ERCAS Working Papers

Tax Simplification and Informal Economy in developing and transitioning countries

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1. Introduction

Informal economy is present in all countries; however it is in low and middle income countries that it has its deepest roots with some measurements estimating it to average at above 40% of national GDP. This represents a large part of the economy and poses serious problems for economic development and the relationship between state and society. It also means a significant loss in tax revenue, that poor countries need for the provision of public goods, resulting in the undermining of state capacity (Fukuyama, 2004). This leads to a vicious cycle, since without the efficient provision of public goods the incentive for tax compliance further decreases.

As tax structure and bureaucratic burden haven been identified as primary causes for informal economy, in the following we want to analyze whether lower costs of compliance actually lead to lower levels of informal economy.   Given that in recent years some countries have implemented flat tax as tool for tax simplification, we also want to see whether flat taxes have actually lived up to their promise and increased tax revenue or lowered levels of informal economy.

2. Background

2.1 Definitions

Any analysis requires a clear definitional groundwork to be meaningful. For the purposes of this paper we decided to use some of the most commonly used definitions in the literature.

Informal economy

Various terms haven been used to refer to the concept of informal economy, with all of them including the dimension of it being hidden, non-formal, unofficial, in the shadows or underground. In the following, we use the definition of Friedrich Schneider from the University of Linz in Austria, who has written extensively on the "shadow economy"[1] (Schneider et, 2010, p.5) as "all market-based legal production of good and services that are deliberately concealed from public authorities" to avoid tax or social security payment or compliance with labor regulation and administrative procedure.

Similar definitions are provided by Frey and Pommerehne (1984), Loyaza (1996), Johnson, Kauffman and Shleifer (1997), Johnson, Kaufmann and Zoido-Lobaton (1998), Thomas (1999), Fleming, Roman and Farell (2004), Schneider and Enste (2000, 2002), Del'Anno and Schneider (2004), Schneider (2005).

Flat tax

"A flat income tax can be defined as one that levies a flat rate (that is, a proportional rate) on all sources of income of individuals and businesses, but avoids double taxation." (Saavedra, 2007) However, Keen et al (2006), specify personal income flat tax as "a single marginal rate of taxation on labor income minus some type of allowance". Therefore flat tax is normally not completely flat. A comprehensive income tax system, a system that is flatter is considered to be a 'simple' tax system (Schneider & Neck, 1993).

Simplification

Simplification of a tax system refers to decreasing the tax burden of regulations (e.g exemptions, number of legal procedures to pay taxes, time spent paying taxes, fill paper and solve disputes). A complex tax system as opposed to a simple tax system allows for more possibilities to tax avoidance for the loopholes on regulation (Schneider & Neck, 1993). Slemrod (1984) defines complexity of a tax system as the sum of compliance costs and administrative costs. Compliance cost refers to the costs incurred by individuals and businesses whereas the administrative costs are

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[1] As is argued in Schneider & Williams (2013), the term "shadow economy" might have a misleading (and depreciatory) connotation in the context of developing countries, where it is rather the norm than the exception. For this reason in the following the term "informal economy" will be used.

the costs incurred by the government. The complexity of a tax system has different implications not only for tax avoidance, but it may also increase perceived unfairness of the tax system and add legal uncertainty (Thießen, 2003).

2.2 Literature review and political relevance

Research and international organizations have addressed the issue of how to improve the tax collection process through tax reform, however very little has been done on the how to simplify the tax system (World Bank, 2009). The focus has been too much on addressing the expansion of tax collection and little on the simplification of the system. On the relationship between informal economy and tax systems it has been shown in the literature that tax and social security burden in addition to complexity have been associated with higher levels of informal economy (Thießen,2003, 2010; Torgeler and Schneider, 2007; Friedman et al, 2000).

Tax systems are not only important for the resources it can provide to governments, but also as a catalyst for state capacity and expansion of responsiveness and accountability (Wilson Prichard, 2010). Therefore tax systems are important tools for state building as they can increase state capacity, public engagement and accountability. For this simply expanding revenue is not enough. Rather a national dialogue is needed to any long-term strategy for achieving revenue stability and self-sufficiency.

Despite all the advantages of increasing both tax collection and state capacity, it is very difficult for policy makers to pass laws that increase taxes on personal income. In particular, they are faced with the difficulty of low political will of the elite to pass this type of laws. The same occurs on informal economy: especially when informal economy is large the willingness of citizens to pay taxes is reduced. The population does not see the advantages of paying taxes if the majority of the members of the society live within the informality. The logic for citizens is simple: 'I will pay taxes as long as everyone else pays their fair share' (Torgler and Schneider, 2007)

The link between state capacity and taxation is discussed by the Institute of Development studies (Prichard, 2010) stating that governments, with the support of development partners, have the opportunity to systematically promote linkages between taxation and state capacity development as well as the expansion of responsiveness and accountability. Addressing responsiveness and accountability has the advantage of improving the enforcement and administration, while increasing awareness and transparency strengthens civil society engagement and thus confidence in the tax systems and tax collection. While making changes in the tax system can be difficult politically, Prichard (2010) found that small changes on the tax administration can have huge positive results when there is political will. He found that simply signaling a firm commitment to tax enforcement on the relatively economically and political powerful can have a great impact. His examples include cases in: Ghana (1983–88, 2001–2004), Kenya (1993–96), Rwanda (1996–2002), Sierra Leone

(2000–01), Swaziland (1987–88), Uganda (1993–2000), Chile (1973–75, 1990–93), Colombia (1991–92), Jamaica (1979–85), Mongolia (1999–2003), Nicaragua (1980–84) and Peru (1992–96). As a result Prichard proposes a taxation agenda which includes:

1) Greater emphasis on how revenue is collected, and how this can contribute to broader state building goals rather than just increase revenue collection.

2) Support for civil society actors to engage in debates about tax issues. Such actors can be essential to strengthening the state building role of taxation.

On flat taxes, closer inspection reveals that there have been two waves of tax implementation: the first one starting in 1994 with Estonia and the second one started by Russia in 2001. Both waves have exhibited important differences in the structure of the implementation. For instance, first wave countries typically set the new tax single rate as the highest pre-reform marginal tax rates whereas second wave countries set it at the lowest bound. An analysis by an IMF team (Keen et al, 2006) draws some lessons relevant for this paper: First of all flat taxes might have improved compliance (e.g. in Russia, however conclusive evidence is lacking); secondly, flat tax does not mean tax simplification per se: for example, Russia implemented a flat tax system while leaving a system of exemptions and special treatments of various kinds. Thus, the system even after flat tax implementation remained complex. In particular, flat tax systems generally have a defined tax-free threshold that tax authorities allow, for instance to not charge very low income tax payers. This threshold in turn allows for amble over-regulation and complexity similar to progressive tax systems.

As regards the effect on informal economy, Sabirianova (2009) argues that flat tax implementation might have a positive effect in the short run, but it diminishes in the long run. However, in a study of Ukraine there were indications that reduction of complexity helped in decreasing informal economy (Thiessen, 2009). Friedmann et al (2000) stress that "entrepreneurs go underground not to avoid official taxes but to reduce the burden of bureaucracy and corruption" (Friedman et al, 2000). According to Schneider & Neck (1993) a less 'complex' tax income system can reduce exemptions, loopholes and according legal processes, while making it easier to control tax collection.

3. Hypothesis

Based on the above literature, the hypotheses to be tested in the course of this paper are:

Hypothesis I: Tax simplification leads to lower levels of informal economy due to lower cost of compliance in both terms of money and time.

Hypothesis II: The implementation of Flat Taxes leads to lower levels of informal economy as a policy example for tax simplification. It is expected that flat taxes mean less time spent on paying taxes and reduced bureaucratic burden, which will have two effects: (a) lower cost of compliance with tax authorities (b) less room for manipulation and illegal rent-seeking activities which might increase tax morale.

4. Methodology

4.1   Description of Approach

To test our hypotheses, first of all a dataset is assembled compiling data on flat tax countries and year of implementation (Duncan, 2012), data on tax simplification as operationalized through the 'time [hours per year] / steps needed on tax issues' indicator (World Bank: Doing Business indicators) and a range of controls from the Quality of Government dataset (Teorell et al, 2013). Below, a more detailed discussion is provided of the applied variables (4.2), samples (4.3) and descriptive statistics (5).

We will first attempt to establish a relationship between Flat Taxes and Tax simplification (Hypothesis II) through a descriptive analysis of the impact of flat tax implementation on bureaucratic burden, tax collection and informal economy. In a second step, Hypothesis I will be tested in an OLS regression for 105 countries in the years 2006-2009. The analysis cannot be extended to the analysis of the effect of changes in tax complexity on changes in informal economy (which would be better suited to establish a causal mechanism), due to too little variation in the tax complexity variable (indicated in Figure 1).

Figure 1: Variation in Number of Tax Payment Steps 2006-2009
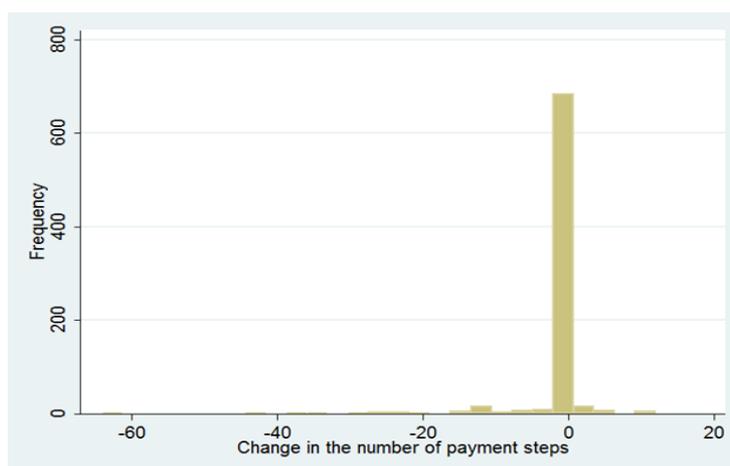
4.2   Description of Variables

In Figure 2 an overview is provided of the definitions, samples and sources of all variables used. As can be expected, informal economy is difficult to measure. For this paper the MIMIC aggregates (Schneider et al, 2010) and estimates by Elgin & Oztunali (2012) were applied. A range of alternative measures and their respective drawbacks are presented in Figure 15. The MIMIC measurement has important weaknesses such as a large margin of error, potential endogeneity and the question what latent phenomenon it actually measures. Despite its weaknesses the MIMIC indicator is largely used in academia and policy making (Schneider & Williams, 2013).The other measures and controls are also provided in Figure 2.

Figure 2: Overview of the definitions, samples and sources of all variables used

(In)Dependent Variables	Scale/ Unit	Definition	Source	Reason for inclusion	N
Informal Economy Aggregate - Mimic	% of GDP	Multiple Indicators Multiple Causes (MIMIC): Size of Government, Share of Direct Taxation, Fiscal Freedom, Business Freedom, Unemployment rate, labor participation rate, GDP p.c., GDP growth, currency M0/M1)	Schneider, Buehn and Montenegro (2010)	-	162 countries, 1999 – 2007
Informal Economy Aggregate - Elgin-Oztunali	% of GDP	Microfoundational model calibrated by MIMIC 2007 data	Elgin & Oztunali (2012)	-	161 countries, 1950-2009
Tax Revenue/Collection	% of GDP	Compulsory transfers to the central government for public purposes; fines, penalties, and most social security contributions are excluded.	World Development Indicators	-	142 countries 1990-2011 (unbalanced)

Flat Tax Dummy	0,1	Countries with Flat Tax	Denvil Duncan (2012)	-	23 countries
Number of Tax Payments (steps)	Number per year	Total number of tax payments per year. Standard case, 2nd year of operation	Doing Business - World Bank	-	185 countries, 2004-2012
Time spent on taxes	Hours per year	Time it takes to prepare, file and pay (or withhold) the corporate income tax, the value added tax and social security contributions	Doing Business - World Bank	-	185 countries, 2004-2012
Controls					
Political Stability	[0, 10] (recoded)	Perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism.	World Governance Indicators	Torgler and Schneider (2007): ↓IE	193 countries
HDI	[0,1]	A composite index measuring average achievement in three basic dimensions of human development—a long and healthy life, knowledge and a decent standard of living.	Human Development Indicators	Johnson et al. (1997): ?↓IE	186 countries
Infant mortality rate	per 1,000 live births	Infant mortality rate is the number of infants dying before reaching five year of age, per 1,000 live births in a given year	World Development Indicators	" (proxy for development)	186 countries
Press Freedom Index	[0,10] (recoded)	Expert survey: Assesses the degree of print, broadcast, and internet freedom.	Reporters without borders	Prichard, 2010	196 countries
Internet Access	Per 100 people	Internet users are people with access to the worldwide network.	World Development Indicators	Van der Vyfer (2010); Green (2002)	215 countries
Former Soviet Union/Warsaw Pact	dummy		Statistical Handbook 1993 : states of the former USSR		15+7 countries
Corruption Perception	[0,10]	how corrupt a country's public sector is perceived to be	Transparency International	Choi & Thum (2005), Johnson et al (1997)	183

4.3   Description of Sample

Sample for Hypothesis I:

For our OLS regression, the sample includes 105 countries and covers a maximum of 4 years (average 2.9 years). We include all available years (with a control) to achieve a greater sample size; for the majority of countries the years 2006-2008 are covered (Figure 4). Our sample includes bigger, developing and transitioning countries - as can be seen in Figure 3 the groups excluded from the sample are high income countries (mostly Western Europe and Northern America) and a range of smaller countries, particularly islands in Oceania and the Caribbean. With these exclusions considered (which stem mostly from the doing business indicators), the resultant sample is representative and comparable for the other income groups and regions.

Figure 3: Comparison of the Sample to the World Total by Region and Income Group

	World Total	Sample	Dropped [% share]
Region			
Western Europe	26	0	100%
Eastern Europe	14	6	57%
Baltics	3	2	33%
C.W. of Independent States	12	9	25%
Asia (ex. Near East)	28	15	46%
Oceania	18	1	94%
Near East	10	5	50%
Northern America	4	0	100%
Central Latin America	9	7	22%
Caribbean	20	3	85%
Southern America	12	11	8%
Northern Africa	5	4	20%
Sub-Saharan Africa	49	37	24%
Income Group			
High income: OECD	31	0	100%
High income: non OECD	45	12[2]	73%
Upper middle income	55	34	38%
Lower middle income	48	31	35%
Low income	36	28	22%
Total	215	105	51%

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[2] Trinidad and Tobago, Uruguay, Equatorial Guinea, Singapore, UAE, Bahrain, Saudi Arabia, Kuwait, Oman, Croatia, Lithuania, Latvia

Figure 4: Sample Size and Patterns

Observations	N	304
Countries	n	105
Total time covered [years]	T	4.00
Average time covered [years]	T-bar	2.90

Freq	Percent	Pattern
93	88.57	111.
5	4.76	. . 1.
3	2.86	1111
2	1.90	. 11.
1	0.95	1. 1.
1	0.95	11. .
Total 105	100.00	XXXX

Samples for Hypothesis II:

For testing the impact of flat Taxes, the most severe limitation is the small set of only 30 countries (Figure 17), which is reduced further by lacking data on informal economy (7 countries) and on the other controls. Furthermore, several countries have just recently implemented flat taxes, so the impact in these countries cannot be assessed. Due to these limitations, the used samples in the testing of Hypothesis II will always include all numbers for which data is available and made explicit whenever used. Figure 17 also provides a first impression of which countries might be drivers in such a small sample (most notably Georgia with an incredible improvement in informal economy around the time of flat tax implementation).

5. Descriptive Analysis

Dependent Variable

As can be seen in the Figure 5, informal economy amounts to a total average of 30% of the global GDP. Figure 6 shows that higher economic development of a country is associated with lower levels of informal economy. Another finding is that upper middle income countries (e.g. Brazil, Mexico, Latvia) experienced the largest change in informal economy from 2000-2007; followed by Lower Middle Countries (e.g. Morocco, Bolivia). In addition, the figure shows that increasing development also entails greater improvement in informal economy (Figure 6). The fact that high income countries have only experienced small changes of informal economy can be explained through a threshold effect - they already reached fairly low levels of informal economy.

Figure 5: Informal economy data

Average Shadow Economy %GDP (MIMIC model)
Per income distribution (World Bank)

- Low income
- Lower middle
- Upper middle
- World
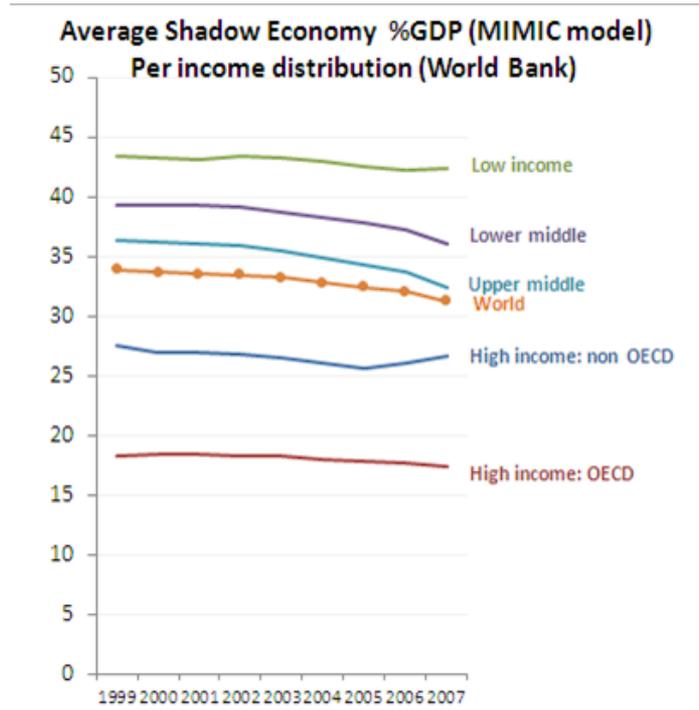- High income: non OECD
- High income: OECD

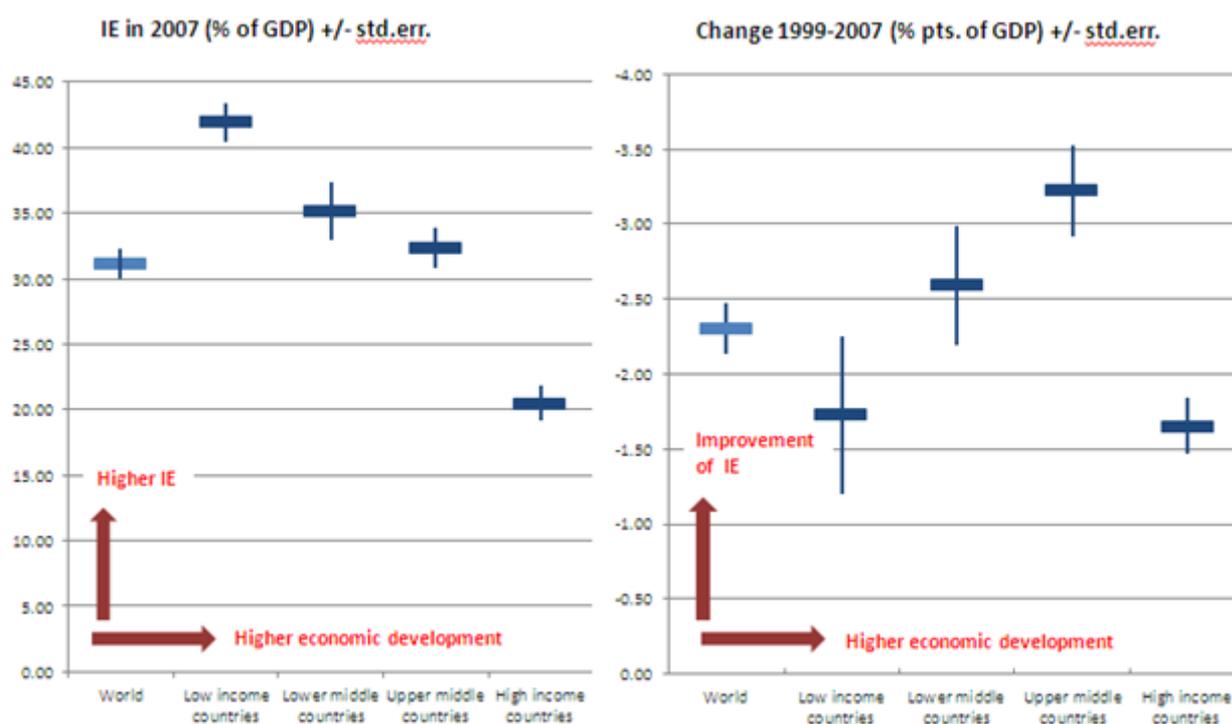## Figure 6: Informal economy Levels and Changes by Income Group

Figure 7 shows that from all the 162 countries for which MIMIC data is available, Azerbaijan (followed by Angola and Ukraine), was the country with the greatest improvement in Informal Economy in the period from 1999 to 2007 with an improvement of 1.07 % pts. annually (> 8% pts. of GDP total). In contrast Cote d'Ivoire had the largest setback, informal economy actually increased by 0.63 % pts. annually (5% pts. in total).

Figure 7: Best- and Worst-Performers in Informal economy 1999-2007

Top 10			Flop 10		
Country	Change in IE % pts p.a.	Std. err.	Country	Change in IE % pts p.a.	Std. err.
Azerbaijan	-1.07	0.16	Cote d'Ivoire	0.63	0.10
Angola	-0.81	0.11	Central African Rep.	0.50	0.18
Ukraine	-0.79	0.03	Zimbabwe	0.36	0.15
Nigeria	-0.77	0.11	Eritrea	0.32	0.07
Russia	-0.77	0.02	Haiti	0.28	0.05
Peru	-0.76	0.10	Guinea-Bissau	0.27	0.07
Sierra Leone	-0.76	0.08	Liberia	0.16	0.10

Colombia	-0.72	0.09	Papua New Guinea	0.13	0.06
Thailand	-0.70	0.04	Gabon	0.09	0.07
Georgia	-0.70	0.08	Guyana	0.08	0.03
Kazakhstan	-0.69	0.01	Portugal	0.06	0.03

Independent Variable and Controls

Figure 8 indicates the mean values of the variables included in our study, while Figure 9 provides the correlations between these variables. What stands out is the large standard error (and the according standard deviation) associated with these values, indicating a large variation across our sample (particularly on steps to pay taxes).

Figure 8: Means

	mean	std err.	Min	Max
Informal economy (EO)	36.7	11.4	11.9	70.9
Number of payments	38.9	22.5	3.0	147.0
Under 5 mortality	58.2	50.4	2.8	209.3
Political Stability	4.3	1.5	0.2	7.6
Press Freedom	8.5	2.0	0.0	11.1
Internet Access	14.2	14.8	0.2	68.0
Flat Tax	*15%*		*0*	*1*

Figure 9: Table of Correlations

| Correlations	EO	MIMIC	Tax coll.	Tax time	Tax steps	Flat dummy	Stability	Mortality	HDI	Press freedom	Internet	Comm.
IE (Elgin Oztunali)	1											
	159											
IE (MIMIC)	1*	1										
	0											
	143	143										
Tax collection	-0.1579	-0.1827	1									
	0.098	0.066										
	111	102	119									
Time spent on taxes	0.1326	0.0754	-0.0056	1								
	0.1692	0.4655	0.963									
	109	96	71	126								
Number of Tax Payments	0.3154*	0.2836*	0.1073	0.2906*	1							
	0.0008	0.0051	0.373	0.001								
	109	96	71	126	126							
Flat tax dummy	0.0125	0.0177	0.0099	0.053	0.2229*	1						
	0.8762	0.8337	0.9149	0.5555	0.0121							
	159	143	119	126	126	201						
Political Stability	-0.5011*	-0.5153*	0.3345*	-0.1716	-0.1154	0.0874	1					
	0	0	0.0002	0.0547	0.1982	0.2269						
	159	143	119	126	126	193	193					
Under 5 mortality	0.4979*	0.5072*	-0.2405*	0.0009	0.0446	-0.1524	-0.5125*	1				
	0	0	0.0084	0.9925	0.6212	0.0353	0					
	158	142	119	125	125	191	191	191				
HDI	-0.6050*	-0.6325*	0.2889*	0.0482	-0.0552	0.1747*	0.6136*	-0.8921*	1			
	0	0	0.0018	0.6056	0.5544	0.0215	0	0				
	155	139	114	117	117	173	173	173	173			
Freedom of the press	0.2284*	0.2394*	-0.3754*	0.0685	-0.0902	-0.2185	-0.4812*	0.2372*	-0.3908*			
	0.0051	0.0053	0.0001	0.4751	0.3463	0.0051	0	0.0024	0			
	149	134	109	111	111	163	163	162	157	163		
Internet access	-0.6802*	-0.7036*	0.2704*	-0.0477	-0.1338	0.1314	0.5833*	-0.6303*	0.8212*	-0.5357	1	
	0	0	0.0031	0.6034	0.1434	0.0731	0	0	0	0		
	155	139	118	121	121	187	187	187	169	160	187	
Former Soviet Union/ Warsaw Pact	0.1275	0.1226	-0.0518	0.1644	0.2859*	0.4675*	0.0488	-0.1622*	0.1881*	-0.0255	0.0414	1
	0.1092	0.1447	0.5761	0.0658	0.0012	0	0.5007	0.025	0.0132	0.7462	0.5733	
	159	143	119	126	126	201	193	191	173	163	187	201

Description of the Relationship

A first step in the analysis is to plot the relationship between tax complexity (operationalized by number of tax payments per year) and informal economy (Figure 10). This graph also shows how countries with flat taxes differ in that relationship from countries without flat taxes. It can be seen that a greater bureaucratic burden is correlated with higher levels of informal economy. Most interestingly, it does not appear as if countries with a flat tax outperform countries without it in terms of a smaller bureaucratic burden. First of all, the three outliers with the highest numbers of steps needed on taxes are Romania, the Ukraine and Belarus – all of them countries with a flat tax regime and also from the same region. Secondly, the other countries with flat taxes seem to be scattered similarly to countries without flat taxes. No significantly better performance on the number of tax payments can be observed.

This already indicates that Hypothesis II might not hold: if there is no effect of flat taxes as a tax simplification, according to our hypothesis we can also not expect an effect on informal economy.

Figure 10: Scatterplot

Impact of Tax simplification on Informal Economy in 2007 (N=109)
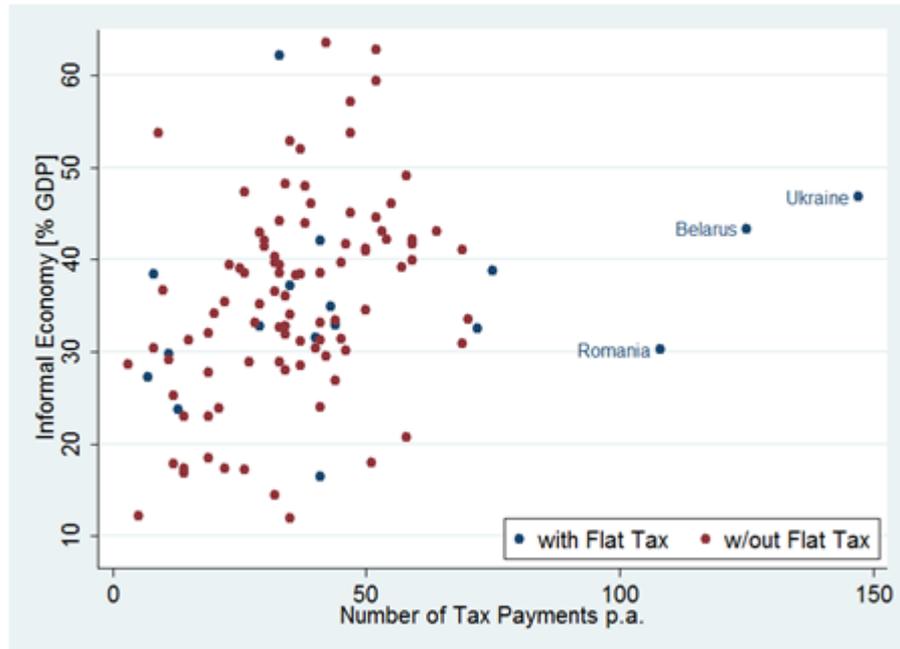
6. Statistical analysis and results

6.1 Testing Hypothesis II

If it is assumed that flat taxes are a promising policy tool for lowering informal economy, one would expect to see countries on average to perform better after the implementation of such a system. However, as can be seen in Figure 11 this is not the case, since for the 10 countries analyzed no significant improvement was observed. The same holds for the impact of tax collection (Figure 12) and tax simplification (Figure 13), indicating the reason for the failure of flat taxes to perform positively on informal economy. As was shown before (Figure 10), flat taxes do not necessarily mean an easier tax system. For instance, Keen et al, 2006, found that the tax system was not perceived less complex after implementing tax simplification in Russia. As argued before, complexity can abound particularly on the tax-exempt threshold.

The results are admittedly based on very small sample sizes, but a careful look at Figure 17 reveals that the major potential driver affecting these graphs would be Georgia. Excluding Georgia however renders the informal economy trend after flat tax implementation even less significant.

These results are also robust to a change in the informal economy measure (using MIMIC instead of Elgin & Oztunali measures).

Therefore, the results appear to be independent of the concrete measure used or of the concrete sample size.

Figure 11

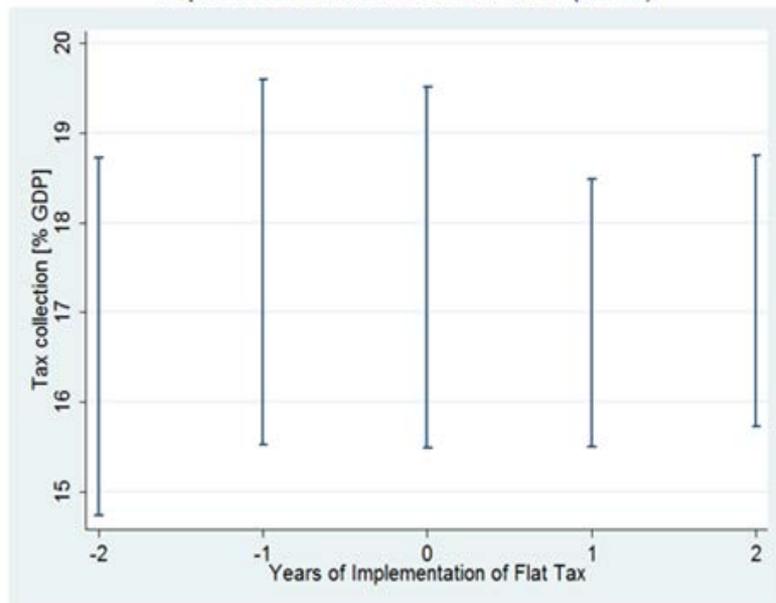Impact of Flat Tax on Informal Economy (N=10)
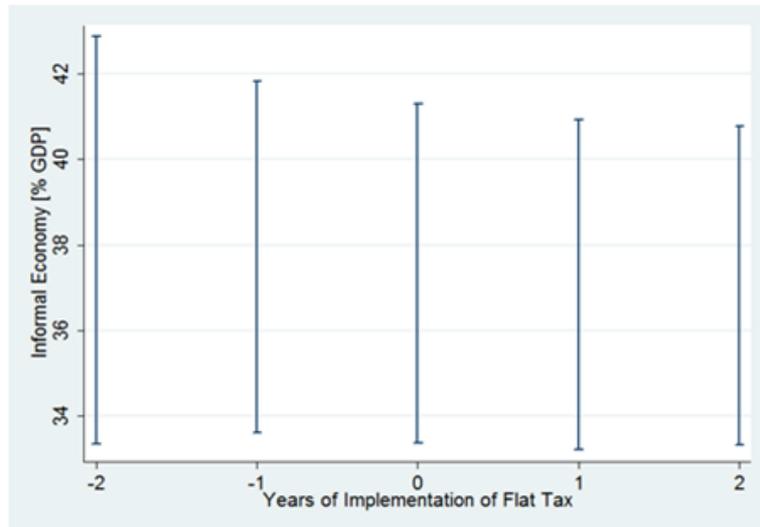
IE (Elgin-Oztunali)
N=10 Estonia, Georgia, Jamaica, Kyrgystan, Latvia, Lithuania, Romania, Slovakia, Trinidad and Tobago, Ukraine
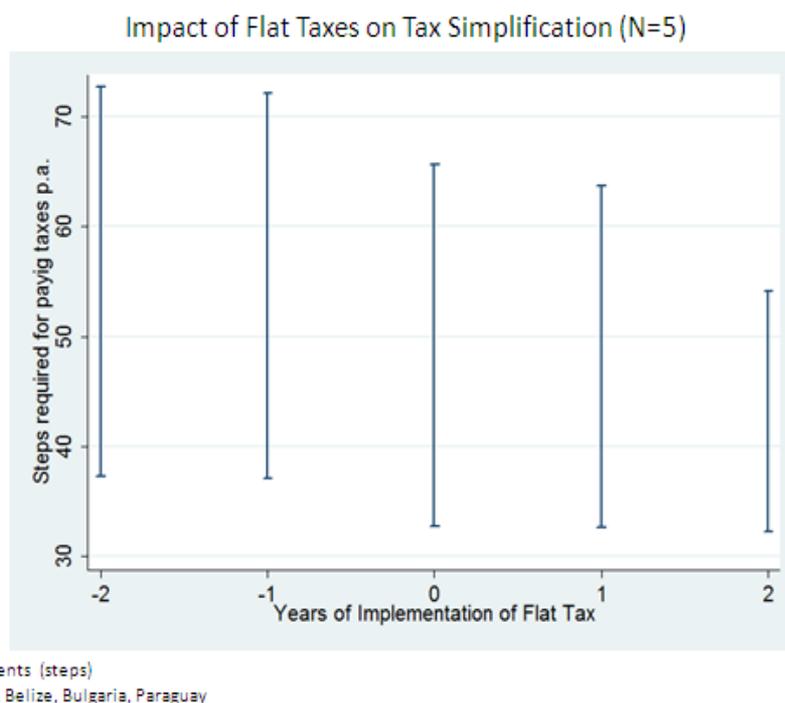
Figure 12

Impact of Flat Tax on Tax collection (N=11)

Tax revenue
N=11 Belarus, Bulgaria, Czech Rep., Georgia, Iceland, Kazakhstan, Latvia, Paraguay, Romania, Trinidad and Tobago, Ukraine

16

Figure 13

Impact of Flat Taxes on Tax Simplification (N=5)

Number of Tax Payments (steps)
N=5 Albania, Belarus, Belize, Bulgaria, Paraguay

6.2   Testing Hypothesis I

The test of the impact of tax complexity gives the expected results. The correlation between number of tax payments and the level of informal economy is positive and highly significant. The inclusion of controls does not affect the general relationship significantly. As expected higher development and public goods provision (lower mortality rates) and political stability are significantly attributed with lower informal economy. It can also be seen that a past in the Warsaw Pact is correlated with much higher levels of informal economy (5% pts). However, in our sample it surprisingly appears as if greater freedom of the press is associated with higher informal economy.

Specifically in the context of developing countries, this might reflect that more repressive (authoritarian) regimes (which are associated with lower freedom of the press - Figure 18) perform better on tax enforcement and thus achieve lower levels of informal economy.

The adjusted R² indicates that the model already explains a significant share of the informal economy, while obviously still a lot of other explanatory variables are missing. The model is robust even to the restriction on just one year, the use of MIMIC estimates instead of Elgin-Oztunali estimates, and to variation in the order controls are introduced. We also tested the relationship with other controls (like: Corruption Perception) but they did not affect the general relationship, were themselves not significant and/or exhibited problems of potential endogeneity.

Figure 14: OLS regression results

Variable		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Number of Tax Payments		0.153***	0.145***	0.137***	0.127***	0.109***	0.121***
Under 5 mortality			0.066***	0.060***	0.056***	0.031*	0.077****
Political Stability				-1.074**	-1.655***	-1.389***	
Press Freedom					1.280***	1.426***	
Internet availability						-0.149**	
Soviet Union/ Warsaw Pact dummy							5.025**
Year (ref.2006)	2007	-0.118	-0.051	-0.068	0.532	0.894	-0.048
	2008	1.303	1.651	1.607	1.380	2.000	1.711
	2009	-4.374	-1.460	-2.085	-2.346	-0.058	-2.392
Constant		30.382***	26.675***	32.001***	24.149***	25.667***	26.191***
N		304	304	304	304	304	304
adj. R^2		0.085	0.166	0.184	0.226	0.241	0.184

7. Discussion/Conclusion

From our analysis we can conclude that there is no persuasive evidence that the implementation of flat taxes will increase tax revenue or lower informal economy. The reason appears to be that flat taxes don't necessarily lead to a reduction in tax complexity due to exemptions particularly at the threshold of tax-exemption for low income households. However, it was shown that tax simplification exhibits great potential as a policy on informal economy reduction, particularly in countries with high levels of bureaucratic burden on tax payments like Romania, the Ukraine and Belarus.

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Appendix

Figure 15: Measures of Informal economy

Variable	Scale/Unit	Definition	Source	Disadvantages
Aggregates - Mimic	% of GDP	Multiple Indicators Multiple Causes (MIMIC): Size of Government, Share of Direct Taxation, Fiscal Freedom, Business Freedom, Unemployment rate, labor participation rate, GDP p.c., GDP growth, currency M0/M1)	Schneider, Buehn and Montenegro (2010)	Large margin of error, not clear what exactly measured, what the latent phenomenon is; potential endogeneity with controls when used as a dependent variable
Employment Surveys	% of working population	Measures Jobs in the IE – how many informal jobs (self-employed or under contract) exist	ILO	No good cross-sectional data exists Depends on national labor surveys
Survey	% of working population	Directly asks individuals, households or firms about their situation	ILO, WB	Doesn't necessarily offer stratified information Respondents might be hesitant to give correct answers
National Expenditure & Income	$	Measures the difference between the National Expenditure & income statistics (both of GNP)	National	Omits other reasons for the discrepancy Difficult to use for cross-sectional analysis due to different statistical measurements
GNP & Transactions	% GNP	Measures gap between Gross National Product & Transactions	National	Assumes that there is a base year without IE Need for much information to separate between financial & pure cross-payment
Labor Participation	% of population (18-64 years)	Total Labor force is assumed to be constant & if we see a change in the official labor force, it is expected to be due to IE	National	Doesn't account for working in the IE as a secondary job or that the labor force can decline due to other reasons
Demand for Electricity	Watts/GDP	Change in Electricity consumption over the years OR (difference between growth of electricity consumption and growth of official GDP)	National/UN	Assumes IE is energy extensive
Tax Auditing		Measure of people "getting caught"	Doing Business	Biased sample
Tax Revenue/ Collection	% of GDP	Compulsory transfers to the central government for public purposes; fines, penalties, and most social security contributions are excluded.	World Development Indicators	Includes many assumptions, such as motivation Large margin of error Unclear what is latent phenomenon Potential endogeneity
Demand for	% GDP	Chang in Currency Demand over the years	National/IMF/WB	Assumes IE transactions are in cash

Currency	(Central Bank Currency in Circulation / GDP) (M0/M1)	assumes same of money in IE and OE

Figure 16: Data on Informal economy

	Change in IE % pts. of GDP	Std. err.	Absolute IE in 2007 % of GDP	Std.err.	t	Pr(|T| > |t|)	Obs.
Total	-2.303	.172	31.122	.984	13.429	0.0000	150
High income	-1.652	.189	20.489	1.236	8.756	0.0000	46
Upper middle	-3.226	.303	32.364	1.435	10.657	0.0000	39
Lower middle	-2.591	.394	35.154	2.014	6.574	0.0000	34
low	-1.726	.523	41.941	1.356	3.302	0.0028	27

Figure 17: Countries with a Flat Tax, Implementation and Changes in Informal economy (Duncan, 2012)

Country	Year of Implementation	Change in IE: x years before and after implementation		
		x=±1	x=±2	x=±5
Jamaica	1986	0.10	-0.07	
Estonia	1994	0.46	-0.09	
Lithuania	1994	-0.51		
Latvia	1997	-0.51	-1.37	
Russian	2001	1.02	2.16	4.68
Ukraine	2004	0.13	0.09	3.43
Slovakia	2004-2013	-0.14	-0.41	-0.94
Georgia	2005	-3.50	-7.75	-16.32
Romania	2005	-0.21	-0.45	0.23
Trinidad and Tobago	2006	-1.68	-0.90	-1.35
Kyrgyzstan	2006	-0.71		2.20

Macedonia	2007	1.52	
Mongolia	2007	-1.08	
Kazakhstan	2007	4.43	
Iceland	2007-2010	-0.89	-0.29
Albania	2008		
Bulgaria	2008		
Czech	2008-2013	0.46	
Bosnia	2009		
Belarus	2009		
Belize	2009		
Paraguay	2010		
Hungary	2011		

No data on IE

Tuvalu	1992
Serbia	2003
Iraq	2004
Montenegro	2007
Mauritius	2007
Timor Leste	2008
Seychelles	2010

Disputed/Dependent

Nagorno-Karabakh, Abkhazia, Jersey, Hong Kong, ...

Figure 18: Relationship between Press Freedom Index (Reporters without Borders) and Freedom House Status

Freedom House Status indicating political and civil rights	Mean Press Freedom Index (high values mean greater freedom)	Std. Err.
Free	9.86	0.14
Partly free	8.51	0.16
Not free	6.32	0.33

Figure 19: Elgin - Oztunali Data

Average Shadow Economy %GDP (Elgin Oztunali model)