulatory practices (IMF, 2021 and Khujamkulov, 2016)). These obstacles can discourage investment, reduce productivity, and inhibit the development of a robust private sector (Amberger et al., 2024 and Nadirov & Aliyev, 2015).

Given this context, the relationship between tax systems and business practices in transition economies requires closer examination. Understanding how tax-related obstacles influence firm behavior and regional development outcomes is critical for designing policies that foster inclusive and sustained economic growth. Therefore, this paper investigates the effects of tax system design and administration on firm-level outcomes in transition economies, with particular attention to how these dynamics contribute to regional disparities and overall economic performance.

This paper contributes to the growing literature on tax-related obstacles in transition economies in several important ways. First, it uses detailed panel data from firm-level surveys to examine how the relationship between tax system characteristics and business operations evolves over time. The dataset's broad country coverage and rich business-environment indicators enhance the generalizability of the findings to other developing and transition contexts.

Second, the analysis examines how changing economic and business conditions influence perceptions of tax-related barriers. Using comparative data from 2008 and 2013, the study demonstrates that variation in firm responses is shaped by both country-level and firm-level characteristics. These include GDP per capita, ownership structures, competition with informal firms, managerial engagement with regulatory processes, and, importantly, tax administration practices.

Lastly, this research addresses issues of causality by leveraging the longitudinal structure of the BEEPS dataset to track firm responses over time. Drawing on methods from the happiness economics literature, it adopts a novel approach that analyzes unobserved responses from earlier survey waves to identify unexplained tax obstacles and estimate their causal impact on subsequent firm behavior. Specifically, the study tests whether firms that reported tax rates or tax administration as significant constraints in 2008 were more likely to experience similar or heightened tax-related burdens in 2013. The findings consistently show that prior concerns about tax administration are associated with increased tax compliance costs over time, as evidenced by longer preparation and payment times, slightly fewer tax payments, and more frequent inspections or visits by tax authorities.

The remainder of the paper is organized as follows. Section 2 reviews the relevant literature on tax systems and business environments in transition economies. Section 3 describes the BEEPS panel dataset and presents key descriptive statistics. Section 4 outlines the empirical methodology, including the modeling framework. Section 5 reports the main findings from ordered probit models estimated using the 2008 and 2013 cross-sections, along with tests for differences in coefficients across survey waves. Robustness checks are conducted using maximum likelihood estimation of generalized ordered probit models with clustered standard errors and robust covariance matrices. Section 6 addresses causality using a methodological approach adapted from the happiness literature. The final section concludes with a summary of key results and policy implications, offering recommendations for improving tax system design and administration in transition economies.

LITERATURE REVIEW

Tax compliance costs impose significant operational burdens on businesses, particularly in transition economies, where regulatory complexity increases financial and time costs. Slemrod and Blumenthal's

(1996) foundational study quantified corporate compliance costs at \$1.56 million annually per firm in the U.S., attributing 60% of expenses to state-level fragmentation and specialized rules like foreign-income taxation. Contemporary analyses reveal escalating burdens. For instance, multinational enterprises now average \$25.6 million annually in compliance expenses, with 43% linked to foreign-income rules (Tax Foundation, 2024). These compliance costs tend to be highly regressive, placing a disproportionate burden on smaller firms due to fixed cost components. For example, Kuziakiv (2020) notes that micro-enterprises in Ukraine incur compliance costs of about 8% of turnover under standard tax regimes, undermining their competitiveness and encouraging participation in the informal economy. Similarly, in Bosnia and Herzegovina, political fragmentation exacerbates administrative barriers, further delaying the transition to a functioning market economy and distorting efficient resource allocation (Stiftung, 2024).

Tax administration inefficiencies in developing and transition economies manifest through structural weaknesses, including incomplete taxpayer databases, ineffective audits, and institutional corruption. Umar and Tusubira (2017) identify these barriers across 17 transition economies, where tax revenues average 8% to 15% of GDP, significantly below around 25% to 30% in advanced economies, due to administrative incapacity and public distrust. Systemic issues include redundant filing procedures, erratic inspections, and poor central-local fiscal coordination. For example, Yemen's tax system struggles with low voluntary compliance, partly due to literacy barriers and inadequate accounting infrastructure among small enterprises (Abd Obaid, Ibrahim, and Mat Udin, 2020). These obstacles correlate with elevated informality. For instance, firms facing high administrative burdens often operate underground to evade compliance, constraining growth and limiting access to formal credit markets. Reform proposals emphasize simplifying tax codes beyond superficial awareness campaigns, resolving jurisdictional conflicts, and linking public goods provision to tax morale enhancements to incentivize compliance (Al-Fassel, 2014).

In many transition economies, tax systems and regulatory environments pose significant challenges to business development, particularly for small and medium-sized enterprises (SMEs). Hashi (2001), through a case study in Albania, identified frequently changing regulations, high tax burdens, and financial system deficiencies as major obstacles for SMEs. Expanding this work, Hashi and Mladek (2001) examined enterprise development across multiple post-socialist countries and found that excessive taxes and mandatory contributions discouraged firm entry in Albania, the Czech Republic, Hungary, Lithuania, and Poland. They also noted that complex tax thresholds stifled business growth.

Building on this foundation, Aidis (2005) introduced the concept of formal and informal barriers to business operations using survey data from Lithuania, confirming that high formal tax burdens negatively impacted firms. Aidis and Adachi (2007) extended this analysis by comparing Russia's sluggish firm entry rate to other BRIC countries, arguing that aggressive tax regimes and intrusive inspection agencies contribute to a hostile business climate that discourages entrepreneurship.

World Bank (2003) surveys indicate that smaller firms spend 2.3 times more (as a percentage of revenue) on compliance than larger enterprises, with compliance costs consuming 3% to 8% of turnover for firms below \$100,000 in revenue. Primary drivers include fragmented reporting requirements and excessive time spent during tax inspections; in Belarus, SMEs with fewer than 50 employees typically hire two accountants solely for tax compliance, incurring monthly costs exceeding \$3.5 million (Engelschalk and Loeprick 2016). Additionally, 68% of regional SMEs cite unfair competition with untaxed informal firms as a growth barrier (OECD 2015). Simplified regimes offer relief: Estonia's distributed profits tax reduced compliance costs by 15% to 30% while increasing formal business registrations (European Commission 2022).

DATA DESCRIPTION

Business Environment and Enterprise Performance Survey Panel Data

The BEEPS dataset offers extensive firm-level information across transition economies and has become a central resource for examining topics such as corruption and informal payments (e.g., Alon and Hageman 2017; Anderson 2013; Stefes 2007; Kenny 2009), finance (Brown et al. 2011; Rahman et al. 2017; Beck et al. 2018), regulatory and political risk (Kenyon and Naoi 2010), and innovation and firm ownership

(Veugelers 2011; Commander and Svenjar 2011). These studies demonstrate the dataset's versatility and richness for analyzing the institutional and economic conditions faced by firms in post-socialist countries. Although several studies have examined how the business environment affects firm performance and tax compliance using earlier BEEPS Rounds I–III (e.g., Commander and Svenjar 2011; Joulfaian 2009), this study draws on the up-to-date BEEPS Rounds IV–V panel data to analyze the relationship between tax systems and firms' perceived tax-related obstacles to business operations. This recent panel dataset, based on face-to-face interviews with firm owners and senior managers, provides detailed information on business practices, external constraints, and firm-level outcomes over time. By leveraging this underexplored data source, this study fills a critical gap in the literature on tax policy and firm behavior in transition economies. It assumes that firms' survey responses are valid indicators of their perceptions of tax-related barriers and enables analysis of how these perceptions evolve in response to institutional changes.

Perceived Tax Obstacles and Firm-Level Survey Responses

Table 1 presents descriptive statistics for the key variables used in this study, focusing on firms' perceptions of tax-related obstacles in 2008. in transition countries. Business owners and senior managers in the firms were asked to rate the extent to which tax rates and tax administration posed obstacles to their business operations in transition countries, including the follow-up survey questions:

- 60% of firms were visited or inspected by tax officials in the past year (#j3),
- they underwent an average of two inspections or meetings (#j4), and
- approximately 131 firms reported being asked for a gift or informal payment during those encounters (#j5).

Survey Question #j30a, which captures perceptions of tax rate burdens (including profit taxes, labor taxes, and contributions), had a mean score of 2.01 on a 5-point scale, indicating that tax rates were perceived as a moderate obstacle. According to the World Bank, firms in transition countries paid an average of 12.6% in profit taxes and 25.2% in labor-related taxes and contributions in 2008. Survey Question #j30b measured perceived obstacles from tax administration, yielding a lower mean score of 1.40, suggesting that firms generally viewed tax administration as a minor constraint. Still, the burdens of compliance were non-trivial: firms reported spending an average of 356 hours annually on tax preparation and payment, and making roughly 51 tax payments per year.

TABLE 1
DESCRIPTIVE STATISTICS FOR VARIABLES OF INTEREST BETWEEN 2008 AND 2013 (WITH T-TEST=0)

Variables	2008 (N = 2,010)			2013 (N = 2,010)			Ho: mean (diff) = 0, t-test value
	Mean	Std. Dev	Min	Max	Mean	Std. Dev	
Obstacle to current operations: Tax Rates (0: no obstacle, 4: severe)	2.01	1.32	0	4	1.50	1.31	0 4 -13.3
Paying Taxes - Profit tax	12.6	5.4	5.49	22.1	9.51	5.48	0 21.7 -27.3
Paying Taxes - Labor tax and contributions (% of profit)	25.2	11.2	0.5	44.1	22.4	11.7	0 43.1 -23.4
Obstacle to current operations: Tax Administrations (0: no obstacle, 4: severe)	1.40	1.28	0	4	0.957	1.20	0 4 -12.3
Time to prepare and pay taxes (hours, annually)	355.5	230.1	81	986.5	256.8	88.8	81 436 -25.5
Tax payments (number, annually)	51.3	36.7	7	147	29.1	19.9	5 70 -28.2
Over the last year was this establishment visited or inspected by tax officials? (0:no, 1:yes)	0.606	0.488	0	1	0.60	0.489	0 1 0.32
How many times was this establishment either inspected by tax officials or required to meet with them? (0:no, 1:yes)	1.99	5.56	0	120	1.77	3.64	3.64 70 1.52
In any of these inspections or meetings was a gift or informal payment expected or requested? (0:no, 1:yes)	0.057	0.232	0	1	0.057	0.232	0 1 .
Corruption Perception Index	34.6	12.5	18	67	39.3	11.6	17 68 -43.2
Manager experience (years)	16.5	10.01	1	57	18.3	10.3	1 58 -7.38
Female manager (0:no, 1:yes)	0.203	0.402	0.402	1	0.197	0.397	0 1 0.77
What % of senior management time was spent in dealing with govt. regulations?	12.8	19.01	0	100	13.4	19.1	0 100 -0.93
Competes w/informal firms (0:no, 1:yes)	0.444	0.497	0	1	0.415	0.492	0 1 2.05
Employees (number)	87.9	300.1	0	9,500	75.3	247.1	1 8,000 3.57
City Size (1: capital city, 3: pop btw 250,000 to 1 mil, 5: pop less than 50,000)	2.92	1.67	1	5	2.83	1.69	1 5 5.42

Manufacturing (0:no, 1:yes)	0.401	0.490	0	1	0.405	0.491	0	1	-0.59
Service (0:no, 1:yes)	0.345	0.475	0	1	0.267	0.442	0	1	9.37
joint venture with foreign partner(s) (0:no, 1:yes)	0.023	0.151	0	1	0.012	0.113	0	1	2.84
state-owned firm (0:no, 1:yes)	0.009	0.096	0	1	0.025	0.157	0	1	-3.89
Shareholding company with shares traded in the stock market (0:no, 1:yes)	0.112	0.316	0	1	0.031	0.175	0	1	11.9
Subsidized (0:no, 1:yes)	0.085	0.279	0	1	0.105	0.307	0	1	-2.49
GDP per Capita (constant 2010 US\$)	6,727.5	5,684.4	698.2	25,447.4	7,122.4	5,460.6	855.5	22,574.7	-20.8
CIS country (0:no, 1:yes)	0.38	0.48	0	1	0.389	0.487	0	1	.
GDP growth rate (annual %)	3.5	5.5	-14.8	10.77	3.85	3.74	-1.13	12.3	-2.54
Ag value added (% of GDP)	11.1	6.4	1.81	27.03	10.7	6.02	2.08	27.4	7.15

To contextualize the institutional environment, I also include the Corruption Perceptions Index (CPI) from Transparency International. The 2008 average CPI score among the 28 transition countries in the sample was 34.6, placing them among the bottom 80 of 180 countries, indicating high perceived public-sector corruption.

Several firm-level characteristics are also used to control for variation in perceptions of tax obstacles. On average, senior managers had 16.5 years of experience, with 20% identifying as female. Managers spent about 13% of their time dealing with government regulations, though this ranged widely. 44% of firms reported competition from informal businesses as a constraint. Firms had an average of 88 employees, and were located in cities ranging from 250,000 to one million in population. The sample was composed primarily of manufacturing firms (40%) and service firms (34.5%). Legal structures varied and included joint ventures, state-owned enterprises, publicly traded companies, and others. Additionally, 9% of firms reported receiving government subsidies.

In the analysis, I include several country-level economic controls as well: GDP per capita, GDP growth rate, agricultural value added (as a percentage of GDP), and an indicator for whether a country is part of the Commonwealth of Independent States (CIS). The CIS variable is particularly important, as firms in these countries share a Soviet legacy that continues to shape their institutional and economic environments, distinguishing them from firms in non-CIS transition countries.

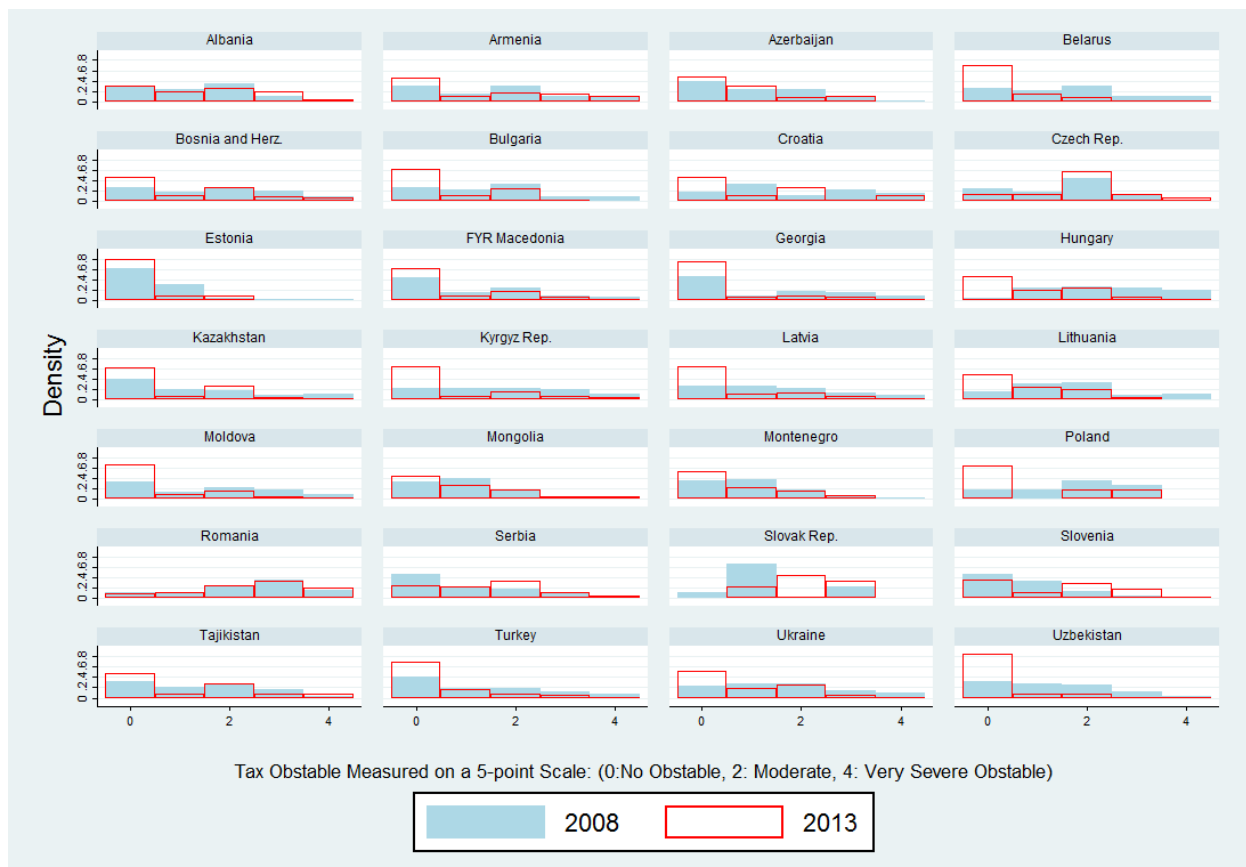
Table 1 presents firm-level responses from both the 2008 and 2013 BEEPS surveys, allowing for a panel comparison across years. Two key patterns emerge: (1) firms reported fewer tax-related obstacles in 2013, and (2) legal statuses and firm characteristics shifted during this period. Specifically, in 2013, firms rated tax rates and tax administration (Questions #j30a and #j30b) as minor to moderate obstacles, with a mean score of 1.5, down from 2008 levels. Reported effective tax burdens also fell: average profit taxes dropped to 9.5% (a 25% decrease), and labor and contribution taxes to 22.4% (an 11.5% decrease). The perceived barriers from tax administration also declined. The mean obstacle score fell to 0.95, and firms spent 257 hours annually on tax preparation, a 27.7% reduction from 2008. The number of annual tax payments decreased to 29, a 43.2% decline. While the average number of inspections slightly decreased (#j4), no changes were reported in the frequency of visits by tax officials (#j3) or requests for informal payments (#j5).

Firm-level characteristics evolved between the two periods. The number of state-owned firms increased from 20 to 57, accompanied by a rise in firms receiving government subsidies. Conversely, the number of joint ventures with foreign partners and publicly traded shareholding companies declined. Firms also reported smaller employee counts and market sizes in 2013. Figures 1 and 2 visualize these trends by plotting histogram responses on the 5-point scale (0 = no obstacle to 4 = very severe obstacle) for tax rates and tax administration. Across most countries, firms in 2013 perceived both as less severe barriers compared to 2008.

FIGURE 1
TAX RATES AS FIRMS' PERCEIVED OBSTACLE TO BUSINESS OPERATIONS
BY COUNTRY



FIGURE 2
TAX ADMINISTRATION AS FIRMS' PERCEIVED OBSTACLE TO BUSINESS OPERATIONS
BY COUNTRY



The next section introduces the empirical modeling approach using a generalized ordered probit model. The categorical dependent variable measures firms' perceived tax obstacles. The analysis explores how economic and institutional factors shape these perceptions and investigates correlations between perceived obstacles and structural tax practices.

METHODOLOGY

This study uses ordered probit models as its primary empirical strategy to examine how firm-level and country-level characteristics influence firms' perceptions of tax-related obstacles to business operations in transition economies in 2008 and 2013. The dependent variables, perceived obstacles from tax rates and tax administration, are measured on a 5-point scale using responses from the BEEPS panel dataset. To control for broader institutional and economic conditions, I include country-level indicators such as Transparency International's CPI and the World Bank's Doing Business Index.

Consider the number of observations on a categorical dependent variable Y , and on K independent variables $X_1, \dots, X_K$, plus a disturbance term, u_{it} , that has a standard normal distribution:

$$Y_{it} = X_{it}\beta + u_{it}, u_{it} \sim N(0,1), \forall i = 1, \dots, K. \quad (1)$$

where Y_{it} , the observed ordinal variable, takes on values 0 through M according to the following scheme:

$$Y_{it} = j \text{ if } \alpha_{j-1,t} < Y_{it} \leq \alpha_{jt} \text{ and } j = 0, \dots, M. \quad (2)$$

Therefore, the probability P_{ijt} that observation i at time t will select alternative j is

$$P_{ijt} = P(Y_{it} = j) = P(\alpha_{j-1,t} < Y_{it}^* \leq \alpha_{jt}) = F(\alpha_{jt} - \mathbf{X}_{it}\beta) - F(\alpha_{j-1,t} - \mathbf{X}_{it}\beta), \quad (3)$$

where Y_{it}^* in this case represents the perception of tax obstacles to business operations by the firm. This is only observed through a response to the survey Y_{it} . $F(\cdot)$ is the cumulative normal distribution function with mean zero and unit variance. The objective is to estimate predicted probabilities for each category in the ordered probit model. This specification assumes that firms reporting higher tax rates, more tax payments, or more time spent on tax compliance are more likely to perceive tax systems as significant obstacles. While the subjective nature of survey responses introduces heterogeneity in individual perceptions, the model identifies systematic patterns linked to structural tax and regulatory factors.

To explore these relationships further, I compute correlation coefficients between perceived tax obstacles (i.e., tax rates and tax administration) and objective measures of tax structure and regulatory burden. These include effective tax rates on profit and labor, the number of tax payments per year, hours spent preparing taxes, frequency of inspections, and the share of time senior managers devote to regulatory compliance. Refer to the footnote and Supplementary Table 1 for the correlation coefficients. The correlation analysis summarized in Supplementary Table 1 shows that the alignment between perceptions and objective conditions was stronger in 2008 than in 2013. For example, the correlation between perceived tax rates as an obstacle and profit and labor tax burdens was 0.13 and 0.18 in 2008, but declined to 0.06 and 0.08 in 2013. Similarly, the correlation between perceived tax administration and the number of tax payments decreased from 0.09 to 0.04. However, the correlation between tax administration obstacles and the share of time senior managers spent on regulatory issues increased from 0.08 to 0.12, suggesting a shift in what firms associate with administrative burdens.

The next section presents the empirical results from the ordered probit models. These estimates capture the relationship between tax system features and perceived tax obstacles, and track how this relationship evolved between 2008 and 2013 using the panel structure of the data.

EMPIRICAL RESULTS

Ordered Probit Models of Reported Tax Rate Obstacles

Table 2 presents ordered probit estimates for firms' perceived obstacles related to tax administration in 2008 and 2013. The dependent variable captures the severity of tax administration as a barrier. Each model includes firm- and country-level covariates and uses a balanced sample of 2,010 firms across both years.

TABLE 2

ORDERED PROBIT REGRESSION FOR TAX ADMINISTRATION WITH χ^2 TESTS EQUIVALENCE BETWEEN 2008 AND 2013

Obstacle to current operations:	(1) 2008	(2) 2013	(3) χ^2 tests for equivalence between 2008 and 2013
Tax Administrations (0: no obstacle, 4: severe)	Coef. (Std. Err.)	Coef. (Std. Err.)	
Time to prepare and pay taxes (hours, annually)	0.0001 (0.0002)	0.001*** (3.50E-04)	10.1
Tax payments (number, annually)	0.002* (0.001)	0.005** (0.002)	2.29
Over the last year, was this establishment visited or inspected by tax officials? (0:no, 1:yes)	0.164*** (0.052)	0.191*** (0.057)	0.12
Over the last year, how many times was this establishment either inspected by tax officials or required to meet with them? (0:no, 1:yes)	0.002 (0.004)	0.003 (0.007)	0.01
In any of these inspections or meetings was a gift or informal payment expected or requested? (0:no, 1:yes)	0.660*** (0.106)	0.750*** (0.109)	0.42
Corruption Perception Index	-0.007 (0.006)	0.001 (0.005)	0.91
Manager experience (years)	-0.0002 (0.002)	0.001 (0.003)	0.06
Female manager (0:no, 1:yes)	0.022 (0.060)	0.007 (0.066)	0.03
What % of senior management time was spent in dealing with govt. regulations?	0.005*** (0.001)	0.007*** (0.001)	1.71
Competes w/informal firms (0:no, 1:yes)	0.252*** (0.049)	0.007 (0.054)	12.1
Employees (number)	-3.73E-05 (8.64E-05)	7.76E-06 (1.00E-04)	0.06
City Size (1: capital city, 3: pop btw 250,000 to 1 mil, 5:pop less than 50,000)	-0.006 (0.015)	-0.012 (0.016)	0.07
Manufacturing (0:no, 1:yes)	0.160** (0.062)	-0.068 (0.061)	7.65
Service (0:no, 1:yes)	0.170*** (0.064)	-0.004 (0.068)	3.56

joint venture with foreign partner(s) (0:no, 1:yes)	0.192 (0.158)	-0.304 (0.249)	2.85
state-owned firm (0:no, 1:yes)	-0.273 (0.258)	-0.293* (0.177)	0.00
Shareholding company with shares traded in the stock market (0:no, 1:yes)	0.060 (0.078)	-0.072 (0.152)	0.71
Subsidized (0:no, 1:yes)	0.082 (0.089)	0.003 (0.085)	0.47
GDP per Capita (constant 2010 US\$)	4.24E-06 (1.09E-05)	3.13E-05*** (8.76E-06)	3.97
CIS country (0:no, 1:yes)	-0.025 (0.082)	-0.25** (0.102)	3.30
GDP growth rate (annual %)	0.001 (0.005)	-0.018** (0.009)	3.67
Ag value added (% of GDP)	-0.017*** (0.006)	0.015** (0.007)	12.84
	cut1 -0.292 (0.244)	1.01 (0.330)	
	cut2 0.319 (0.244)	1.40 (0.330)	
	cut3 1.01 (0.245)	2.11 (0.332)	
	cut4 1.63 (0.247)	2.76 (0.335)	
Log Likelihood	-2,961.49	-2,472.24	
Pseudo R^2	0.02	0.04	
Observations	2,010	2,010	

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level. Standard errors are in parentheses.

In 2008, a higher number of annual tax payments was marginally associated with increased perceptions of administrative burden, suggesting that compliance complexity contributes to firms' concerns. This relationship strengthened in 2013, when both the number of tax payments and the time spent on tax preparation were significantly linked to higher reported obstacles. Additionally, firms that experienced inspections, especially those involving informal payment requests, were more likely to perceive tax administration as problematic. Across both years, more time senior managers spent on government regulations was consistently associated with stronger perceptions of administrative barriers.

Country-level effects were limited in 2008 but became more pronounced by 2013. Higher GDP per capita and a greater share of agriculture in GDP increased the likelihood of reporting administrative tax obstacles, while stronger GDP growth reduced it. Firms in CIS countries were significantly less likely to report tax administration as a barrier, reflecting potential institutional differences within the region.

To assess whether these relationships changed over time, we conducted chi-squared tests comparing 2008 and 2013 coefficients in Column 3 of Table 2. Significant differences emerged for several variables, including compliance time, informal competition, firm sector, GDP growth, and CIS status, highlighting a meaningful shift in the determinants of perceived tax barriers between survey waves.

Ordered Probit Models of Reported Tax Rate Obstacles

Table 3 presents ordered probit estimates for firms' perceived obstacles related to tax rates in 2008 and 2013. As in the previous analysis of tax administration, the dependent variable is measured on a 5-point scale, where higher values indicate greater concern with tax rates as a barrier to doing business.

The 2008 results in Column 1 indicate that higher statutory tax rates on profit and labor contributions are strongly associated with a greater likelihood of firms reporting tax rates as a business obstacle. Firms in which senior managers spent more time dealing with government regulations also reported tax rate concerns more frequently, suggesting a link between administrative burden and perceptions of tax severity. Manufacturing firms and those facing competition from informal firms were more likely to perceive tax rates as barriers, consistent with existing literature on regulatory pressures in these sectors. Interestingly, female managers were marginally more likely to report tax rate obstacles, and firms in countries with higher corruption perceptions tended to report fewer issues with tax rates, possibly reflecting informal arrangements or selective enforcement. GDP per capita was positively associated with tax rate concerns, suggesting that more developed economies may place higher expectations on the efficiency of their tax systems.

The 2013 outcomes in Column 2 reveal the patterns broadly consistent with 2008. Profit and labor tax rates remain strong predictors of perceived obstacles, and regulatory engagement by senior management continues to be positively associated with reported burdens. Firms led by female managers again show a marginally higher tendency to report tax rate obstacles, and competition with informal firms remains a significant factor. Together, these findings confirm the persistence of key drivers shaping firm perceptions of tax rate burdens in transition economies over time.

TABLE 3
ORDERED PROBIT REGRESSION FOR TAX RATES WITH [CHI] ^2 TESTS EQUIVALENCE BETWEEN 2008 AND 2013

	(1) 2008	(2) 2013	(3) χ^2 tests for
	Coef. (Std. Err.)	Coef. (Std. Err.)	equivalence between 2008 and 2013
Obstacle to current operations: Tax Rates (0: no obstacle, 4: severe)			
Paying Taxes - Profit tax	0.008* (0.004)	0.018*** (0.005)	2.31
Paying Taxes - Labor tax and contributions (% of profit)	0.018*** (0.002)	0.015*** (0.003)	0.67
Corruption Perception Index	-0.012** (0.005)	2.13E-05 (0.004)	3.04
Manager experience (years)	0.003 (0.007)	0.005** (0.002)	0.51
Female manager (0:no, 1:yes)	0.11* (0.059)	0.106* (0.061)	0.00
What % of senior management time was spent in dealing with govt. regulations?	0.006*** (0.001)	0.005*** (0.001)	0.01
Competes w/informal firms (0:no, 1:yes)	0.256*** (0.048)	0.107*** (0.049)	4.66
Employees (number)	-9.98E-05 (8.91E-05)	5.48E-0 (9.65E-05)	1.50
City Size (1: capital city, 3: pop btw 250,000 to 1 mil, 5:pop less than 50,000)	-0.008 (0.014)	-0.005 (0.015)	0.04
Manufacturing (0:no, 1:yes)	0.195*** (0.060)	-0.087 (0.057)	12.75
Service (0:no, 1:yes)	0.064 (0.062)	-0.041 (0.064)	1.51
Joint venture with foreign partner(s) (0:no, 1:yes)	0.038 (0.156)	-0.354 (0.224)	2.55
State-owned firm (0:no, 1:yes)	-0.181 (0.245)	0.072 (0.154)	0.82
Shareholding company with shares traded in the stock market (0:no, 1:yes)	0.086 (0.077)	-0.158 (0.14)	1.92
Subsidized (0:no, 1:yes)	0.084	0.017	0.32

GDP per Capita (constant 2010 US\$)	(0.088)	(0.08)	
	2.30E-05**	-8.99E-06	
	(1.05E-05)	(8.57E-06)	5.52
CIS country (0:no, 1:yes)	0.004	-0.351***	
	(0.084)	(0.09)	9.44
GDP growth rate (annual %)	-0.007	-0.008	
	(0.005)	(0.007)	0.01
Ag value added (% of GDP)	0.003	0.008	
	(0.005)	(0.006)	0.46
	/cut1 -0.301 (0.239)	0.079 (0.22)	
	/cut2 0.221 (0.239)	0.535 (0.22)	
	/cut3 0.92 (0.24)	1.229 (0.221)	
	/cut4 1.712 (0.241)	1.981 (0.223)	
Log likelihood	-3,114.61	-3,005.04	
Pseudo R^2	0.02	0.02	
Observations	2,010	2,010	

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level. Standard errors are in parentheses.

Differences in Reported Tax Administration and Tax Rate Obstacles Over Time

To examine how perceptions of tax obstacles have evolved, Table 4 compares firm responses from 2008 and 2013. The results show a clear decline in the severity of both tax administration and tax rates as reported obstacles. Specifically, the average scores on Survey Questions #j30a (tax rates) and #j30b (tax administration) dropped by 0.51 and 0.44 points, respectively.

This overall decline corresponds with improvements in tax system efficiency. Between 2008 and 2013, firms reported reducing annual tax preparation by 99 hours and dropping 22 tax payments per year. Statutory tax rates on profit and labor also declined. Inspections by tax officials (Question #j4) fell by 22 percent, further suggesting a lighter administrative burden. In addition, the CPI improved during this period, signaling a general trend toward better governance and less perceived corruption in the region (e.g., higher CPI scores reflect lower perceived corruption).

Despite the overall reduction in tax obstacles, the correlation between tax rates and tax administration as perceived barriers grew stronger over time. Supplementary Table 3 shows that their correlation coefficient increased from 0.47 in 2008 to 0.52 in 2013. This suggests that although firms viewed both dimensions as less problematic by 2013, their perceptions of these obstacles became more closely linked, possibly reflecting a more integrated view of tax system performance as firms gain experience over time. Supplementary Table 3 shows that perceptions of tax rates and tax administration as business obstacles are strongly correlated, with the relationship intensifying over time. In 2008, the correlation coefficient between the two was 0.47; by 2013, it had increased to 0.52. Although both obstacles became less severe on average in 2013 (as shown in Table 4), the stronger correlation suggests that firms increasingly viewed these aspects of the tax system as interconnected.

TABLE 4
DESCRIPTIVE STATISTICS FOR DIFFERENCE IN VARIABLES BETWEEN 2008 AND 2013

Variables	Difference between 2008 and 2013			
	Mean	Std. Dev	Min	Max
$\Delta(2013 - 2008)$: Obstacle to current operations: Tax Rates (0: no obstacle, 4: severe)	-0.51	1.71	-4	4
$\Delta(2013 - 2008)$: Obstacle to current operations: Tax Administrations (0: no obstacle, 4: severe)	-0.44	1.62	-4	4
$\Delta(2013 - 2008)$: Paying Taxes - Profit tax (%)	-3.17	5.2	-17.7	3.3
$\Delta(2013 - 2008)$: Paying Taxes - Labor tax and contributions (% of profit)	-2.83	5.43	-22.6	17.2
$\Delta(2013 - 2008)$: Corruption Perception Index	4.7	4.88	-10	14
$\Delta(2013 - 2008)$: Time to prepare and pay taxes (hours, annually)	-98.74	173.49	-667.5	14
$\Delta(2013 - 2008)$: Tax payments (number, annually)	-22.28	35.39	-119	12
$\Delta(2013 - 2008)$: Over the last year, was this establishment visited or inspected by tax officials? (0:no, 1:yes)	-0.004	0.62	-1	1
$\Delta(2013 - 2008)$: Over the last year, how many times was this establishment either inspected by tax officials or required to meet with them? (0:no, 1:yes)	-0.22	6.4	-117	70

$\Delta(2013 - 2008)$: In any of these inspections or meetings was a gift or informal payment expected or requested? (0:no, 1:yes)	0	0.3	-1	1
$\Delta(2013 - 2008)$: What % of senior management time was spent in dealing with govt. regulations?	0.53	25.32	-100	100
$\Delta(2013 - 2008)$: GDP per Capita (constant 2010 US\$)	394.84	847.54	-2,872.7	2,758
$\Delta(2013 - 2008)$: CIS country (0:no, 1:yes)	0	0	0	0
$\Delta(2013 - 2008)$: GDP growth rate (annual %)	0.35	6.22	-9.176	21.35
$\Delta(2013 - 2008)$: Ag value added (% of GDP)	-0.42	2.63	-10.034	4.686

To analyze changes in firm perceptions over time, I construct first-difference models using the difference in reported obstacle severity between 2008 and 2013 as the outcome:

$$\Delta(Y_{i,2013} - Y_{i,2008}) = \Delta\beta(\mathbf{X}_{i,2013} - \mathbf{X}_{i,2008}) + \mathbf{Z}_{i,2008}\boldsymbol{\gamma} + u_{it}, \quad (4)$$

where $Y_{i,2013}$ and $Y_{i,2008}$ represent the firm i 's response to tax administration or tax rate obstacles in 2013 and 2008, respectively. $\mathbf{X}_{i,2013}$ and $\mathbf{X}_{i,2008}$ represent a vector of explanatory variables of interest from firm i each year. I control for the specification including $\mathbf{Z}_{i,2008}$ for the firm i 's response to the survey in 2008. u_{it} represents a disturbance term. The ordered probit models are used to estimate the likelihood that these changes affect firms' reported tax obstacles across the two survey waves, with results summarized in Table 5.

TABLE 5
ORDERED PROBIT MODEL ESTIMATES FOR FIRST DIFFERENCES: TAX ADMINISTRATION OBSTACLES

$\Delta(2013 - 2008)$: Obstacle to current operations: Tax Administration	Coef. (Std. Err.)
$\Delta(2013 - 2008)$ Time to prepare and pay taxes (hours, annually)	0.001*** (2.64E-04)
$\Delta(2013 - 2008)$ Tax payments (number, annually)	-0.002 (0.001)
$\Delta(2013 - 2008)$ Over the last year, was this establishment visited or inspected by tax officials? (0:no, 1:yes)	0.027 (0.037)
$\Delta(2013 - 2008)$ Over the last year, how many times was this establishment either inspected by tax officials or required to meet with them? (0:no, 1:yes)	0.001 (0.004)
$\Delta(2013 - 2008)$ In any of these inspections or meetings was a gift or informal payment expected or requested? (0:no, 1:yes)	0.438*** (0.078)
$\Delta(2013 - 2008)$ Corruption Perception Index	-0.005 (0.006)
$\Delta(2013 - 2008)$ What % of senior management time was spent in dealing with govt. regulations?	0.004*** (0.001)
$\Delta(2013 - 2008)$ GDP per Capita (constant 2010 US\$)	-6.83E-05* (3.54E-05)

Δ(2013 – 2008) CIS country (0:no, 1:yes)	(omitted)
Δ(2013 – 2008) GDP growth rate (annual %)	-0.006 (0.004)
Δ(2013 – 2008) Ag value added (% of GDP)	0.004 (0.009)
Manager experience (years) in 2008	-0.002 (0.002)
Female manager (0:no, 1:yes) in 2008	-0.051 (0.058)
Competes w/informal firms (0:no, 1:yes) in 2008	-0.174*** (0.047)
Employees (number) in 2008	4.48E-05 (7.74E-05)
City Size (1: capital city, 3: pop btw 250,000 to 1 mil, 5:pop less than 50,000) in 2008	0.01 (0.014)
Manufacturing (0:no, 1:yes) in 2008	-0.136** (0.06)
Service (0:no, 1:yes) in 2008	-0.176*** (0.061)
Joint venture with foreign partner(s) (0:no, 1:yes) in 2008	-0.254* (0.152)
State-owned firm (0:no, 1:yes) in 2008	0.303 (0.237)
Shareholding company with shares traded in the stock market (0:no, 1:yes) in 2008	-0.164** (0.074)
Subsidized (0:no, 1:yes) in 2008	0.06 (0.085)
Log likelihood	-3,690.96
Pseudo R ²	0.02
Observations	2,010

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level. Standard errors are in parentheses. Cut points are not reported.

Table 5 reports the results for changes in tax administration perceptions. Firms that experienced an increase in the likelihood of being asked for gifts or informal payments during tax inspections were significantly more likely to report greater tax administration obstacles. Similarly, firms that reported longer time to prepare and pay taxes, or more time senior managers spent dealing with government regulations, also perceived worsening administrative burdens. In contrast, higher GDP per capita in 2013 was weakly associated with a decline in reported obstacles, possibly reflecting improved institutional capacity or service delivery.

Baseline characteristics from 2008 also help explain the change in perceptions. Firms in the manufacturing or service sectors, or those competing with informal firms in 2008, were significantly less likely to report worsening tax administration barriers by 2013. Additionally, firms with specific legal statuses, such as joint ventures with foreign partners or publicly traded shareholding firms, were less likely to experience increased administrative tax burdens over time. These patterns suggest that firms with formal organizational structures or exposure to global standards may adapt more effectively to administrative tax requirements.

In addition, Table 6 presents ordered probit estimates for changes in perceived tax rate obstacles. Among the tax practice variables, only one emerges as a significant predictor: increases in the time senior managers spent on government regulations are positively associated with increased perceptions of tax rate

burdens. This finding mirrors the pattern observed for tax administration and underscores the broader regulatory environment's role in shaping firms' tax perceptions.

TABLE 6
ORDERED PROBIT MODEL ESTIMATES FOR $\Delta(2013 - 2008)$: TAX RATE OBSTACLES

$\Delta(2013 - 2008)$: Obstacle to current operations: Tax Rates	Coef. (Std. Err.)
$\Delta(2013 - 2008)$ Paying Taxes - Profit tax (% of profit)	0.007 (0.005)
$\Delta(2013 - 2008)$ Paying Taxes - Labor tax and contributions (% of profit)	0.002 (0.004)
$\Delta(2013 - 2008)$ Corruption Perception Index	0.014*** (0.005)
$\Delta(2013 - 2008)$ What % of senior management time was spent in dealing with govt. regulations?	0.004*** (0.001)
$\Delta(2013 - 2008)$ GDP per Capita (constant 2010 US\$)	-1.30E-04*** (3.45E-05)
$\Delta(2013 - 2008)$ CIS country (0:no, 1:yes)	(omitted)
$\Delta(2013 - 2008)$ GDP growth rate (annual %)	0.003 (0.004)
$\Delta(2013 - 2008)$ Ag value added (% of GDP)	-0.006 (0.009)
Manager experience (years) in 2008	-0.001 (0.002)
Female manager (0:no, 1:yes) in 2008	-0.036 (0.057)
Competes w/informal firms (0:no, 1:yes) in 2008	-0.162*** (0.046)
Employees (number) in 2008	2.54E-05 (7.75E-05)
City Size (1: capital city, 3: pop btw 250,000 to 1 mil, 5:pop less than 50,000) in 2008	0.018 (0.014)
Manufacturing (0:no, 1:yes) in 2008	-0.136** (0.059)
Service (0:no, 1:yes) in 2008	-0.078 (0.061)
Joint venture with foreign partner(s) (0:no, 1:yes) in 2008	-0.121 (0.151)
State-owned firm (0:no, 1:yes) in 2008	-0.034 (0.236)
Shareholding company with shares traded in the stock market (0:no, 1:yes) in 2008	-0.07 (0.074)
Subsidized (0:no, 1:yes) in 2008	0.108 (0.084)
Log likelihood	-3,862.06
Pseudo R^2	0.01
observation	2,010

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level. Standard errors are in parentheses. Cut points are not reported.

As with administrative obstacles, firms identified as manufacturing or competing with informal businesses in 2008 were less likely to report tax rates as a growing obstacle in 2013. Other firm-level controls from the earlier wave showed no consistent effect. Overall, the results suggest that certain sectors and baseline conditions shield firms from rising perceptions of tax burdens, even amid broader tax policy changes.

DIRECTION OF CAUSALITY BETWEEN REPORTED TAX OBSTACLES AND BUSINESS PRACTICE

Thus far, this study has documented a robust association between firms' perceptions of tax system obstacles and their tax-related business practices. However, the question of causality remains unresolved. Do firms that devote more time and resources to tax compliance become more likely to *perceive* the tax system as a burden? Or, conversely, do firms that *perceive* the tax system as burdensome end up experiencing more complex or costly tax procedures? This section investigates the direction of this relationship.

Understanding the causal link between perceived tax obstacles and firms' operational practices has meaningful implications for tax policy and institutional reform in transition countries. If perceived burdens causally shape behavior, then changing perceptions, through simplification, transparency, or trust-building, may have direct behavioral impacts. Alternatively, if burdensome tax practices drive perceptions, then reforming compliance processes becomes the primary policy lever.

To explore causality, I draw on an approach developed in the economics of subjective well-being. Graham, Eggers, and Sukhtankar (2004), for instance, investigated whether higher income makes individuals happier, or whether happier individuals earn more, using longitudinal data from the Russia Longitudinal Monitoring Survey. Their findings highlighted the role of unobserved personal attributes, such as optimism or aspirations, in shaping both income and happiness outcomes over time.

Analogously, this study treats firms' reported perceptions of tax obstacles as a subjective but meaningful measure. While perceptions are observable only through survey responses, they likely reflect deeper, unmeasured dimensions of firm experience, expectations, or institutional trust. To isolate this *unexplained* component, I use the residuals from an ordered probit model estimating reported tax obstacles in 2008 as a function of firm- and country-level characteristics.

First, I aim to capture the *unobserved* residual term related to the measurement of reported tax barriers in 2008. Second, by isolating this *unobserved* component that influences firms' responses to tax obstacles, I can assess its role in explaining causality. Let's revisit equation (1) as applied to the 2008 survey data:

$$Y_{i,2008}^* = \beta X_{i,2008} + u_{i,2008}, \quad (1)$$

where the dependent variable $Y_{i,2008}^*$ is observable only through the reported response, $Y_{i,2008}$, by firm i in 2008. In the survey, the dependent variable is categorical, representing reported tax barriers on a 5-point scale, and $X_{i,2008}$ represents a vector of explanatory variables, plus a disturbance term, $u_{i,2008}$, which follows a standard normal distribution. Third, after estimating the ordered probit model to assess the impact of typical country and firm-specific characteristics on tax obstacles in transition countries, we can rearrange the estimated equation as follows:

$$\widehat{Y_{i,2008}^*} - \widehat{\beta X_{i,2008}} = \widehat{u_{i,2008}}. \quad (5)$$

Fourth, utilizing the estimated residual term, $\widehat{u_{i,2008}}$, which represents the *unexplained* component in assessing reported tax barriers in 2008, I regress tax practices (e.g., time spent on tax preparation and payment, number of tax payments, frequency of visits or inspections by tax officials, etc.) in 2013 on the estimated error term and control variables:

$$X_{i,2013} = \widehat{u_{i,2008}}\delta + \mathbf{Z}_{i,2013}\boldsymbol{\gamma} + \sigma_{i,2013}, \quad (6)$$

where $X_{i,2013}$ serves as the dependent variable representing firm i's tax practices in 2013. The term $\widehat{u_{i,2008}}$ denoting the *unobserved* estimated residual term in 2008, plays a crucial role. $\mathbf{Z}_{i,2013}$ and $\sigma_{i,2013}$ represent a vector of controls and a disturbance term in 2013, respectively. The coefficient for $\widehat{u_{i,2008}}$, δ , measures the relationship between firm i's perceived tax barriers in 2008 and its tax practices in 2013.

These modeling approaches provide a novel empirical framework for testing causality. If δ is statistically significant, it suggests that perceptions, beyond observable firm or country traits, play a causal role in shaping future business behavior unexplained previously. As in the happiness literature, identifying these dynamics can deepen our understanding of how institutional experiences and expectations affect economic decision-making over time.

Table 7 demonstrates that the unobserved residual component related to tax administration obstacles in the prior survey period has a positive effect on the average hours required for tax preparation and payment in the subsequent period. Specifically, column (1) of the causality model shows that, although marginally significant, a one-unit increase in the unobserved residual for tax administration obstacles in 2008 is associated with a 2.4-hour increase in the reported average time spent on tax preparation and payment in 2013. This result suggests a causal relationship between perceived tax administration barriers and the time firms devote to tax compliance activities. Column (2) of Table 7 further supports this conclusion by showing that both the unexplained tax administration obstacles and the time spent on tax preparation and payment in 2008 significantly influence the corresponding outcome in 2013.

TABLE 7
EFFECT OF UNOBSERVED TAX ADMINISTRATION OBSTACLE IN 2008 ON TIME TO PREPARE AND PAY TAXES IN 2013

Tax Administration Obstacle in 2013: Time to prepare and pay taxes (hours, annually)	(1)	(2)
	Coef. (Std. Err.)	Coef. (Std. Err.)
Unobserved Tax Administration Obstacle in 2008	2.448* (1.366)	2.166** (0.905)
Time to prepare and pay taxes (hours) in 2008		0.347*** (0.007)
Corruption Perception Index in 2013	-1.681*** (0.302)	-0.972*** (0.201)
Manager experience (years) in 2013	0.08 (0.167)	0.172 (0.111)
Female manager (0:no, 1:yes) in 2013	3.421 (4.303)	-6.428** (2.859)
What % of senior management time was spent in dealing with govt. regulations? in 2013	0.215** (0.089)	-0.043 (0.059)
Competes w/informal firms (0:no, 1:yes) in 2013	2.866 (3.492)	-2.833 (2.317)
Employees (number) in 2013	-0.002 (0.007)	-0.001 (0.005)
City Size (1: capital city, 3: pop btw 250,000 to 1 mil, 5:pop less than 50,000) in 2013	4.217*** (1.042)	-0.009 (0.696)
Manufacturing (0:no, 1:yes) in 2013	17.936*** (3.995)	1.405 (2.668)
Service (0:no, 1:yes) in 2013	2.424 (4.478)	6.801** (2.969)

Joint venture with foreign partner(s) in 2013 (0:no, 1:yes)	-28.285* (15.147)	-13.591 (10.044)
State-owned firm (0:no, 1:yes) in 2013	9.86 (10.953)	-39.711*** (7.327)
Shareholding company with shares traded in the stock market in 2013 (0:no, 1:yes)	-4.985 (9.781)	10.357 (6.49)
Subsidized (0:no, 1:yes) in 2013	1.233 (5.658)	10.951*** (3.755)
GDP per Capita (constant 2010 US\$) in 2013	-9.66E-04* (5.63E-04)	0.002*** (3.77E-04)
CIS country (0:no, 1:yes) in 2013	4.319 (5.664)	-73.593*** (4.06)
GDP growth rate (annual %) in 2013	-11.524*** (0.496)	-1.375*** (0.385)
Ag value added (% of GDP) in 2013	2.932*** (0.451)	5.503*** (0.303)
Constant	315.272*** (15.157)	130.757*** (10.692)
Adj. R^2	0.28	0.68
Observation	2,010	2,010

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level. Standard errors are in parentheses.

Table 8 reports estimates from two models where the dependent variable is the firm's 2013 response to whether it was visited or inspected by tax officials. Both models include the unobserved residual term from the previous survey as an explanatory variable, while model (2) additionally incorporates the firm's 2008 response to the tax inspection question.

TABLE 8
EFFECT OF UNOBSERVED TAX ADMINISTRATION OBSTACLE IN 2008 ON VISITS OR INSPECTIONS BY TAX OFFICIALS IN 2013

Tax Administration obstacle in 2013: Was this establishment visited or inspected by tax officials?	(1)	(2)
	Coef. (Std. Err.)	Coef. (Std. Err.)
Unobserved Tax Administration Obstacle in 2008	0.021** (0.008)	0.021** (0.008)
Over the last year, was this establishment visited or inspected by tax officials in 2008?		0.129*** (0.022)
Corruption Perception Index in 2013	0.002 (0.002)	0.001 (0.002)
Manager experience (years) in 2013	0.001 (0.001)	0.001 (0.001)
Female manager (0:no, 1:yes) in 2013	-0.041 (0.026)	-0.032 (0.026)
What % of senior management time was spent in dealing with govt. regulations? in 2013	0.001 (0.001)	0.001 (0.001)
Competes w/informal firms (0:no, 1:yes) in 2013	0.005 (0.021)	0.003 (0.021)

Employees (number) in 2013	1.34E-04*** (4.29E-05)	1.17E-04*** (4.26E-05)
City Size (1: capital city, 3: pop btw 250,000 to 1 mil, 5:pop less than 50,000) in 2013	-0.026*** (0.006)	-0.023*** (0.006)
Manufacturing (0:no, 1:yes) in 2013	-0.012 (0.025)	-0.009 (0.024)
Service (0:no, 1:yes) in 2013	0.065** (0.028)	0.057** (0.027)
Joint venture with foreign partner(s) in 2013 (0:no, 1:yes)	-0.043 (0.093)	-0.019 (0.092)
State-owned firm (0:no, 1:yes) in 2013	-0.082 (0.067)	-0.082 (0.067)
Shareholding company with shares traded in the stock market in 2013 (0:no, 1:yes)	-0.013 (0.06)	-0.032 (0.06)
Subsidized (0:no, 1:yes) in 2013	0.088** (0.035)	0.086** (0.035)
GDP per Capita (constant 2010 US\$) in 2013	-2.6E-05*** (3.46E-06)	-2.34E-05*** (3.45E-06)
CIS country (0:no, 1:yes) in 2013	-0.08** (0.035)	-0.082** (0.035)
GDP growth rate (annual %) in 2013	-0.007** (0.003)	-0.007** (0.003)
Ag value added (% of GDP) in 2013	0.011*** (0.003)	0.009*** (0.003)
Constant	0.692*** (0.093)	0.623*** (0.093)
Adj. R^2	0.10	0.12
Observation	2,010	2,010

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level. Standard errors are in parentheses.

TABLE 9
EFFECT OF UNOBSERVED TAX RATE OBSTACLE IN 2008 ON TAX RATES IN 2013

Tax Rate obstacle in 2013: Profit Tax or Labor Tax and Contributions	(1) Profit Tax in 2013 Coef. (Std. Err.)	(2) Labor Tax and Contributions in 2013 Coef. (Std. Err.)
Unobserved Reported Tax Rate Obstacle in 2008	-0.042 (0.087)	0.082 (0.167)
Corruption Perception Index in 2013	0.007 (0.02)	-0.034 (0.038)
Manager experience (years) in 2013	0.009 (0.011)	-0.026 (0.021)
Female manager (0:no, 1:yes) in 2013	0.211 (0.283)	1.013* (0.543)
What % of senior management time was spent in dealing with govt. regulations? in 2013	0.009 (0.006)	0.031** (0.011)

Competes w/informal firms (0:no, 1:yes) in 2013	0.418* (0.229)	-0.569 (0.441)
Employees (number) in 2013	-1.88E-04 (4.58E-04)	6.11E-05 (0.001)
City Size (1: capital city, 3: pop btw 250,000 to 1 mil, 5:pop less than 50,000) in 2013	0.576*** (0.068)	0.048 (0.131)
Manufacturing (0:no, 1:yes) in 2013	1.539*** (0.262)	1.187** (0.504)
Service (0:no, 1:yes) in 2013	-0.104 (0.294)	-0.399 (0.565)
Joint venture with foreign partner(s) in 2013 (0:no, 1:yes)	-3.558*** (0.995)	0.298 (1.91)
State-owned firm (0:no, 1:yes) in 2013	1.093 (0.72)	4.244*** (1.382)
Shareholding company with shares traded in the stock market in 2013 (0:no, 1:yes)	0.116 (0.642)	-0.606 (1.234)
Subsidized (0:no, 1:yes) in 2013	-1.344*** (0.372)	0.612 (0.714)
GDP per Capita (constant 2010 US\$) in 2013	3.83E-04*** (3.70E-05)	0.001*** (7.10E-05)
CIS country (0:no, 1:yes) in 2013	1.922*** (0.372)	15.132*** (0.715)
GDP growth rate (annual %) in 2013	0.023 (0.033)	-0.392*** (0.063)
Ag value added (% of GDP) in 2013	-0.073** (0.03)	-0.023 (0.057)
Constant	3.894*** (0.997)	13.437*** (1.914)
Adj. R^2	0.18	0.35
Observation	2,010	2,010

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level. Standard errors are in parentheses.

In model (1), the results indicate that the unobserved residual term from 2008 positively predicts the frequency of reported visits or inspections by tax officials in 2013. The coefficient implies that a one-unit increase in the unobserved residual for tax administration obstacles is associated with a two-percentage-point increase in affirmative responses to Question #j4 in the 2013 survey. This finding reinforces the presence of a causal effect linking earlier perceptions of tax administration barriers to subsequent inspection experiences. Model (2) yields an identical coefficient for the unobserved residual and includes a positive, statistically significant effect of the firm's 2008 response to the inspection question. This result indicates that firms reporting inspections or visits in 2008 were more likely to report similar experiences in 2013, highlighting the persistence of such interactions over time.

The results from the direction-of-causality tests suggest that firms' perceptions of tax administration as a barrier can influence their future tax-related experiences. Specifically, past perceptions of tax obstacles are associated with outcomes such as longer preparation times, increased likelihood of inspections, and more frequent tax payments. The unobserved residual terms related to tax administration barriers appear to reflect underlying, firm-specific characteristics or undisclosed business conditions that affect tax practices. These results underscore the importance of perceived tax barriers, despite not being directly included in the models, as meaningful contributors to the observed causal relationships between firms' reported tax obstacles and their subsequent compliance behavior. In sum, the analysis reveals a robust causal effect of

firms' prior perceptions of tax administration challenges on future tax-related burdens previously unexplained.

Further supporting evidence comes from an analysis of the correlation between the 2008 unobserved residuals for tax administration obstacles and tax practices in 2013, as reported in Supplementary Table 4. These residuals are positively correlated with two key outcomes: the frequency of tax inspections ($r = 0.06$) and the average hours required for tax compliance ($r = 0.03$). These findings are consistent with Neuman, Omer, and Schmidt (2020), who argue that unpredictable tax outcomes often arise from routine business activities, such as investments, sales, or purchases, when they interact with economic risks and tax law uncertainties. These uncertain business environments complicate firms' efforts to forecast profits and plan their tax strategies. As a result, firms operating under higher uncertainty are more likely to undergo inspections or audits and spend more time on tax-related activities. By contrast, the direction of causality between perceptions of tax rate obstacles and actual tax rates is less evident. Supplementary Table 5 shows that the unobserved residual term for tax rate obstacles in the previous survey period has no statistically significant effect on the tax rates paid in the subsequent period. Both columns (1) and (2) indicate no causal link between perceived tax rate barriers and either the profit tax rate or labor tax and contribution rates in later years. This finding is further supported by Supplementary Table 4, which presents negligible correlations between the residual terms for tax rate obstacles in 2008 and both profit tax rates ($r = -0.0005$) and labor tax rates ($r = 0.0008$) in 2013. These results are unsurprising, given that tax rates are primarily determined by legal statutes based on property, sales, payroll, or corporate income, rather than by firms' subjective perceptions of past tax barriers.

CONCLUSION

This study investigates the roles of tax rates and tax administration as perceived obstacles to business operations in transition economies. Drawing on panel data from the BEEPS surveys, the analysis explores how both economic and firm-level factors influence businesses' perceptions of tax-related barriers. Descriptive statistics confirm that tax rates and tax administration remain significant challenges across the surveyed regions. Generalized ordered probit models show that a range of country- and firm-specific characteristics are associated with firms reporting tax system obstacles in both 2008 and 2013.

To assess changes in firms' perceptions over time, we used ordered probit models of first differences to capture shifts between 2008 and 2013 in both reported tax obstacles and their underlying determinants. The results show that an increase in the expected incidence of informal payments to tax officials is positively associated with heightened perceptions of tax administration obstacles. Similarly, longer time required for tax preparation and payment, along with more managerial time spent dealing with government regulations, corresponds to more reports of tax administration challenges. In contrast, higher GDP per capita in 2013 significantly reduces the likelihood of firms perceiving tax administration as a barrier. Moreover, firms in the manufacturing and service sectors, as well as those competing with informal businesses, are less likely to report tax administration obstacles. Legal structure also matters: joint ventures with foreign partners and publicly traded shareholding companies report fewer tax administration issues, underscoring the influence of firm status and governance on tax-related perceptions.

Regarding tax rate obstacles, the findings suggest that increases in regulatory burden, measured by changes in senior management time devoted to government regulations, are linked to higher concerns about tax rates. Firms with heightened managerial engagement in regulatory matters are more likely to perceive tax rates as impediments. Consistent with the findings for tax administration, firms in the manufacturing sector or those competing with informal enterprises are less likely to report tax rate concerns in 2013. Additionally, firms operating in higher-income countries report fewer tax rate obstacles, while improved corruption perceptions significantly reduce the severity of these concerns. However, other firm-specific factors do not significantly explain changes in perceptions of tax rate obstacles over time.

To explore the direction of causality between tax perceptions and tax practices, the analysis incorporates the effect of 'unexplained' or 'unobserved' residuals from prior survey periods. The results show that the unobserved residual related to tax administration obstacles in 2008 has a significant and positive effect on

the average time required for tax compliance in 2013, as well as on the likelihood of being inspected or visited by tax officials. Interestingly, the same residual is negatively associated with the number of tax payments, suggesting a complex interplay between perceived administrative barriers and subsequent compliance behavior. In contrast, the unobserved residual associated with tax rate obstacles has no significant effect on the actual tax rates paid in the subsequent period, consistent with the expectation that statutory tax rates are determined by formal tax bases rather than firms' subjective perceptions.

Overall, these findings emphasize the importance of strengthening tax system design and administration in transition and developing economies. By reducing administrative burdens and addressing firm-level concerns about tax enforcement, governments can mitigate perceived obstacles to doing business, enhance compliance, and support broader economic development.

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APPENDIX

SUPPLEMENTARY TABLE 1
CORRELATION BETWEEN PERCEIVED TAX OBSTACLES AND STRUCTURE OF TAX PRACTICE

Perceived Tax Rates as Obstacle (2008)

	Perceived Tax Rates as Obstacle (2008)
Paying Taxes for Labor and Contribution (2008)	0.18
Paying Taxes for Profit (2008)	0.13

Perceived Tax Rates as Obstacle (2013)

	Perceived Tax Rates as Obstacle (2013)
Paying Taxes for Labor and Contribution (2013)	0.08
Paying Taxes for Profit (2013)	0.06

Perceived Tax Administration as Obstacle (2008)

	Perceived Tax Administration as Obstacle (2008)
Number of Tax Payments (2008)	0.09
Hours Spent by Senior Manager to Deal with Gov't Regulations (2008)	0.08
Time to Prepare and Hours to Pay Taxes (2008)	0.08
Inspection Time by Tax Officials (2008)	0.02

Perceived Tax Administration as Obstacle (2013)

	Perceived Tax Administration as Obstacle (2013)
Number of Tax Payments (2013)	0.04
Hours Spent by Senior Manager to Deal with Gov't Regulations (2013)	0.12
Time to Prepare and Hours to Pay Taxes (2013)	0.08
Inspection Time by Tax Officials (2013)	0.02

SUPPLEMENTARY TABLE 2
CORRELATION BETWEEN TAX SYSTEM AS OBSTACLES AND GDP INDICATOR

Perceived Tax Administration as Obstacle and GDP Indicators (2008)

	Tax Administration (2008)	AVA of GDP* (2008)	GDP per capita (2008)	GDP Growth Rate (2008)
Tax Administration (2008)	1.00			
AVA of GDP (2008)*	-0.01	1.00		
GDP per capita (2008)	-0.04	-0.73	1.00	
GDP Growth Rate (2008)	0.04	0.30	-0.39	1.00

Perceived Tax Administration as Obstacle and GDP Indicators (2013)

	Tax Administration (2013)	AVA of GDP* (2013)	GDP per capita (2013)	GDP Growth Rate (2013)
Tax Administration (2013)	1.00			
AVA of GDP (2013)*	-0.004	1.00		
GDP per capita (2013)	0.05	-0.74	1.00	
GDP Growth Rate (2013)	-0.09	0.39	-0.32	1.00

Perceived Tax Rates as Obstacle and GDP Indicators (2008)

	Tax Rates (2008)	AVA of GDP* (2008)	GDP per capita (2008)	GDP Growth Rate (2008)
Tax Rates (2008)	1.00			
AVA of GDP (2008)*	-0.05	1.00		
GDP per capita (2008)	0.02	-0.73	1.00	
GDP Growth Rate (2008)	-0.01	0.30	-0.39	1.00

Perceived Tax Rates as Obstacle and GDP Indicators (2013)

	Tax Rates (2013)	AVA of GDP* (2013)	GDP per capita (2013)	GDP Growth Rate (2013)
Tax Rates (2013)	1.00			
AVA of GDP (2013)*	-0.03	1.00		
GDP per capita (2013)	0.05	-0.74	1.00	
GDP Growth Rate (2013)	-0.06	0.39	-0.32	1.00

*AVA stands for agricultural value added

SUPPLEMENTARY TABLE 3
CORRELATION BETWEEN TAX RATES AND TAX ADMINISTRATION AS OBSTACLES TO
BUSINESS OPERATIONS

Perceived Tax Rates and Tax Administration as Obstacle (2008)

	Tax Rates (2008)	Tax Administration (2008)
Tax Rates (2008)	1.00	
Tax Administration (2008)	0.47	1.00

Perceived Tax Rates and Tax Administration as Obstacle (2013)

	Tax Rates (2013)	Tax Administration (2013)
Tax Rates (2013)	1.00	
Tax Administration (2013)	0.52	1.00

Perceived Tax Rates (2008) and Tax Rates (2013) as Obstacle

	Tax Rates (2008)	Tax Rates (2013)
Tax Rates (2008)	1.00	
Tax Rates (2013)	0.15	1.00

Perceived Tax Administration (2008) and Tax Administration (2013) as Obstacle

	Tax Administration (2008)	Tax Administration (2013)
Tax Administration (2008)	1.00	
Tax Administration (2013)	0.14	1.00

Perceived Tax Administration (2008) and Tax Rates (2013) as Obstacle

	Tax Administration (2008)	Tax Rates (2013)
Tax Administration (2008)	1.00	
Tax Rates (2013)	0.12	1.00

Perceived Tax Rates (2008) and Tax Administration (2013) as Obstacle

	Tax Rates (2008)	Tax Administration (2013)
Tax Rates (2008)	1.00	
Tax Administration (2013)	0.06	1.00

SUPPLEMENTARY TABLE 4
CORRELATION BETWEEN UNOBSERVED RESIDUAL ON TAX OBSTACLES IN 2008 AND
TAX PRACTICES IN 2013

Unexplained Tax Administration as Obstacle (2008) Tax Practice (2013)

	Unobserved Tax Administration as Obstacle (2008)
Number of Tax Payments (2013)	-0.03
Hours Spent by Senior Manager to Deal with Gov't Regulations (2013)	0.01
Time to Prepare and Hours to Pay Taxes (2013)	0.03
Inspection Time by Tax Officials (2013)	0.06

Unexplained Unobserved Tax Rates as Obstacle (2008) and Tax Practice (2013)

	Unobserved Tax Rates as Obstacle (2008)
Paying Taxes for Labor and Contribution (2013)	0.0008
Paying Taxes for Profit (2013)	-0.0005