

Prof. Dr. DDr.h.c. Friedrich Schneider

September 2019

E-mail: friedrich.schneider@jku.at

Revised Version

<http://www.econ.jku.at>

SHADOW ECONOMIES AROUND THE WORLD: WHAT DID WE LEARN OVER THE LAST 20 YEARS?

AND

LATEST RESULTS FOR AZERBAIJAN AND HER FIVE NEIGHBOR'S



JOHANNES KEPLER
UNIVERSITY LINZ

CONTENT

1. Introduction
2. Theoretical Considerations
3. Estimation Methods and Size of the Shadow Economies
 - 3.1 Direct Approaches
 - 3.2 Currency Demand Approach
 - 3.3 MIMIC Approach
 - 3.4 Empirical Results
4. How do We Estimate Shadow Economies? – A Résumé
5. Policy Measures

1. INTRODUCTION

- (1) There are many political statements that tax evasion and the shadow economy are important and cause severe damage on the official economy and on public (tax) revenues.**
- (2) Hence, the goal of this lecture is *threefold*:**
 - (i) To present the size and development of the shadow economy and of tax evasion in 158 countries all over the world including Azerbaijan and her five neighbor's.**
 - (ii) To critically discuss the plausibility of the size of the (MIMIC-)Macro-Estimates of the shadow economy.**
 - (iii) Finally, policy measures to reduce the shadow economy are presented.**

1. INTRODUCTION

- **A *shadow economy*** has many names, like cash, underground, grey or sometimes dark economy. There is no convention what the „correct“ name is.
- A ***shadow economy*** is ***more or less*** a ***parallel economy*** meaning, that additional “shadow activities” are captured like: neighbors or friends help, do-it-yourself activities or family production in general (and in the agricultural sector).
- Hence, the consequence is, that using macro-methodes quite often a ***“large” shadow economy*** is measured.

2. THEORETICAL CONSIDERATIONS

2.1 DEFINITIONS

- (1) The *shadow economy* includes all legal production and provision of goods and services that are deliberately concealed from public authorities for the following four reasons:
- (i) to avoid payment of income, value added or other taxes;
 - (ii) to avoid payment of social security contributions;
 - (iii) to avoid having to meet certain legal standards such as minimum wages, maximum working hours, etc.; and
 - (iv) to avoid complying with certain administrative procedures.

2. THEORETICAL CONSIDERATIONS

2.1 DEFINITIONS

(2) *Underground activities* are all *illegal* actions that fit the characteristics of classical crime activities like *smuggling*, burglary, drug dealing, etc.

(3) *Informal household and do-it-yourself* activities are household actions that are not registered officially under various specific forms of national legislation.

These two activities should not be included in the shadow economy activities, but to some extent they are.

(4) *Tax evasion* is under- (or not) reporting capital and/or labor income, domestic or abroad.

2. THEORETICAL CONSIDERATIONS

2.2 THEORIZING ABOUT THE SHADOW ECONOMY AND TAX EVASION

What are the main causes determining the size of the shadow economy and of tax evasion? In () the expected sign.

- (i) *Tax and social security contribution burdens; (+)*
- (ii) *Intensity of regulations (+); (iii) Public Sector Services (-);*
- (iv) *Tax morale (-); (v) Unemployment (+);*
- (vi) *Self-employment (+); (vii) Size of the agricultural sector (+);*
- (viii) *Official income (-); (ix) Quality of public institutions (-);*
- (x) *Federal (direct democratic) system (-)*

What are the main indicators, in which shadow economy activities are reflected?

- (i) *Official GDP (+/-); (ii) Cash (+); (iii) Official Employment (-)*

2. THEORETICAL CONSIDERATIONS

2.3 PROBLEM OF DOUBLE COUNTING

All ten cause factors, but especially

(i) tax burden, (ii) regulation,

(iii) unemployment, (iv) self-employment,

(v) and size of the agricultural sector are also major driving forces for smuggling, do-it-yourself activities and neighbors help.

Hence, in the MIMIC and Currency Demand Estimations these activities are (at least) partly included; hence, these estimates are higher than the „true“ shadow economy estimates.

3. ESTIMATION METHODS

THREE ESTIMATION PROCEDURES

- (1) Direct procedures that use the micro, individual level and then estimate the size of the shadow economy. Quite often this method is done by surveys and by “calculating” discrepancies in National Accounts.
- (2) Indirect procedures that make use of macroeconomic indicators proxying the development of the shadow economy over time; e.g. the currency demand approach.
- (3) Statistical models that use statistical tools to estimate the shadow economy as an “unobserved” or “latent” variable; e.g. the MIMIC (Multiple Indicator and Multiple Causes) Method.

3. ESTIMATION METHODS

3.1 DIRECT APPROACHES – GENERAL REMARKS

- (1) These are microeconomic approaches that employ either well designed surveys or samples based on voluntary replies or tax auditing and other compliance methods.**
- (2) Estimates of the shadow economy can also be based on the discrepancy between income declared for tax purposes and the actual detected one by audits.**

Advantage of methods (1) and (2): Detailed knowledge about the shadow economy on an individual basis.

3. ESTIMATION METHODS

3.2 THE CURRENCY DEMAND APPROACH

Basic regression equation for the currency demand from Tanzi (1983):

$$\ln (C / M2)_t = b_0 + b_1 \ln (1 + TW)_t + b_2 \ln (WS / Y)_t + b_3 \ln R_t + b_4 \ln (Y / N)_t + u_t$$

with $b_1 > 0$, $b_2 > 0$, $b_3 < 0$, $b_4 > 0$, where

ln denotes natural logarithms,

C / M2 ratio of cash holdings to deposit accounts,

TW average tax rate (to proxy changes of the shadow economy),

WS / Y percentage of wages and salaries in national income (to capture changing payment and money holding patterns),

R interest on savings deposits (to capture the opportunity cost of cash), and

Y / N per capita income.

3. ESTIMATION METHODS

3.2 THE CURRENCY DEMAND APPROACH - *OBJECTIONS*

- (1) Not all transactions in the shadow economy are paid in cash.
- (2) Blades and Feige, criticize that the US dollar is used as an international currency.
- (3) The often criticized assumption of the same velocity of money in both types of economies.
- (4) Ahumada, Canavese and Canavese criticize that the assumption of equal income velocity of money in both economies is only correct, if the income elasticity is 1.
- (5) Finally, the assumption of 0 or x-percent shadow economy in a base year is open to criticism.

3. ESTIMATION METHODS

3.3 The Multiple Indicators Multiple Causes (MIMIC)

Approach:

- Modeling the shadow economy as an unobservable (latent) variable;
- Description of the relationships between the latent variable and its causes in a structural model: $\eta = \Gamma x + \zeta$
- Link between the latent variable and its indicators is represented in the measurement model: $y = \Lambda_y \eta + \varepsilon$

η : latent variable (shadow economy)

X : ($q \times 1$) vector of causes in the structural model

Y : ($p \times 1$) vector of indicators in the measurement model

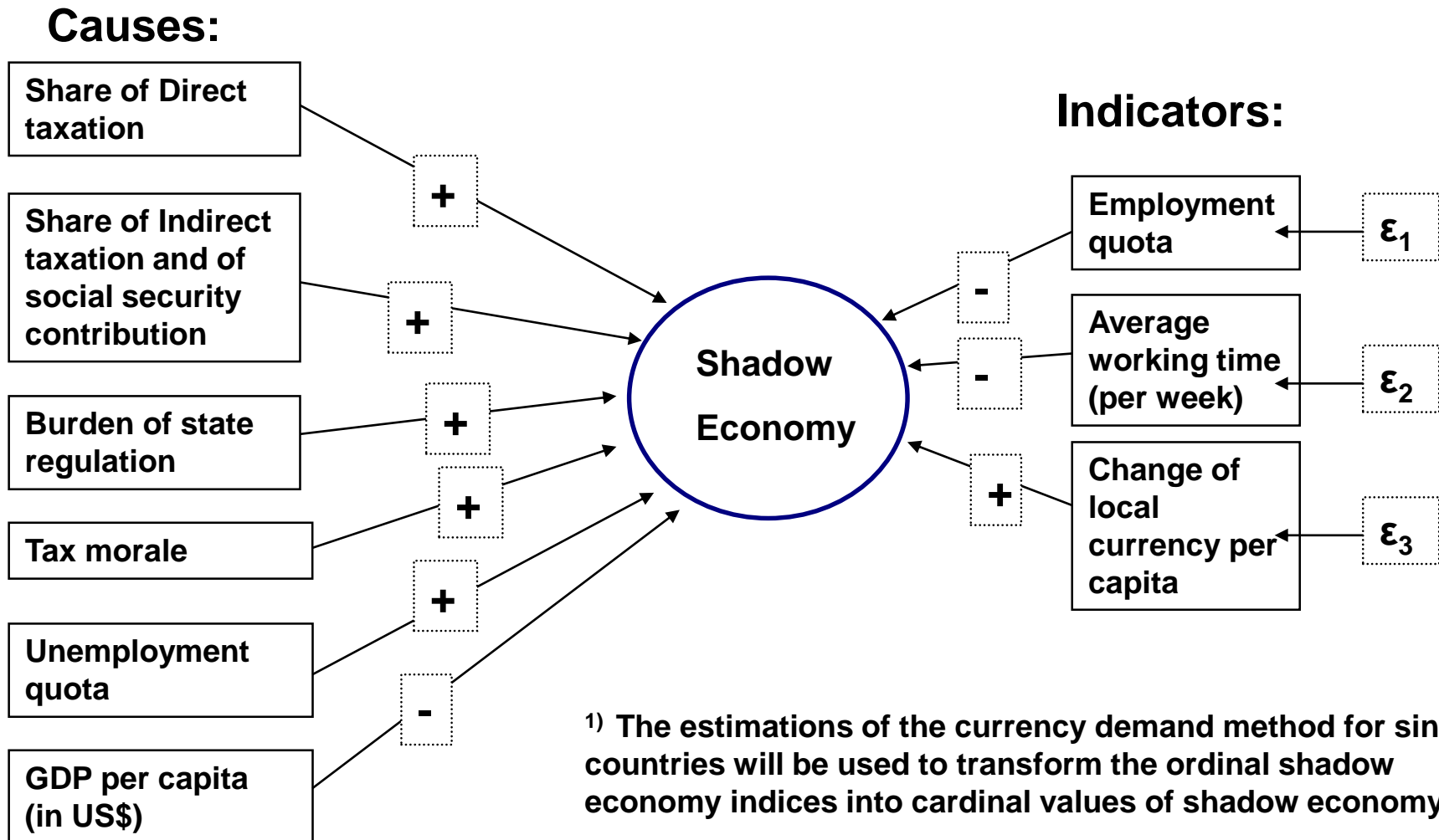
Γ : ($1 \times q$) coefficient matrix of the causes in the structural equation

Λ_y : ($p \times 1$) coefficient matrix in the measurement model

ζ, ε : error term in the structural model and ε is a ($p \times 1$) vector of measurement error in y

3. ESTIMATION METHODS

Figure 3.1: Path diagram of the MIMIC model¹⁾



3. ESTIMATION AND SIZE OF THE SHADOW ECONOMY – 3.5 EMPIRICAL RESULTS

Table 3.1: MIMIC Model Estimation Results: 1991-2015, 158 Countries (Part 1)

	1	2	3	4	5	6
<i>Causes</i>						
Trade Openness	-0.086***	-0.085***	-0.137***	-0.086***	-0.086***	-0.113***
GDP per Capita	-0.332***	-0.335***	-0.37***	-0.298***	-0.302***	-0.334***
Unemployment Rate	0.051**	0.054***	0.069***	0.053**	0.057***	0.069***
Size of Government	0.102***	0.102***	0.111***			
Fiscal Freedom				-0.131***	-0.134***	-0.147***
Rule of Law	-0.049***			-0.06***		
Control for Corruption		-0.042***			-0.046**	
Government Stability			-0.054***			-0.015

Source: Own calculations.

Note: *** p<0.01, ** p<0.05, * p<0.1

3. ESTIMATION AND SIZE OF THE SHADOW ECONOMY – 3.5 EMPIRICAL RESULTS

Table 3.1: MIMIC Model Estimation Results: 1991-2015, 158 Countries (Part 2)

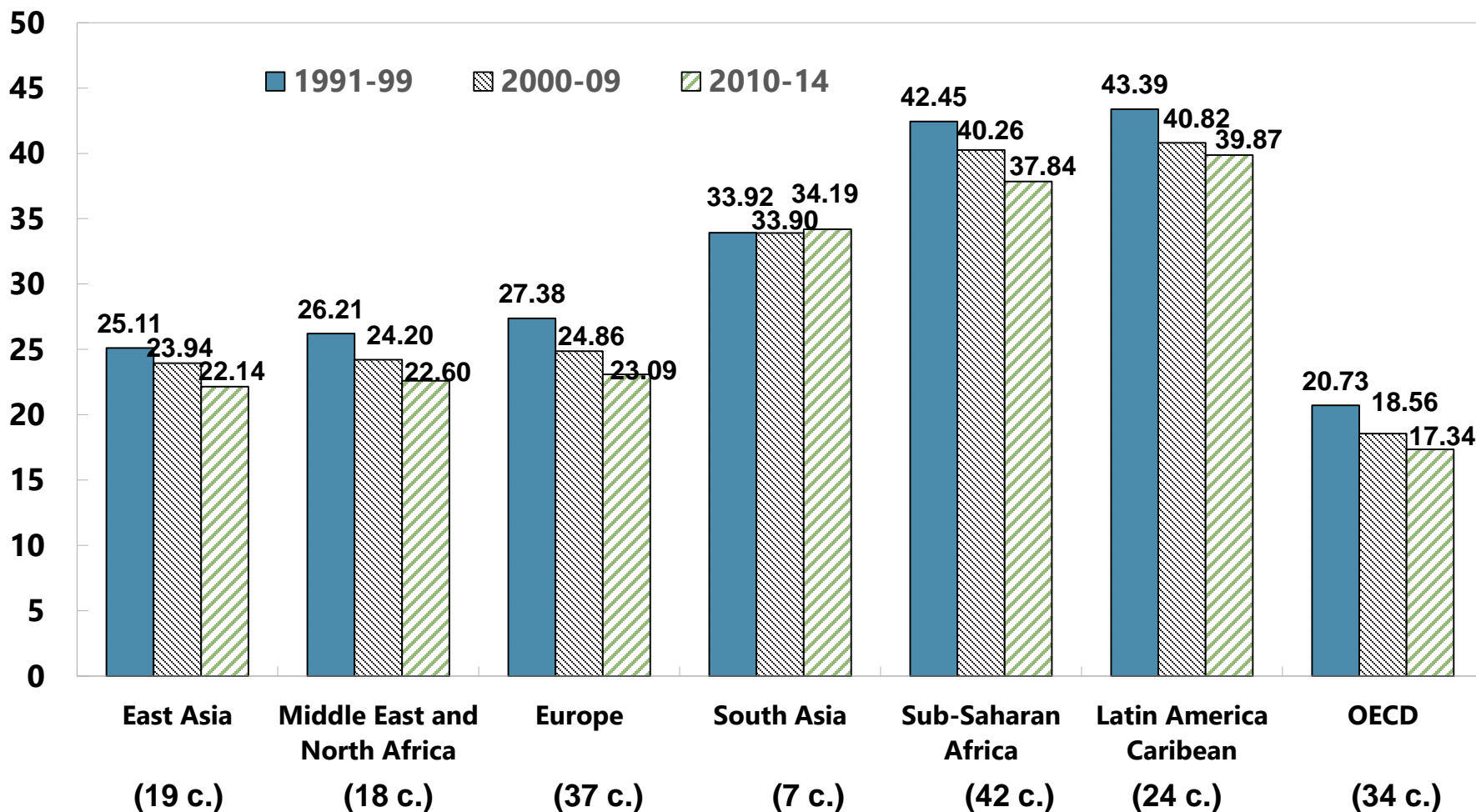
	1	2	3	4	5	6
<i>Indicators</i>						
Currency	1	1	1	1	1	1
Labor Force Participation Rate	-0.521***	-0.532***	-0.31***	-0.452***	-0.468***	-0.249***
Growth of GDP p.c.	-0.208**	-0.245***	-0.386***	-0.113	-0.144*	-0.157***
<i>Statistical Tests</i>						
RMSEA	0.073	0.073	0.067	0.078	0.078	0.055
Chi-square	5.13	5.06	6.49	5.08	5.06	5.35
Observations	1897	1892	2350	1758	1757	1998
Countries	151	151	122	144	144	120

Source: Own calculations.

Note: *** p<0.01, ** p<0.05, * p<0.1

3. ESTIMATION AND SIZE OF THE SHADOW ECONOMY – 3.5 EMPIRICAL RESULTS

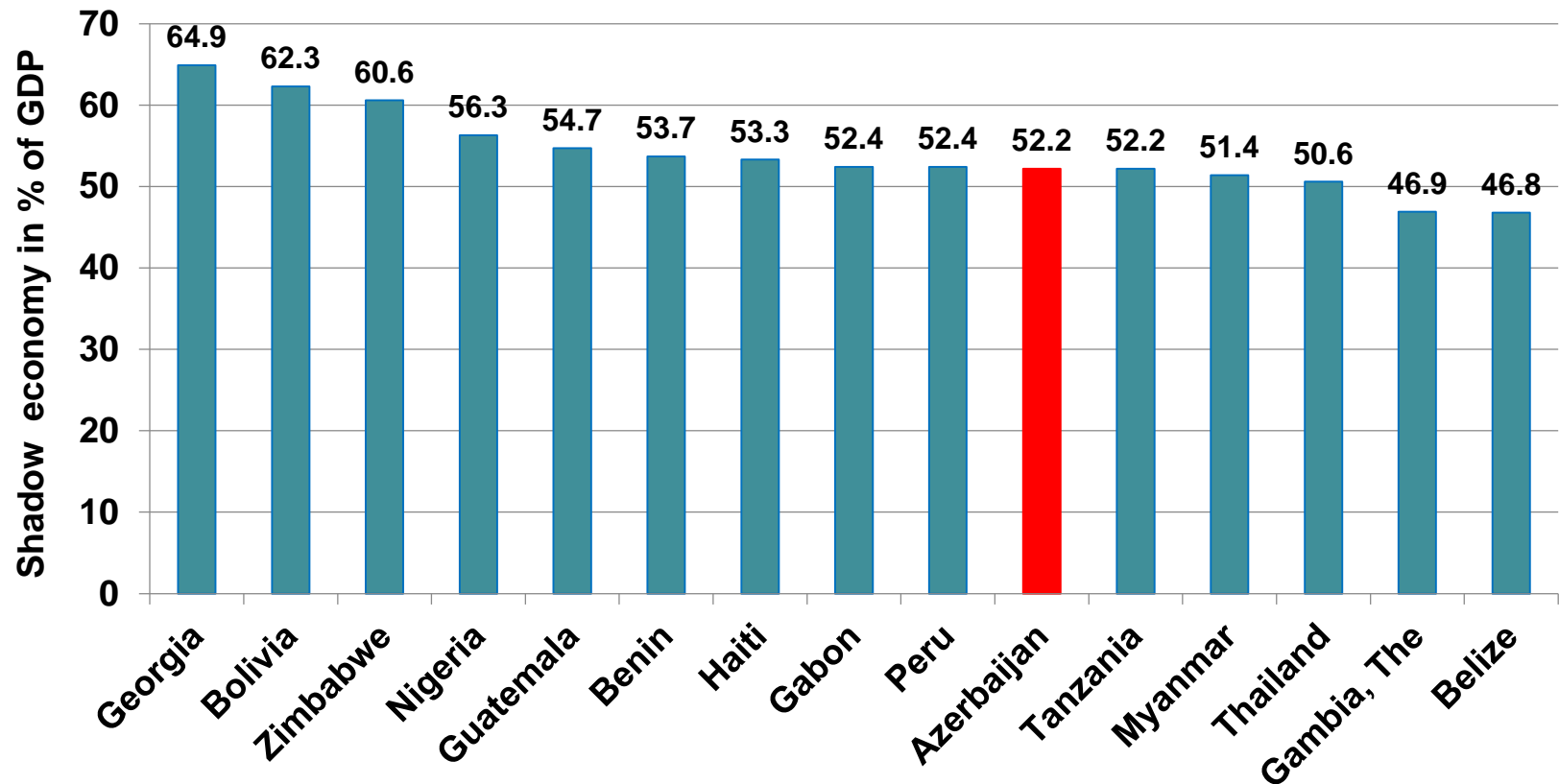
Figure 3.2: Shadow economy by region (average, percent of GDP)



Source: Own calculations.

3. ESTIMATION AND SIZE OF THE SHADOW ECONOMY – 3.5 EMPIRICAL RESULTS

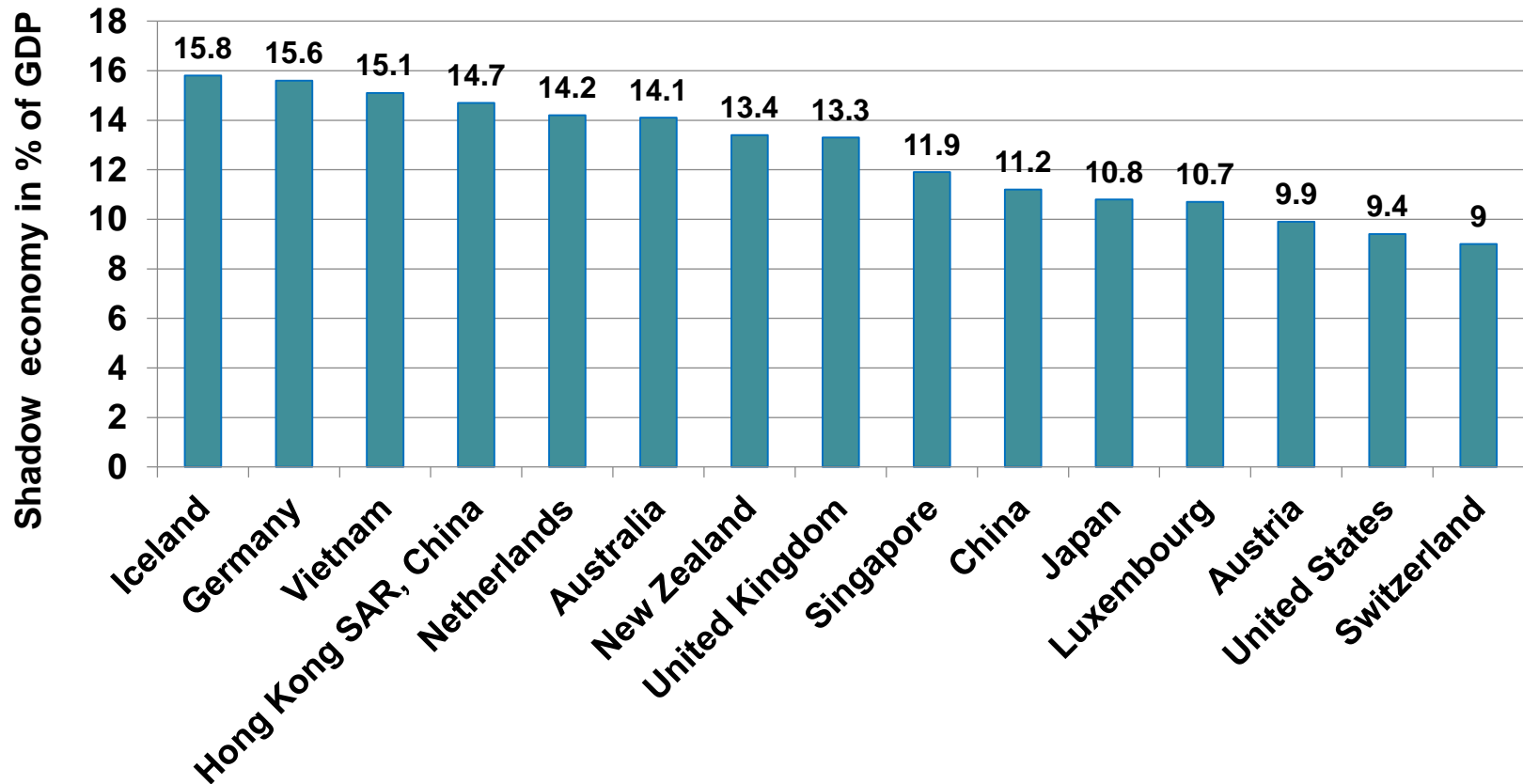
Figure 3.3: Size of the shadow economy in % of GDP of the 15 countries with the highest and the lowest shadow economy – **Part I (highest)**; average over 1991 to 2015.



Source: Own calculations.

3. ESTIMATION AND SIZE OF THE SHADOW ECONOMY – 3.5 EMPIRICAL RESULTS

Figure 3.3: Size of the shadow economy in % of GDP of the 15 countries with the highest and the lowest shadow economy – **Part II (lowest)**; average over 1991 to 2015.



Source: Own calculations.

3. ESTIMATION AND SIZE OF THE SHADOW ECONOMY – 3.5 EMPIRICAL RESULTS

Table 3.3: Decomposition of the shadow economy activities in Estonia and Germany

Kinds of shadow economy activities (rough estimates!)	Estonia		Germany	
	Size in % of official GDP average 2009-2015	Proportion of total shadow economy	Size in % of official GDP average 2009-2015	Proportion of total shadow economy
(1) Total (macro) shadow economy (estimated by the MIMIC and calibrated by the currency demand procedures)	28.0	100%	16.2	100%
(2) Legally bought material for shadow economy and DIY-activities	6.0	21%	3.1	19.1%
(3) Illegal activities (smuggling etc.)	2.0	7%	1.2	7.4%
(4) Do-it-yourself activities and neighbors help ¹⁾	2.0	7%	1.5	9.2%
(5) Sum (2) and (4)	10.0	35%	5.8	35.7%
(6) “Corrected” or “adjusted” shadow economy, but legal activities (position (1) minus position (5))	18.0	65%	10.4	64.2%
¹⁾ Without legally bought material which is included in (2)				

Source: Own calculations, Linz, September 2016.

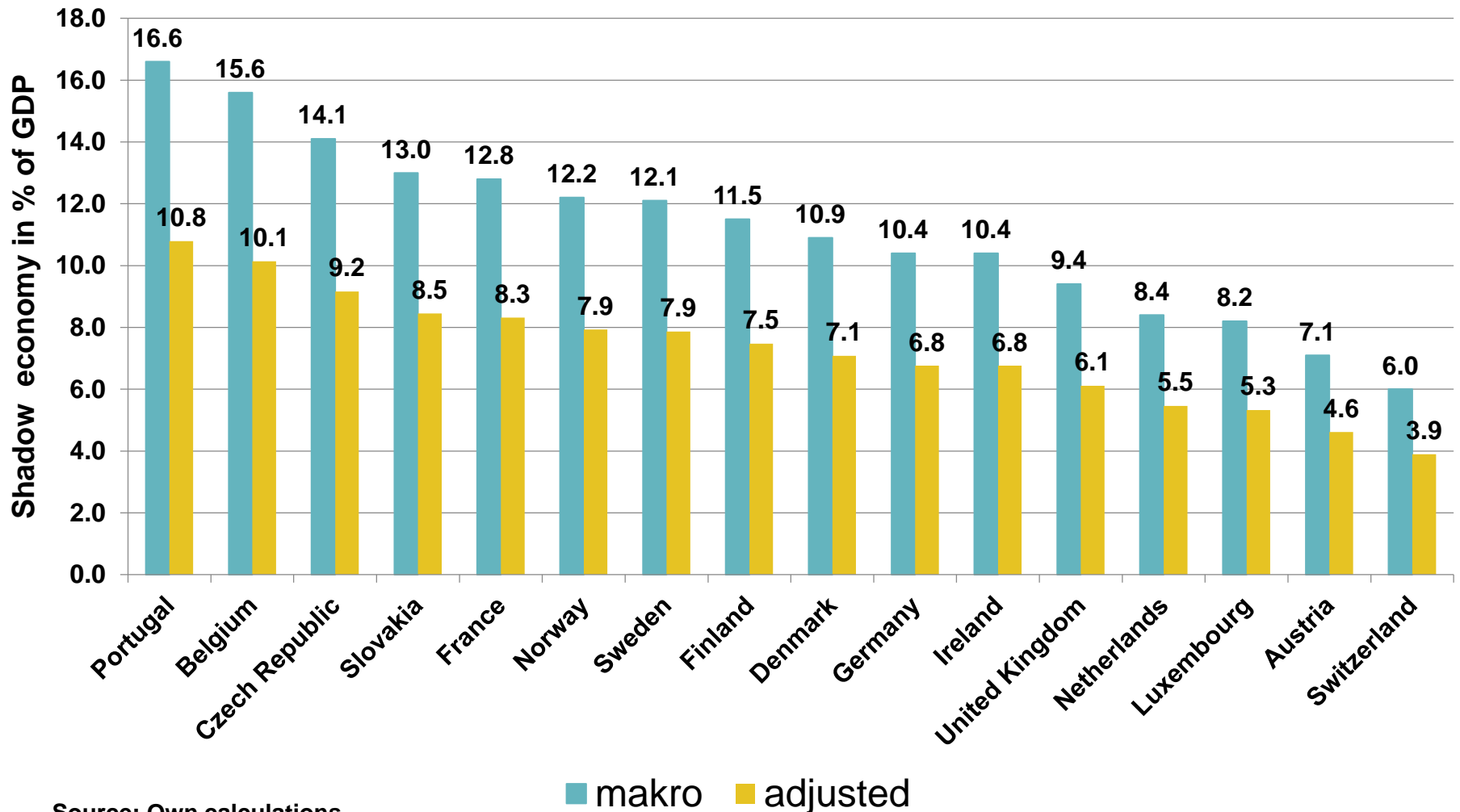
Table 3.4: Size of the shadow economies of different country groups *Macro-MIMIC* + *adj. MIMICin* []

		Size of the shadow economy ¹⁾			
Country groups [adjusted values]	No. of countries	Years 1991- 1999	Years 2000- 2009	Years 2010- 2015	Average over 1999 – 2015
East Asia	19	25.53 [16.59]	23.86 [15.51]	21.08 [13.70]	23.49 [15.27]
Middle East and North Africa	18	27.31 [17.75]	24.34 [15.82]	23.81 [15.48]	25.15 [16.35]
Europe	37	28.12 [18.28]	24.79 [16.11]	22.77 [14.80]	25.23 [16.40]
South Asia	7	34.75 [22.59]	32.31 [21,00]	27.58 [17.93]	31.55 [20.51]
Sub-Saharan Africa	42	42.36 [27.53]	39.98 [25.99]	36.13 [23.48]	39,49 [25.67]
Latin America Caribbean	24	42.29 [27.49]	39.33 [25.56]	34.80 [22.62]	38.81 [25.22]
OECD	34	21.42 [13.92]	18.84 [12.25]	18.24 [11.86]	19.5 [12.68]
<i>Average over all countries</i>	<i>181</i>	<i>31.68</i> <i>[20.59]</i>	<i>29.06</i> <i>[18.89]</i>	<i>26.34</i> <i>[17.12]</i>	<i>29.03</i> <i>[18.87]</i>

3. SIZE OF THE SHADOW ECONOMY

– 3.5 EMPIRICAL RESULTS

Figure 3.4: Size of the Shadow Economy of 16 European Countries in 2017–macro and adjusted

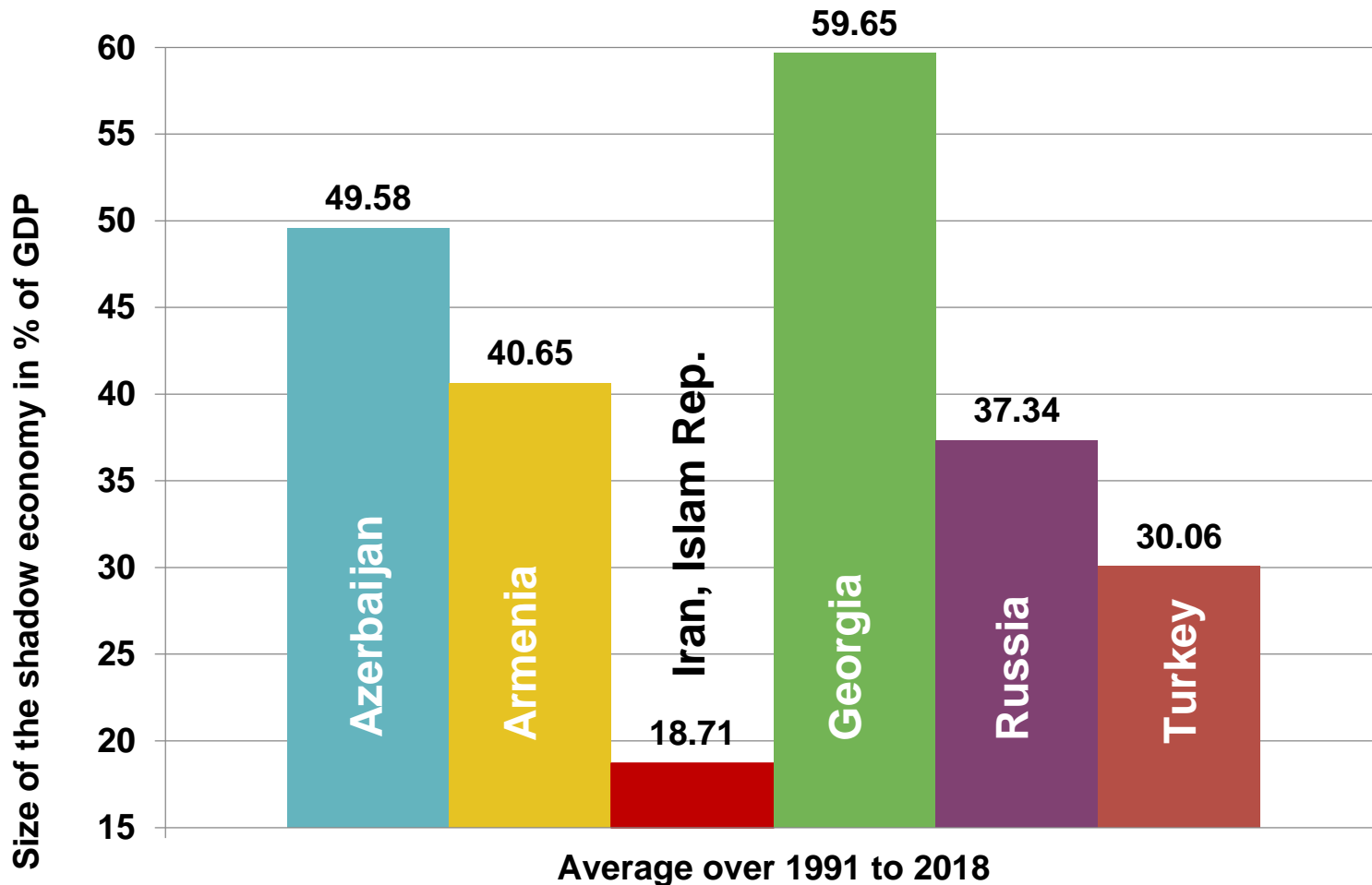


Source: Own calculations.

3. SIZE OF THE SHADOW ECONOMY –

3.4 EMPIRICAL RESULTS

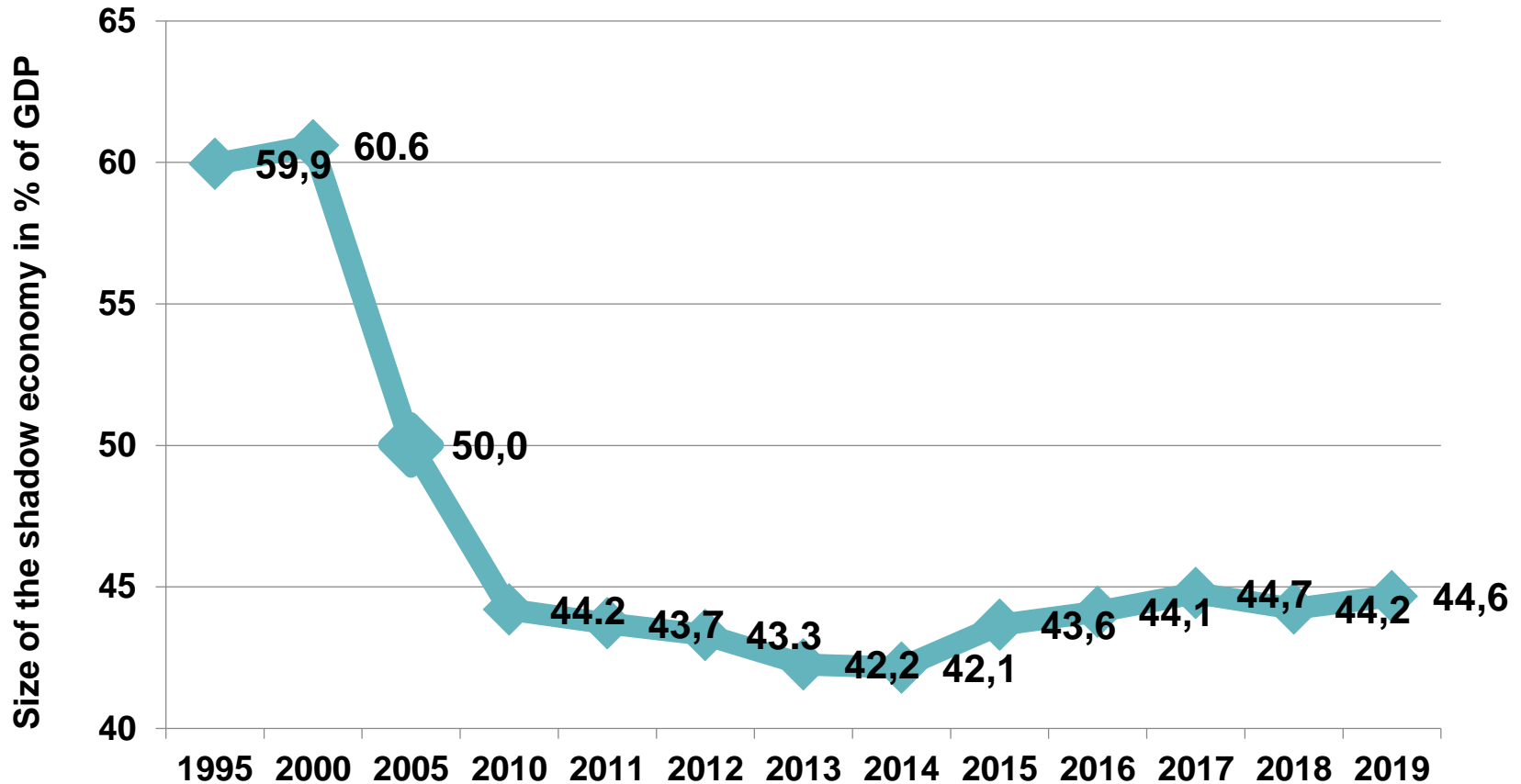
Figure 3.4: A comparison of the size of the shadow economy (in % of GDP) of Azerbaijan and her five Neighbours. Average over 1991 to 2018:



3. SIZE OF THE SHADOW ECONOMY –

3.4 EMPIRICAL RESULTS

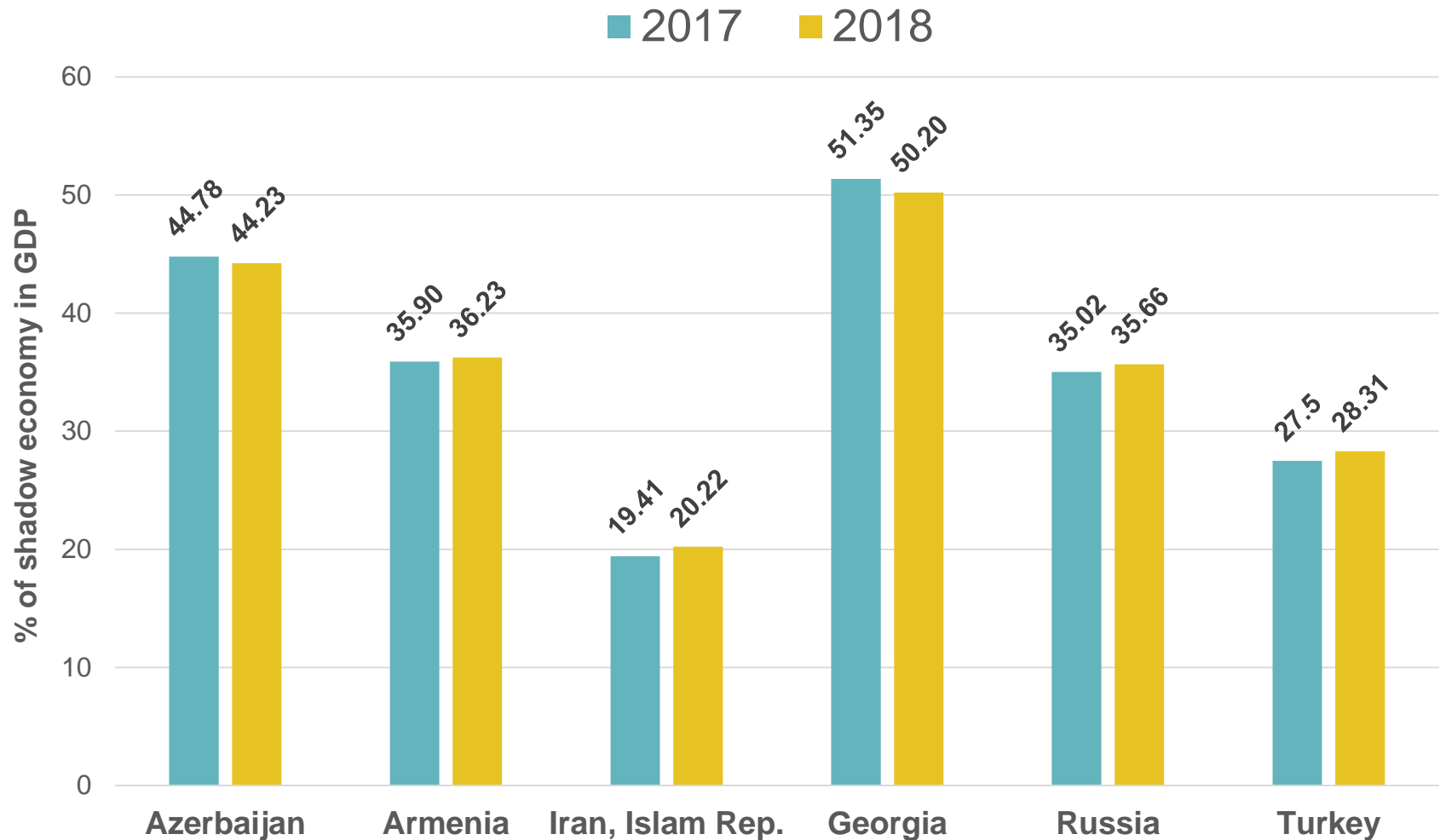
Figure 3.5: Development of the *Azerbaijani shadow economy* (in % of GDP) over time; 1995 to 2019 (projection)



3. SIZE OF THE SHADOW ECONOMY

3.4 EMPIRICAL RESULTS

Figure 3.5: The development of the shadow economy (in % of GDP) of Azerbaijan and her five Neighbours from 2017 and 2018 applying macro-mimic and adjusted mimic method.



3. SIZE OF THE SHADOW ECONOMY

3.4 EMPIRICAL RESULTS

Table 3.3: Size and development of the shadow economy (in % of GDP) of Azerbaijan and her five Neighbours from 1991 to 2017 in percent of official GDP

Country	1991	1995	2000	2005	2010	2015	2016	2017	2018	Av. over years
Azerbaijan	54,69	59,95	60,60	50,01	44,20	43,66	44,12	44,78	44,23	49,58
Armenia	46,65	47,14	46,60	41,03	40,14	35,96	36,18	35,90	36,23	40,65
Iran, Islam Rep.	19,13	21,06	18,90	16,63	15,60	18,38	19,03	19,41	20,22	18,71
Georgia	61,47	71,95	67,30	66,91	64,73	53,07	52,46	51,35	50,20	59,94
Russia	39,73	45,65	41,91	36,41	33,70	33,72	34,28	35,02	35,66	37,34
Turkey	35,99	32,84	32,10	29,77	30,21	27,43	26,42	27,5	28,31	30,06
av. over countries	42,94	46,43	44,57	40,13	38,10	35,37	35,42	35,97	36,41	39,48

4. HOW DO WE ESTIMATE THE SHADOW ECONOMIES? – A RÉSUMÉ

4.1 Surveys and other Micro-Method

- (1) Quite often *only* households are considered;
- (2) Non-responses and/or incorrect responses;
- (3) Results of the financial volume of „black“ hours worked and not of value added.
- (4) New methods (a combination of surveys and micro data) are promising

4.2 Discrepancy Method

- (1) Combination of meso estimates/assumptions;
- (2) Calculation method often not clear;
- (3) Documentation and procedures often not public.

4. HOW DO WE ESTIMATE THE SHADOW ECONOMIES? – A RÉSUMÉ

4.3 Monetary and/or Electricity Methods

- (1) Some estimates are very large, only a macro-estimates and a double counting problem.**
- (2) Are the assumptions about the size of the shadow economy and it's activities plausible?**
- (3) Breakdown by sector or industry not possible!**
- (4) Great differences to convert millions of KWh into a value added figure when using the electricity method (Lackó approach).**

4. HOW DO WE ESTIMATE THE SHADOW ECONOMIES? – A RÉSUMÉ

4.4 MIMIC (Latent) Method:

- (1) Only relative coefficients of the size of the shadow economy, no absolute values.**
- (2) Estimations quite often highly sensitive with respect to changes in the data and specifications.**
- (3) Difficulty to differentiate between the selection of causes and indicators; little theoretical “guidance”.**
- (4) The use of the calibration procedure and starting values has great influence on the size and development of the shadow economy.**
- (5) Large macro values of the shadow economy and again a double counting problem**

4. HOW DO WE ESTIMATE THE SHADOW ECONOMIES? – A RÉSUMÉ

4.5 Open Research Questions and what did we learn?

- (1) The link between theory and empirical estimation of the shadow economy is still unsatisfactory. In the best case theory provides us with derived signs of the causal and indicator variables. However, which are the “core” causal and which are the “core” indicator variables is theoretically „open“.**
- (2) An internationally accepted definition of the shadow economy is still missing. Such a definition is needed in order to make comparisons easier between countries and methods; also to avoid a double counting problem, e.g. legally bought material.**

4. HOW DO WE ESTIMATE THE SHADOW ECONOMIES? – A RÉSUMÉ

4.5 Open Research Questions and what did we learn?

- (3) Experimental methods should be used to provide a micro-foundation.**
- (4) No ideal or dominating method – all have serious problems and weaknesses.**
- (5) If possible use several methods.**

5. POLICY MEASURES

5.1 GENERAL STATEMENT

In every country the government faces the challenge to undertake policy measures which reduce a shadow economy and tax evasion.

However, the crucial question is: “Is this a blessing or a curse?”

Answers:

- (1) If one assumes, that roughly between 50-60% of all shadow economy activities complement those of the official sector (i.e. those goods would not be produced in the official sector) the *development* of the *total* (official + shadow economy) GDP is *always higher* than the “pure” official one.

5. POLICY MEASURES


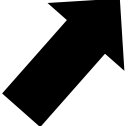












5.1 GENERAL STATEMENT (CONT.)

- (2) A decline of the shadow economy will only increase the total welfare in every country if the policy maker succeeds in transferring a shadow economic activity into the official economy.
- (3) Therefore, a policy maker has to favour and choose such policy measures that strongly increase the incentives to transfer the production from the shadow (black) to the official sector.

→ Only then the decline of the shadow economy will be a blessing for the whole economy.

5. POLICY MEASURES

Table 5.1: Interactions between the shadow economy and the official economy

The shadow economy influences	through	Effects on official economy and overall economic performance
 Tax system  	<i>tax evasion</i> 	Redistribution policies to finance qualitative and quantitative improvement of public goods are impaired, thus economic growth may be negatively affected (Schneider (2005, 2015)).
	<i>additional tax revenues</i> 	If the shadow economic activity is complementary to the official economy, extra income is generated via the shadow economy which is then (at least partly) spent in the official economy for goods and services (Schneider (2005, 2015)).
Allocations 		more efficient use of scarce resources
		incentives for firms and individuals, stimulation of creativity and innovation
		enlargement of market supply through additional goods and services
	<i>stronger competition and stimulation of markets</i>  	cost advantages of producers acting from the shadow economy may lead to ruinous competition problems in information flows for producers and consumers due to reduction in transparency and lack of structure in unofficial sector
Policy decisions  	<i>bias in officially published data</i> 	stabilizing, redistributive and fiscal policies may fail desired effects*

 = negative influence

 = positive influence

5. POLICY MEASURES

5.2 POLICY MEASURES AGAINST THE SHADOW ECONOMY

Seven policy measures:

- (1) *Unemployment* is either to some extent controllable by the government through economic policy in a traditional Keynesian sense; or the government can try to improve the country's competitiveness to increase foreign demand.
- (2) The impact of *self-employment* on the shadow economy is only partly controllable by the government. A government can deregulate the economy or incentivize “*to be your own entrepreneur*”, which would make self-employment easier, potentially reducing unemployment and positively contributing to efforts in controlling the size of the shadow economy.

5. POLICY MEASURES

5.2 POLICY MEASURES AGAINST THE SHADOW ECONOMY (CONT.)

- (3) These two policies need to be *accompanied* with a *strengthening* of *institutions* and *trust* in *public institutions* to reduce the probability that self-employed shift reasonable proportions of their economic activities into the shadow economy, which, if it happened, made government policies incentivizing self-employment less effective.
- (4) Besides these measures, policy makers should focus to *reduce overall taxation* (especially indirect taxation and custom duties).

5. POLICY MEASURES

5.2 POLICY MEASURES AGAINST THE SHADOW ECONOMY (CONT.)

- (5) *Equally important* is the *quality of institutions*; i.e. creating democratic and transparent institutions with lesser regulatory burden, corruption and bureaucracy in order to be able to restore the trust and confidence of the people in the public institutions.
- (6) *Reducing administrative burden* on economic activities by simplifying the procedures for obtaining licenses, accelerating the release of documents required for entrepreneurship, reducing bureaucratic barriers for such documents and increasing transparency of the whole process.

5. POLICY MEASURES

5.2 POLICY MEASURES AGAINST THE SHADOW ECONOMY (CONT.)

(7) *Discouraging* the *use* of *cash* by *increasing* popularity of *electronic payments*. Key measures in this regard should focus on:

- (i) *development* of *adequate infrastructure* for *bank cards* and other electronic payments, particularly in the service sector and in rural areas;
- (ii) *creating incentives* for companies that encourage their customers to use electronic payments, and to pay the salaries of their employees into a bank account;
- (iii) *organizing unscheduled inspections* in companies to verify that card terminals and other related infrastructure work correctly.

**THANK YOU VERY
MUCH FOR YOUR
ATTENTION!**



6. APPENDIX: FURTHER EMPIRICAL RESULTS

Table A 1: Size of the shadow economy *in Germany in the year 2005* using two different estimation approaches

Estimation approach	In % of off. GDP	In bill. euros	In % of the total shadow economy (Macro-MIMIC)
Survey about black labor as value-added provided by Feld and Larsen (2012a)	3.6%	70	22.5%
+ correction of the survey, see Feld and Larsen (2012a, p. 61)	5.1%	112	32%
+ material used	3.0-4.0%	65-90	19-25%
+ illegal activities	4.3-4.8%	90-105	27-30%
+ shadow economy activities already included in the GDP	0.1-0.2%	2-4	1%
Shadow economy using the MIMIC procedure (and for calibration the currency demand approach)	15.5-16.0%	340-350	100%

Table source: Enste and Schneider (2006), Table 2, p. 188.

Sources of representative survey: Feld and Larsen (2005, 2012a, 2012b) and Pedersen (2003).

The source of illegal activities and official material used are based on survey of TNS-Emnid (2004) ordered by the German research institute IW, Cologne.

6. APPENDIX: SIZE OF THE SHADOW ECONOMY

3.4 EMPIRICAL RESULTS

Table A 2: Comparison between National Accounts Statistics and MIMIC Results of 8 Sub-Saharan African countries over 2010-2014

Country	Methods (averages over 2010-2014)			Differences	
	(1) National Accounts Statistics ¹⁾	(2) MIMIC	(3) MIMIC Adjusted	(2)-(1)	(3)-(1)
Guinea-Bissau	53.4	38	31.8	-15.4	-21.6
Mali	55	40.4	26.3	-14.6	-28.7
Togo	40.1	28	24.7	-12.1	-15.4
Guinea	48.1	37	24.1	-11.1	-24
Burkina Faso	43.1	32	26	-11.1	-17.1
Senegal	47.5	40	20.8	-7.5	-26.7
Benin	55.6	49	18.2	-6.6	-37.4
Cote d'Ivoire	34	35	22.8	1	-37.4
Correlation: 0.73 Spearman's Rank Correlation: 0.857***					

1) Discrepancy method
Source: Medina et al. (2017), p.28

Table A 3: A comparison of the size of the shadow economy (in % of GDP) in the Baltic countries 2009 – 2015 by Putnins and Sauka with Zukauskas and Schneider, and Schneider (Macro and adjusted).

Year	Estonia				Latvia				Lithuania			
	Putnins and Sauka	Zukauskas and Schneider	Schneider		Putnins and Sauka	Zukauskas and Schneider	Schneider		Putnins and Sauka	Zukauskas and Schneider	Schneider	
	Firm Managers	Survey	MIMIC		Firm Managers	Survey	MIMIC		Firm Managers	Survey	MIMIC	
			Macro	Corr. Adj.			Macro	Corr. Adj.			Macro	Corr. Adj.
2009	20.2%		29.6%	19.4%	36.6%		27.1%	17.6%	17.7%		29.6%	19.2 %
2010	19.4%		29.3%	19.1%	38.1%		27.3%	17.7%	18.8%		29.7%	19.3 %
2011	18.9%		28.6%	18.6%	30.2%		26.5%	17.2%	17.1%		29.0%	18.9 %
2012	19.2%		28.2%	18.3%	21.1%		26.1%	17.0%	18.2%		28.5%	18.5 %
2013	15.7%		27.6%	17.9%	23.8%		25.5%	16.6%	15.3%		28.0%	18.2 %
2014	13.2%		27.1%	17.6%	23.5%		24.7%	16.0%	12.5%		27.1%	17.6 %
2015	14.9%	15.0 %	26.2%	17.0%	21.3%	11.7 %	23.6%	15.3%	15.0%	9.8 %	25.8%	16.8 %
Average 2009 - 2015	17.4%		28.1%	18.3%	27,8%		25,8%	16.8%	16.4%		28.2%	18.4 %

Source: Putnins and Sauka, 2016, Table 1, p.12 and Schneider, Zukauskas and Schneider, own calculations, Linz, September 2016.

6. APPENDIX A1: FURTHER RESULTS

Table A 4: The Size of the Shadow Economy in Germany According to Different Methods (in % of official GDP) – Part 1

Method/Source	Shadow economy (in % of official GDP) in:							
	1970	1975	1980	1985	1990	1995	2000	2005
Survey (IfD Allensbach, 1975) (Feld and Larsen, 2005)	-	3.6 ¹⁾	-	-	-	-	-	-
	-	-	-	-	-	-	4.1 ²⁾	3.1 ²⁾
	-	-	-	-	-	-	1.3 ³⁾	1.0 ³⁾
Discrepancy between expenditure and income (Lippert and Walker, 1997)	11.0	10.2	13.4	-	-	-	-	-
Discrepancy between official and actual employment (Langfeldt, 1983)	23.0	38.5	34.0	-	-	-	-	-

1) 1974.

2) 2001 and 2004; calculated using wages in the official economy.

3) 2001 and 2004; calculated using actual “black” hourly wage paid.

6. APPENDIX A1: FURTHER RESULTS

Table A 5: The Size of the Shadow Economy in Germany According to Different Methods (in % of official GDP) – Part 2

Method/Source	Shadow economy (in % of official GDP) in:							
	1970	1975	1980	1985	1990	1995	2000	2005
Physical input method (Feld and Larsen, 2005)	-	-	13.5	14.5	14.6	-	-	-
Transactions approach	17.2	22.3	29.3	31.4	-	-	-	-
Currency demand approach (Kirchgässner 1983; Langfeldt, 1982, 1984; Schneider and Enste, 2000)	3.1	6.0	10.3	-	-	-	-	-
	12.1	11.8	12.6	-	-	-	-	-
	4.5	7.8	9.2	11.3	11.8	12.5	14.7	-
Latent (MIMIC) approach (Frey and Weck, 1983; Pickardt and Sarda, 2006; Schneider 2005, 2007)	5.8	6.1	8.2	-	-	-	-	-
	-	-	9.4	10.1	11.4	15.1	16.3	-
	4.2	5.8	10.8	11.2	12.2	13.9	16.0	15.4
Soft modelling (Weck-Hannemann, 1983)	-	8.3	8.3	-	-	-	-	-

6. APPENDIX A2: ESTIMATION PROCEDURE OF TAX EVASION

Table A 6: The calculation of tax evasion

Kinds of shadow economy activities	Size in % of official GDP	Proportion of the overall shadow economy
(1) Total shadow economy (estimated by the MIMIC and calibrated by the currency demand procedures)	15.0	100%
(2) Legally bought material	3.0–4.0	20–26%
(3) Illegal activities (goods and services)	1.0–2.0	7–13%
(4) Do-it yourself and neighbors help without material	3.0-4.0	20-26%
(5) Already in the official GDP included illegal activities	1.0–2.0	7–13%
(6) Sum (2) to (5)	8.0–12.0	53–80%
(7) Explicit shadow economic, but legal activities (position (1) minus position (5))	3.0–7.0	20–47%
(8) Tax evasion (approx. 35% of the explicit shadow economy, driving forces: indirect taxation and self-employment)	1.4–2.5	10–16%

Source: Buehn and Schneider (2013), p. 12.

6. APPENDIX A 2: THE AMOUNT OF TAX EVASION IN 31 EUROPEAN COUNTRIES

Table A 7: Size of tax evasion in % of GDP of 31 highly developed European countries in 2017

Country	Tax evasion	Tax Evasion Adj.
Bulgaria	3.8	2.5
Turkey	3.5	2.3
Croatia	3.4	2.2
Romania	3.4	2.2
Estonia	3.2	2.1
Lithuania	3.1	2.0
South-Cyprus	3.1	2.0
Malta	3.1	2.0
Slovenia	2.9	1.9
Hungary	2.9	1.9
Poland	2.9	1.9
Greece	2.8	1.8
Latvia	2.8	1.8
Italy	2.6	1.7
Spain	2.2	1.5

Source: Own calculations.

6. APPENDIX A 3: THE AMOUNT OF TAX EVASION IN 31 EUROPEAN COUNTRIES

Table A 8: Size of tax evasion in % of GDP of 31 highly developed European countries in 2017 (cont.)

Country	Tax evasion	Tax Evasion Adj.
Portugal	2.2	1.4
Belgium	2.0	1.3
Czech Republic	1.8	1.2
Slovakia	1.7	1.1
France	1.7	1.1
Norway	1.6	1.0
Sweden	1.6	1.0
Finland	1.5	1.0
Denmark	1.4	0.9
Germany	1.4	0.9
Ireland	1.4	0.9
United Kingdom	1.2	0.8
Netherlands	1.1	0.7
Luxembourg	1.1	0.7
Austria	0.9	0.6
Switzerland	0.8	0.5

Source: Own calculations.