DOES REGULATORY DISCRETION INCREASE THE UNOFFICIAL ECONOMY? EVIDENCE FROM PANEL DATA

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One factor that contributes in the size of the shadow economy is the regulation of business activities. This paper provides empirical analysis of the effects of regulatory discretion on the unofficial economy. It adds to the previous findings by gathering evidence from a large data set of 162 countries for the 1999 to 2007 period. Going beyond simple correlation, it uses the Arellano–Bond estimator to investigate the dynamics and causal effects of regulation on the shadow economy. We find that increase in regulation increases the size of the shadow economy.

1. INTRODUCTION

The existence of shadow economy or unrecorded business activity is a complex phenomenon. It has been investigated from various perspectives in different disciplines (Guha-Khasnobis et al. 2006). For many economists, the main cause for the existence of a shadow economy is the excessive regulation of private business activity (Laoyza 1996; Ihrig – Moe 2004; Dabla-Norris et al. 2008; Anderson 2012). In particular, previous studies identify three predictions about the

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link between shadow economy and regulation (Johnson et al. 1997, 1998). First, that greater regulation of economic activity leads to greater unofficial economy. Second, a higher tax burden, as perceived by economic agents, turned them away from the official sector. Third, that corruption accompanies the unofficial activity (Dreher – Schneider 2010; Buehn – Schneider 2012).

Regarding the link between regulation and the unofficial economy, previous studies lack adequate coverage of the countries (e.g. the sample used by Johnson et al. (1998) comprises 49 countries which reduces observations in some specifications to as low as 34; Dabla-Norris et al. (1995) have a sample of 41 countries). Moreover, they lack coverage of East Asia and Africa, the two biggest regions in terms of population and number of countries. This makes it difficult to extract general conclusions from these studies.

The findings on the link between tax burden and the informal sector are mixed. The issue is to determine whether a higher tax burden drives firms out of the formal sector, or whether an increasing informal sector causes low tax revenues for the government and consequently a higher tax burden (e.g. Végh 1989; Roubini – Sala-i-Martin 1995; Koreshkova 2006; Blackburn – Powell 2011; Mazhar – Meon 2012).

Opinions on how the shadow economy relates to corruption are also mixed. The studies that interpret corruption as a form of tax on operating firms reach the conclusion that the unofficial economy and corruption are complements (e.g. Hindriks et al. 1999; Hibbs – Piculescu 2005). In contrast, studies that assume that firms go informal primarily to avoid corrupt bureaucracy conclude that corruption and the informal economy are substitutes (Choi – Thum 2005; Dreher et al. 2009).

This paper attempts to provide empirical findings on these links to clear ambiguities by investigating the direction of causality. It employs a larger data set of 162 countries (country coverage varies from 118 to 158 countries in different estimations depending on the availability of right hand side variables). This study uses a panel data set and also investigates the causal link between regulation and the unofficial economy. It allows us to provide a causal interpretation for these theoretically ambiguous links. We find broadly similar results to previous studies, i.e. various measures of regulation increase the size of the shadow economy. However, the results from causality analysis are inconclusive. It may indicate the complexity of the shadow economy and the need for further research.

The rest of the paper is organised as follows. The second section describes the data and methodology, the third and fourth sections detail the results of simple and causality analysis respectively, while the fifth section concludes.

2. DATA AND METHODOLOGY

Following Johnson et al. (1998), I have estimated the following empirical relation:

$$Unofficial_{it} = \alpha + \beta[Regulatory\ Discretion]_{it} + \gamma[Control]_{it} + \varepsilon_{it}\ ,$$

where $Unofficial_{it}$ denotes size of the unofficial sector as a percent of GDP for country i in the year t, α denotes the constant, β is the coefficient, and ε is the composite error term with usual assumptions. The *Regulatory Discretion* is captured in three different ways: (a) through different measures of the business regulation; (b) by using different measures of tax burden; and (c) by the indices of the rule of law and corruption. Each of these variables is used in turn to estimate the above equation controlling for the per capita GDP.

The data for the unofficial economy is from Schneider et al. (2010). They provide the largest available panel data set on unofficial economic activities, covering 162 countries from 1999 to 2007. They estimate the size of the shadow economy relative to the official GDP using the DYMIMIC (dynamic multiple causes, multiple indicators) method.[1] For the other explanatory variable, I have relied on various sources. Details of the data sources and definitions of the variables are given in *Table A*.

3. RESULTS[2]

Tables 1a and *1b* reproduce the results of Johnson et al. (1998) using their data set.[3] The explanatory variables include *Regulation1* (Heritage Foundation's business freedom index); *Regulation2* (World Economic Forum's measure of regulatory discretion); *Regulation3* (Political Risk Services Group's (PRSG) measure of bureaucratic quality); *Regulation4* (Heritage Foundation's measure of overall economic freedom); *Taxation1* (World Economic Forum's (WEF) measure of tax burden); *Taxation2* (Fraser Institute's measure of marginal income tax rate); *Leg Env1* (PRSG's measure of law and order); *Leg Env2* (Heritage Foundation's

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[1]   The DYMIMIC method infers the size of the shadow economy from variables such as direct and indirect taxation, custom duties, government regulations, the rate of unemployment, growth rate of real GDP, and currency circulation. In order to calibrate absolute figures of the size of the shadow economies from the relative DYMIMIC estimation results, they used previous estimates derived using the currency demand method.

[2]   All estimations use STATA version 11.

[3]   The data set is available at http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/0,contentMDK:20701021~pagePK:64214825~piPK:64214943~theSitePK:469382,00.html

Table A

Data description

Variables taken from Johnson et al. (for the year 1997)	Panel data (for 1999–2007)
Code	Description
Regulation1	Business freedom heritage: It is a measure of the ability to start, operate, and close a business that represents the overall burden of regulation as well as the efficiency of government in the regulatory process. High scores indicate a freer business environment. Source: Heritage Foundation's Economic Freedom Index.
Regulation2	Regulatory discretion: World Economic Forum's (WEF) measure of regulatory discretion. Higher values indicate lesser regulatory discretion.
Regulation3	Bureaucratic quality: A measure of the institutional strength and quality of the bureaucracy. High points are given to countries where the bureaucracy has the strength and expertise to govern without drastic changes in policy or interruptions in government services. Sources: International Country Risk Guide Services and The Political Risk Services Group.
Regulation4	Economic freedom: It is a measure of the ability to start, operate, and close a business that represents the overall burden of regulation as well as the efficiency of government in the regulatory process. High scores indicate a freer business environment. Source: Heritage Foundation's Economic Freedom Index.
Regulation5	Regulation quality: It captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Sources: Kaufmann et al. (2010), World Governance Indicators.
Taxation1	Tax burden: WEF's measure of the tax burden. A higher value means lesser burden.
Taxation2	Marginal income tax rate: Fraser Institute's measure of the marginal income tax rate. It assigns lower ratings to countries with higher tax rates at lower income brackets.
Taxation3	Fiscal freedom heritage: It measures the tax burden imposed by the government. It includes both the direct tax burden in terms of top tax rates on individual and corporate incomes, and the overall amount of tax revenue as a percentage of GDP. Source: Heritage Foundation, www.heritage.org/index/about

Variables taken from Johnson et al. (for the year 1997)	Panel data (for 1999–2007)

Code	Description
Leg Env1	Law and order: It is a measure of two components, "law" and "order". The law subcomponent is an assessment of the strength and impartiality of the legal system, while the order subcomponent is an assessment of the popular observance of the law. Higher values indicate greater law and order effectiveness. Sources: International Country Risk Guide Services and The Political Risk Services Group, www.prsgroup.com
Leg Env2	Property rights: It is an assessment of the ability of individuals to accumulate private property, secured by clear laws that are fully enforced by the state. Source: Heritage Foundation, www.heritage.org/index/about
Leg Env3	Equality of citizens before the law: Fraser Institute's measure of civil liberties and political rights. Higher scores indicate greater rights and liberties.
Leg Env4	Rule of law: It captures the perception of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. Sources: Kaufmann et al. (2010), World Governance Indicators, World Bank.
Corruption1	Transparency international's index for corruption perceptions. Higher values indicate lesser corruption.
Corruption2	Bribery index: The World Economic Forum's survey based measure of bribes in the public sector. Higher scores correspond to lower corruption.
Corruption3	Impulse's exporter bribery index: Incidence of bribery in the public sector in a foreign country as reported by German traders and investors abroad.
Corruption4	Corruption control: It captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of state by the elites and private interests. Sources: Kaufmann et al. (2010), Governance Indicators, World Bank.
Corruption5	Corruption ICRG: It is an assessment of the corruption within the political system. Higher values indicate lower corruption. Sources: International Country Risk Guide Services and The Political Risk Services Group. www.prsgroup.com

measure of property rights); *Leg Env3* (Fraser Institute's measure of the equality of citizens before the law); *Leg Env4* (World Governance Indicator's measure of the rule of law); *Corruption1* (Transparency International's index of corruption); *Corruption2* (WEF's measure of bribes in the public sector); *Corruption3* (Impulse's exporter bribery index); *Corruption4* (WGI's index of control of corruption); *Corruption5* (PRSG's measure of public sector corruption).

The results tell us that more restrictive regulations from business point of view increase the size of the shadow economy (Columns 1a.1 to 1a.4 in *Table 1a*); a greater tax burden is unsustainable with the larger size of shadow economy (Columns 1a.5 and 1a.6 in *Table 1a*); a more effective law and order implementation helps attract economic activity in the official sector (Columns 1b.1 to 1b.3 in *Table 1b*); and public sector corruption has a negative effect on business decisions (Columns 1b.4 and 1b.5 in *Table 1b*) and a positive one on the size of the unofficial sector (Column 1b.6 in *Table 1b)*. These tables echo the results of Tables 1 and 2 in the study of Johnson et al. (1998).

The results using panel data are shown in *Tables 2a*, *2b* and *3a, 3b*. Following the recommendation of Beck – Katz (1995), we reported panel corrected standard errors which are robust against heteroskedasticity and autocorrelation.[4] In *Table 2a*, I have used two measures of regulation (*Regulation3* and *Regulation5*). *Regulation3* is similar to Johnson et al. (1998), whereas *Regulation5* is a new measure. Our results, like those of Johnson et al. (1998), indicate a negative relation between the quality of governance and the size of the unofficial economy (columns 1 and 2). In the next two columns (3 and 4), we have used two measures of taxation (*Taxation2* and *Taxation3*). *Taxation2* is similar to Johnson et al. (1998), whereas *Taxation3* is a new measure. The coefficients on these measures of taxation are positive and significant, indicating that the larger size of the shadow economy is not sustainable with lower tax rates.

In *Table 2b*, we have presented the results of the effect of the legal environment (*Leg Env1* and *Leg Env4*) on the unofficial economy using two measures of legal environment. The first measure (*Leg Env1*) is similar to the measure of law and order used by Johnson et al. (1998). The results indicate the negative and significant impact of a good legal environment on the unofficial economy (columns 1 and 2).

In columns 3 and 4 of *Table 2b*, we have employed two measures of corruption (*Corruption4* and *Corruption5*). The higher values of these indices are associated with lower corruption. Our results indicate that the lower the corruption, the lower the size of the unofficial economy. This result supports the evidence of Dreher – Schneider (2010) that the shadow economy and corruption are complements.

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[4]   We do not use individual specific fixed effects because there is not enough within variation in the variables of our sample, in particular the size of the shadow economy.

Table 1a

Unofficial economy, regulation, and taxation (JKZ data)

Independent Var.	1a.1	1a.2	1a.3	1a.4	1a.5	1a.6
Regulation1[b]	8.060***					
	(2.057)					
Regulation2[a]		–2.913				
		(2.941)				
Regulation3[a]			–7.728***			
			(2.459)			
Regulation4[a]				–0.363		
				(0.884)		
Taxation1[a]					–6.485***	
					(1.887)	
Taxation2[a]						1.901***
						(0.686)
GDP pc log	–7.273***	–7.425**	–1.040	–7.421***	–7.304***	–6.987***
	(1.162)	(3.137)	(2.942)	(2.737)	(1.537)	(1.320)
Observations	47	34	39	43	34	42
R-square	0.615	0.598	0.654	0.440	0.680	0.572

Notes: Robust standard errors in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$; [a] A higher value of this variable means better outcome for private business; [b] A higher value of this variable means worse outcome for private business. Constant is included but not reported.

Table 1b

Unofficial economy, legal environment, and corruption (JKZ data)

Independent var.	1b.1	1b.2	1b.3	1b.4	1b.5	1b.6
Leg Env1[a]	–9.307***					
	(2.385)					
Leg Env2[b]		8.023**				
		(3.527)				
Leg Env3[a]			–2.328***			
			(0.656)			
Corruption1[a]				–3.482***		
				(1.061)		

Table 1b continued

Independent var.	1b.1	1b.2	1b.3	1b.4	1b.5	1b.6
Corruption2[a]					−3.881*	
					(2.197)	
Corruption3[b]						0.828*
						(0.451)
GDP pc log	−1.850	−4.785*	−5.227***	−3.999*	−5.807*	−6.464***
	(2.031)	(2.378)	(1.583)	(1.997)	(3.262)	(2.122)
Observations	39	47	43	43	34	44
R-square	0.781	0.584	0.603	0.605	0.627	0.512

Notes: Robust standard errors in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$; [a] A higher value of this variable means better outcome for private business; [b] A higher value of this variable means worse outcome for private business. Constant is included but not reported.

Table 2a

Unofficial economy, regulation, and taxation (Panel data 1999–2007)

Independent var.	2a.1	2a.2	2a.3	2a.4
Regulation3	−5.375***			
	(0.211)			
Regulation5		−4.046***		
		(0.258)		
Taxation2			0.967***	
			(0.040)	
Taxation3				0.172***
				(0.013)
GDP pc log	−2.831***	−3.695***	−7.228***	−6.232***
	(0.180)	(0.176)	(0.108)	(0.057)
Observations	1160	1083	862	1291
No. of countries	132	158	118	150
R-square	0.503	0.446	0.467	0.445
$\div^2$ (p-value)	0.000	0.000	0.000	0.000

Notes: Panel Corrected Standard Errors in parenthesis; *** $p<0.01$, ** $p<0.05$, * $p<0.1$; Constant is included but not reported.

Table 2b

Unofficial economy, legal environment, and corruption (Panel data 1999–2007)

Independent var.	2b.5	2b.6	2b.7	2b.8
Legal Env1	−3.399***			
	(0.222)			
Legal Env4		−7.103***		
		(0.251)		
Corruption4			−6.051***	
			(0.262)	
Corruption5				−2.832***
				(0.359)
GDP pc log	−4.253***	−1.888***	−2.500***	−4.992***
	(0.162)	(0.167)	(0.163)	(0.211)
Observations	1160	1083	1083	1160
No. of countries	132	158	158	132
R-square	0.498	0.531	0.514	0.469
$\div^2$ (p-value)	0.000	0.000	0.000	0.000

Notes: Panel Corrected Standard Errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.1; Constant is included but not reported.

Table 3a

Unofficial economy, regulation, and taxation
Arellano–Bond Estimator (Panel data 1999–2007)

Independent var.	(3a.1)	(3a.2)	(3a.3)	(3a.4)
Lag unoff eco	0.804***	0.458***	0.655***	0.669***
	(0.088)	(0.102)	(0.090)	(0.104)
GDP pc log	−2.451***	−4.430***	−3.323***	−3.061***
	(0.514)	(0.560)	(0.539)	(0.601)
Regulation3	−0.508***			
	(0.137)			
Regulation5		−0.379***		
		(0.142)		
Taxation2			0.024	
			(0.017)	
Taxation3				0.007**
				(0.003)
Observations	901	768	743	994
No. of countries	132	158	117	149

Table 3a continued

Arellano–Bond test of zero autocorrelation: AR(1) p-value	0.001	0.290	0.002	0.001
AR(2) p-value	0.040	0.720	0.285	0.042
Sargan test (p-value)	0.000	0.012	0.000	0.000
No. of instruments	28	19	25	28

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; Constant is included but not reported.

Table 3b

Unofficial economy, legal environment, and corruption
Arrelano–Bond Estimator (Panel data 1999–2007)

Independent var.	(3b.1)	(3b.2)	(3b.3)	(3b.4)
Lag unofficial eco.	0.871***	0.493***	0.783***	0.482***
	(0.093)	(0.104)	(0.108)	(0.102)
GDP pc log	−2.097***	−4.216***	−2.686***	−4.317***
	(0.546)	(0.583)	(0.664)	(0.576)
Legal Env1	−0.230**			
	(0.111)			
Legal Env4		−0.534***		
		(0.196)		
Corruption5			−0.128*	
			(0.066)	
Corruption4				−0.295***
				(0.105)
Observations	901	768	901	768
No. of countries	132	158	132	158
Arellano–Bond test of zero autocorrelation: AR(1) p-value	0.001	0.190	0.000	0.202
AR(2) p-value	0.028	0.605	0.042	0.589
Sargan test (p-value)	0.000	0.000	0.000	0.000
No. of instruments	28	19	28	19

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; Constant is included but not reported.

4. CAUSALITY ANALYSIS

It is important to search empirically for the causal effects assumed in theoretical studies. Therefore, we try to identify the causal impact of the regulatory discretion on the shadow economy. Given the difficulties in finding the instruments for all three sets of our variables, I use the Arellano – Bond (1991) estimator, which uses the own past values of the endogenous regressors as instruments.

Tables 3a and *3b* show the results. The two crucial assumptions of the Arellano–Bond estimator are the absence of serial correlation in the error term beyond order 1 and the validity of the overidentifying restrictions. The bottom panel of the table provides the test hypothesis on these two assumptions. As is clear from the table, in most of the cases there exist serial correlation beyond order one. At the same time, the Sargan test clearly indicates that overidentifying restrictions are not valid. Although the coefficients of our regressions are in line with the earlier findings, but the failure to satisfy the assumptions of the Arellano–Bond estimator do not permit a valid inference.[5]

5. CONCLUSIONS

We have investigated the relationship between regulatory discretion and the size of the unofficial economy. The paper endorses the findings of Johnson et al. (1998), Dreher – Schnieder (2010) and Buehn – Schneider (2012), and adds two important dimensions to their results. First, it produces the same results using a much larger data set than the previous authors, thus filling the important gap in terms of country coverage. Secondly, the paper attempts to discover the causal connection between the shadow economy size and business regulation. The results of the causal analysis using the Arellano–Bond estimator suffer from weak instrument and serial correlation problems. A more rigorous causal analysis could be an important motivation for future research in this area.

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[5]   Inclusion of 2 or more lags of the dependent variable on the right hand side eliminates auto-correlation in some cases, but it does not affect the outcome of the overidentifying restriction test.

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