Saltanat Kondybayeva, PhD

Al-Farabi Kazakh National University

saltanatkondybayeva@gmail.com

The theoretical remarks about the shadow economy
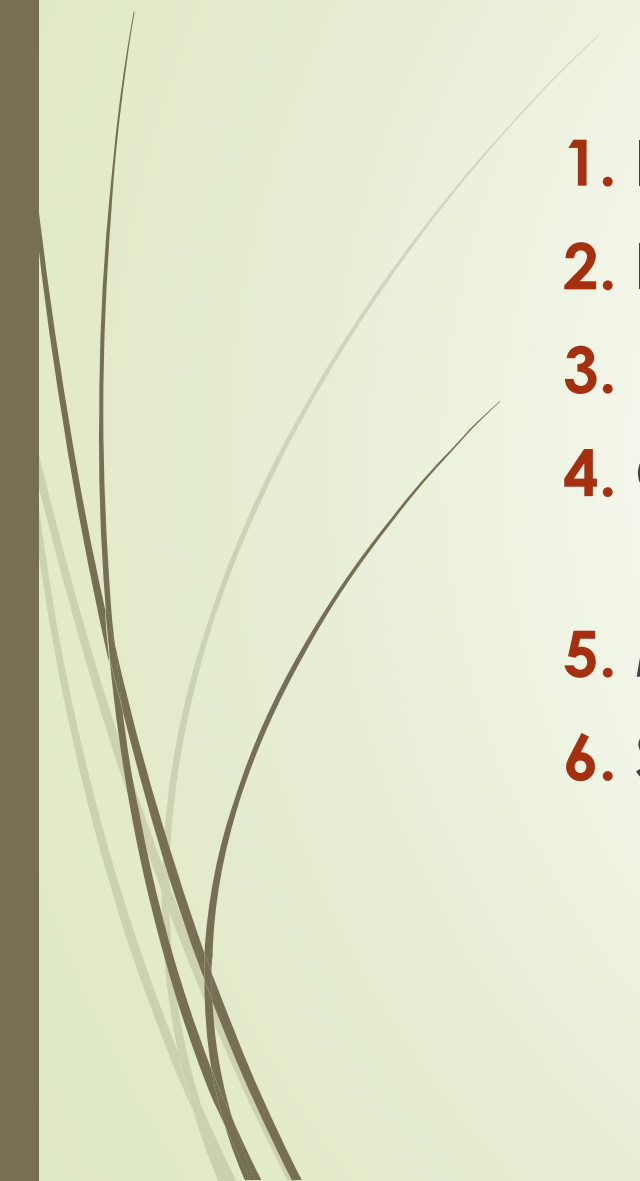
Measuring the shadow economy.
Money Laundering:
Some Preliminary Empirical Findings

Outline

Goal of this lecture:

Discussing a new method of measuring the shadow economy. Defining its advantages and disadvantages.

Analysing the Models of the shadow economy

Considering first and second class models of the shadow economy. Discussing their features.

1. Introduction

(1) The term „Money Laundering" originates from the US describing the Mafia's attempt to "launder" illegal money via cash-intensive washing salons in the 30s, which where controlled by criminal organizations.

(2) The IMF estimates, that 2-5% of the world gross domestic product (GDP) stems from illicit (criminal) sources.

(3) The goal of this lecture is to undertake a first attempt, to shed some light about the size and development of money laundering and its techniques.

2. Illegal (criminal) financial transactions

(1) Apart from the "official" economy there exists an "Underground Economy", which characterizes an illegal economy including all sorts of criminal activities, which are in conflict with the legal system, e.g. organized crime or drug dealing.

(2) Opposite to these classical criminal activities, shadow economy activities mean the production of (in principle) legal goods and services with an value added for the official economy and where the illegality comes from avoiding taxes and social security payments and violating labour market regulations.

(3) Shadow economy and underground (criminal) economy are quite different activities, which can not be summed up to one underground economy because the latter usually produces no positive value added for an economy.
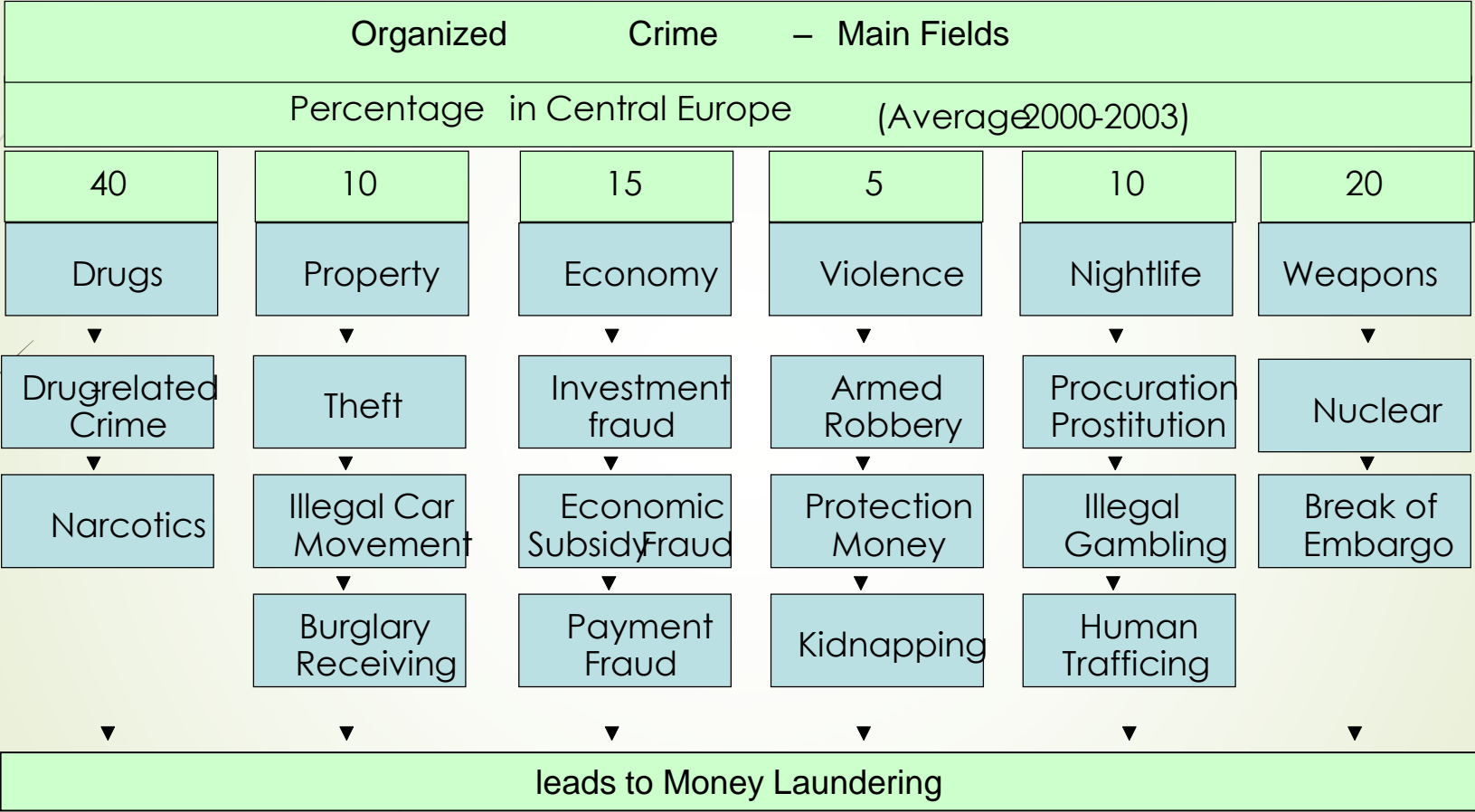
Table 2.2: Quantification of Money Laundering Volume – Part 1

Origin/Study	Year	Volume (worldwide)
Worldwide turnover of Organised Crime: Range: 500 billion USD – 2.1 trillion USD		
National Criminal Intelligence Service (NCIS; Washington D.C.; USA)	**1998**	**1.3 trillion USD**
	2001	**1.9 trillion USD**
	2003	**2.1 trillion USD**
UN-Estimates (New York; USA)	**1994/98**	**700 billion to 1 trillion USD**
International Monetary Fund and Interpol (Washington D.C; USA)	**1996**	**500 billion USD**
Friedrich Schneider (University of Linz)	**2001**	**800 billion USD**
	2002	**960 billion USD**
	2003	**1.2 trillion USD**
	2004	**1.4 trillion USD**
	2005	**1.5 trillion USD**
	2006	**1.7 trillion USD**

Table 2.2: Quantification of Money Laundering Volume – Part 2

Worldwide money laundering turnover, as measured by drug total revenue: 400 billion – 2.85 trillion USD		
The Economist (London)	**1997**	**400 billion USD**
	2001	**600 billion USD**
Friedrich Schneider (University of Linz)	**2001**	**700 billion USD**
	2002	**750 billion USD**
	2003	**810 billion USD**
	2004	**850 billion USD**
	2005	**870 billion USD**
	2006	**910 billion USD**
Kerry	**1997**	**420 billion -1 trillion USD**
Michael Schuster	**1994**	**500-800 billion USD**
Walker	**1998**	**2.85 trillion USD**
→ *Estimates are afflicted with great uncertainties.* → *Problems due to an ambiguous classification and a small databases regarding direct methods.* → *Dubiously potentiated estimates concerning indirect methods.*		

Figure 2.1: Organized Crime and their main areas in Central Europe

Organized Crime – Main Fields					
Percentage in Central Europe (Average 2000-2003)					
40	10	15	5	10	20
Drugs	Property	Economy	Violence	Nightlife	Weapons
Drug related Crime	Theft	Investment fraud	Armed Robbery	Procuration Prostitution	Nuclear
Narcotics	Illegal Car Movement	Economic Subsidy Fraud	Protection Money	Illegal Gambling	Break of Embargo
	Burglary Receiving	Payment Fraud	Kidnapping	Human Trafficing	
leads to Money Laundering					

Source: Siska, 1999, p. 13 and own calculations.

Figure 2.2: Organized Crime – Main Fields (Central Europe, av. 2000-2003)
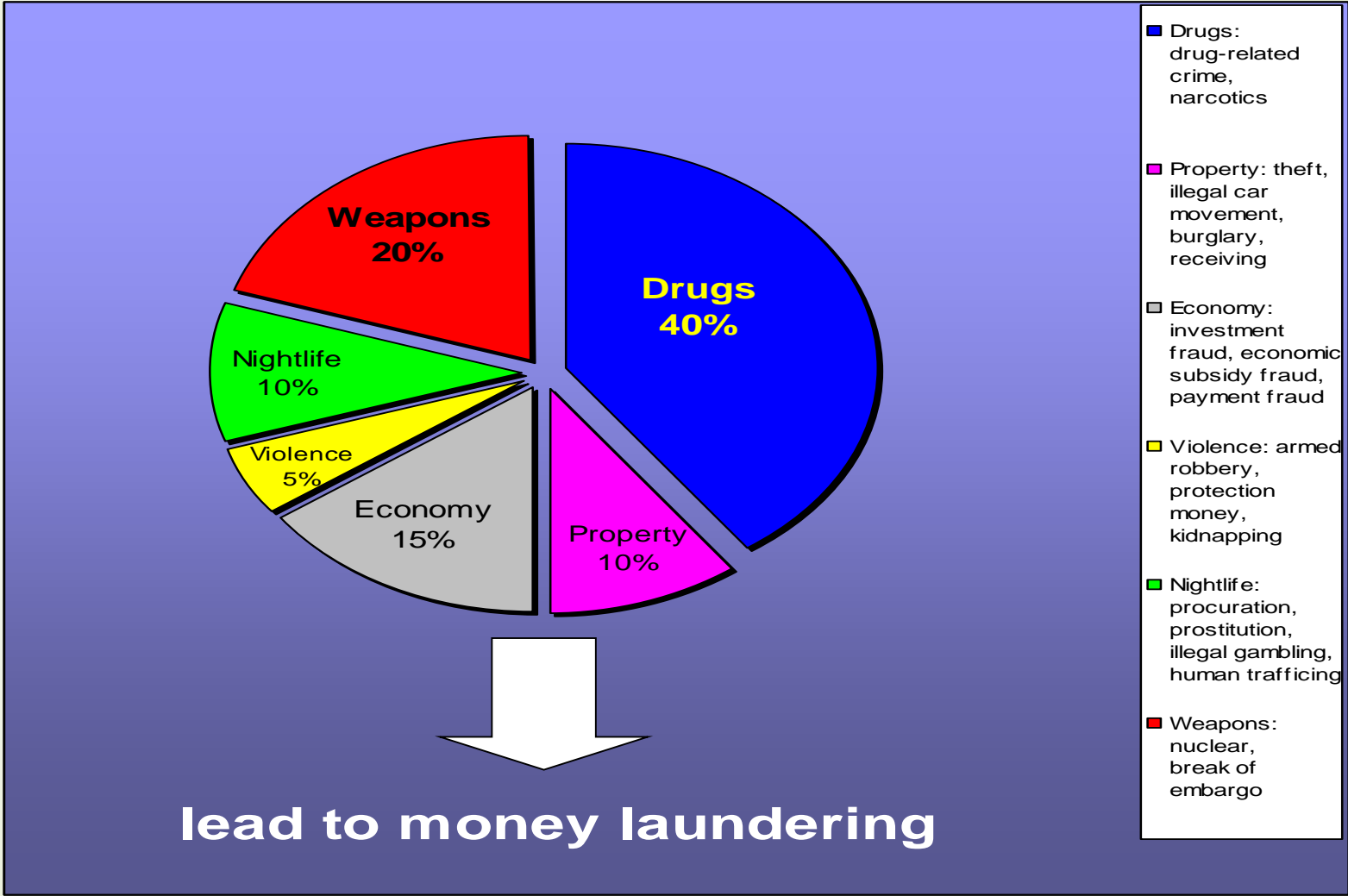
Source: Siska, 1999, p. 13 and own calculations.

3. Necessity of Money Laundering Activities

(1) **According to some estimations, the total turnover of organized crime actually reaches figures between 1,200 billion and 2,1 trillion USD in 2003 and the worldwide volume of money laundering "from drug business" obtains 810 billion in 2003.**

(2) **Money laundering is necessary, because 2/3 of all illegal transactions are done by cash, as cash leaves no traces on information carriers like documents or bank sheets.**

4. Quantification/Estimation of the Volume of Money Laundering
4.1. General Remarks

(1) Apart from a first major difficulty of diverging definitions of the term „money laundering" on the national and the international level a second one arises, as particularly the transaction-intensive layering stage can lead exceedingly to potential double and multiple counting problems.

(2) Furthermore many estimates (or guestimates) quite often are made for specific areas (e.g. drug profits) or are based on figures that are wrongly quoted or misinterpreted or just invented without a scientific base!

4. Quantification/Estimation of the Volume of Money Laundering
4.1. General Remarks (cont.)

(3) **We make a distinction between direct and indirect methods:**

➢ *Direct methods* **focus on recorded ("seized"/confiscated) illegal payments from the public authorities. However, to get an overall/total figure one has to estimate the much bigger (undetected/"Dunkelziffer") volume. Methods, which are used are the discrepancy analysis of international balance of payment accounts, or of changes in cash stocks of national banks.**

➢ *Indirect methods* **try to identify money laundering activities with the help of causes and indicators. First, the various causes (e.g. the various criminal activities) and indicators (confiscated money, prosecuted persons) are identified, and second an econometric estimation is undertaken.**

4. Quantification/Estimation of the Volume of Money Laundering

4.2. Econometric and DYMIMIC Procedures

(1) **In the DYMIMIC estimation procedure money laundering is treated as a latent (i.e. unobservable) variable. This estimation procedure uses various causes for money laundering (i.e. various criminal activities) and indicators (confiscated money, prosecuted, persons, etc.) to get an estimation of the latent variable.**

(2) **One big difficulty of this method is, that one gets only relative estimated values of the size of money laundering and one has to use other estimations in order to transform/calibrate the relative values from the DYMIMIC estimation into absolute ones.**

4. Quantification/Estimation of the Volume of Money Laundering

4.2. Econometric and DYMIMIC Procedures – Cont.

(1) A DYMIMIC estimation of the amount of money laundering or profits from criminal activities for 20 OECD countries over the years 1994/95, 1997/98, 2000/2001, 2002/2003 and 2003/2004 is done.

(2) Theoretically we expect that the more illegal (criminal) activities (e.g. dealing with drugs, illegal weapon selling, increase in domestic crimes, etc.) occur, the more money laundering activities will take place, ceteris paribus.

(3) The more inequal the income distribution and the lower official GDP per capita is, the higher money laundering activities will be, ceteris paribus.

(4) The better the legal system is functioning the less money will be laundered, ceteris paribus.

Figure 4.1: DYMIMIC estimation of the amount of money laundering for 20 highly developed OECD countries, 1994/95, 1997/98, 2000/2001 and 2002/2003
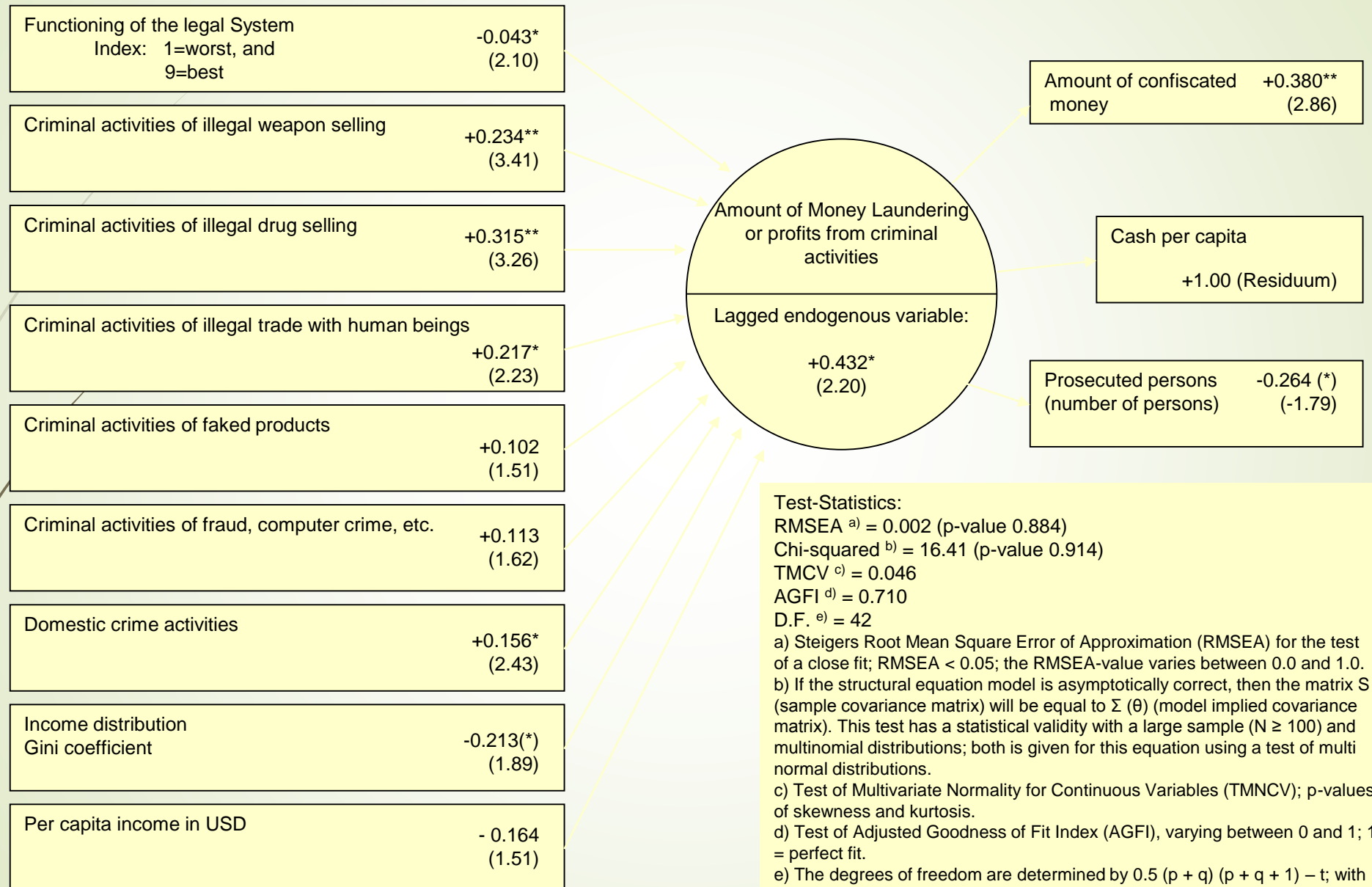
| Functioning of the legal System | -0.043* |
| Index: 1=worst, and 9=best | (2.10) |

| Criminal activities of illegal weapon selling | +0.234** |
| | (3.41) |

| Criminal activities of illegal drug selling | +0.315** |
| | (3.26) |

| Criminal activities of illegal trade with human beings | +0.217* |
| | (2.23) |

| Criminal activities of faked products | +0.102 |
| | (1.51) |

| Criminal activities of fraud, computer crime, etc. | +0.113 |
| | (1.62) |

| Domestic crime activities | +0.156* |
| | (2.43) |

| Income distribution Gini coefficient | -0.213(*) |
| | (1.89) |

| Per capita income in USD | - 0.164 |
| | (1.51) |

Amount of Money Laundering or profits from criminal activities

Lagged endogenous variable:

+0.432*
(2.20)

| Amount of confiscated money | +0.380** |
| | (2.86) |

| Cash per capita | |
| | +1.00 (Residuum) |

| Prosecuted persons (number of persons) | -0.264 (*) |
| | (-1.79) |

Test-Statistics:
RMSEA [a] = 0.002 (p-value 0.884)
Chi-squared [b] = 16.41 (p-value 0.914)
TMCV [c] = 0.046
AGFI [d] = 0.710
D.F. [e] = 42
a) Steigers Root Mean Square Error of Approximation (RMSEA) for the test of a close fit; RMSEA < 0.05; the RMSEA-value varies between 0.0 and 1.0.
b) If the structural equation model is asymptotically correct, then the matrix S (sample covariance matrix) will be equal to Σ (θ) (model implied covariance matrix). This test has a statistical validity with a large sample (N ≥ 100) and multinomial distributions; both is given for this equation using a test of multi normal distributions.
c) Test of Multivariate Normality for Continuous Variables (TMNCV); p-values of skewness and kurtosis.
d) Test of Adjusted Goodness of Fit Index (AGFI), varying between 0 and 1; 1 = perfect fit.
e) The degrees of freedom are determined by 0.5 (p + q) (p + q + 1) – t; with p = number of indicators; q = number of causes; t = the number for free parameters.

Table 4.1: DYMIMIC Calculations of the Volume of Money Laundering

Year	Volume of money laundering (billion USD for 20 OECD countries)	20 OECD countries
1995	503	Australia, Austria, Belgium, Canada, Denmark, Germany, Finland, France, Greece, Great Britain, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Switzerland, Spain and USA.
1996	554	
1997	602	
1998	661	
1999	702	
2000	761	
2001	804	
2002	849	
2003	905	
2004	969	
2005	1,027	
2006	1,106	

Source: Own calculations.

Figure 4.2: DYMIMIC Calculations of the Volume of Money Laundering
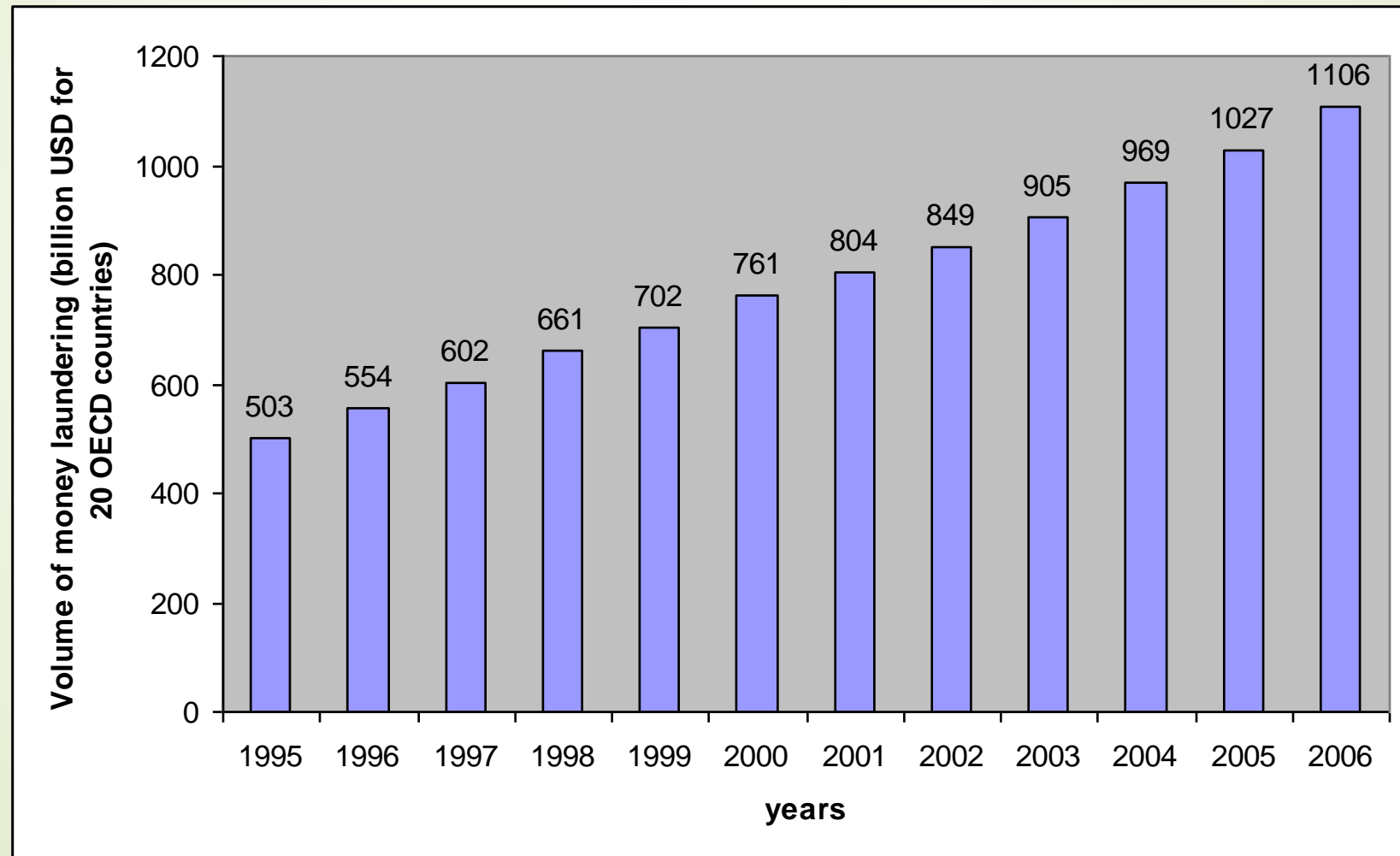
Table 4.3: Fight against money laundering in Austria and Germany

|	1994	1995	1996	2001	2002	2003	2004	2005	2006
Suspicious transaction reports under § 41/1 BWG Austria (cases)	346	310	309	288	215	236	349	417	-
Suspicious transaction reports pursuant to the Money Laundering Act Germany (cases)	2873	2759	3019	7284	8261	6602	8062	9126	-
Sum of criminal cash flow Austria	189 Mio €	80 Mio €	102 Mio €	516 Mio €	619 Mio €	692 Mio €	735 Mio €	843 Mio €	903 Mio €
Sum of criminal cash flow Germany	3,590 Mio €	3,740 Mio €	4,120 Mio €	4,430 Mio €	4,957 Mio €	5,520 Mio €	6,177 Mio €	7,239 Mio €	7,903 Mio €
Sum of "frozen money" Austria	22 Mio €	27 Mio €	6 Mio €	32 Mio €	8 Mio €	2.2 Mio €	28 Mio €	99.3 Mio €	-
Charges Austria (§165 StGB)	20	50	13	74	115	112	100	70	-
Charges Austria (§278a StGB)	34	27	19	89	132	131	159	165	-

Source: Own calculations (indirect analysis on basis of estimates on shadow economy and class. criminal activities); and Siska, Josef, 1999; BMI, 2003 and 2005; FIU 2005 und 2006.

Figure 4.3: Fight against money laundering in Austria and Germany - Sum of criminal cash flow Germany
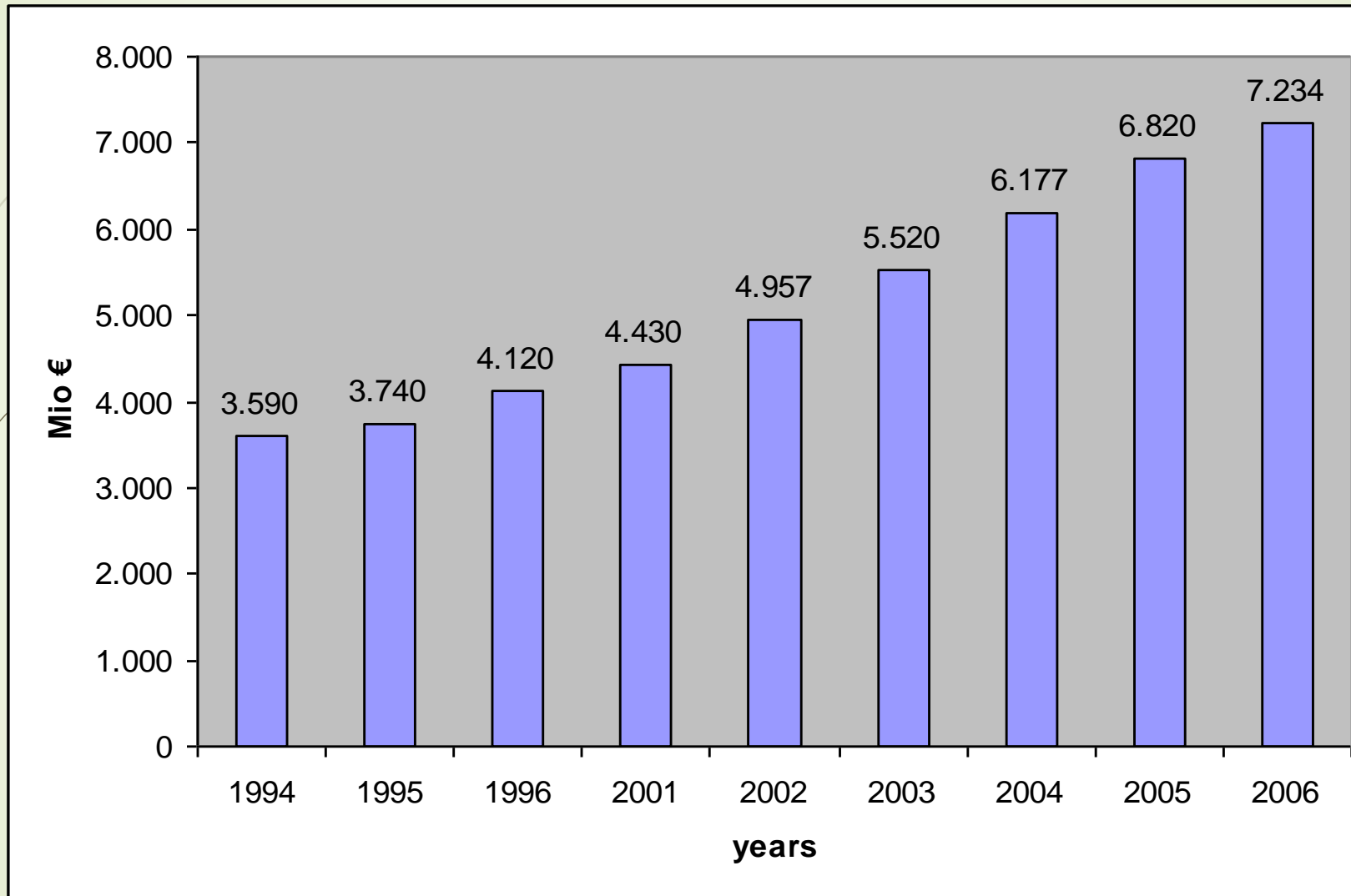
Source: Own calculations (indirect analysis on basis of estimates on shadow economy and class. criminal activities); Siska, Josef, 1999; BMI, 2003 and 2005; FIU 2005 und 2006.

Figure 4.4: Fight against money laundering in Austria and Germany - Sum of criminal cash flow Austria and Sum of "frozen money" Austria
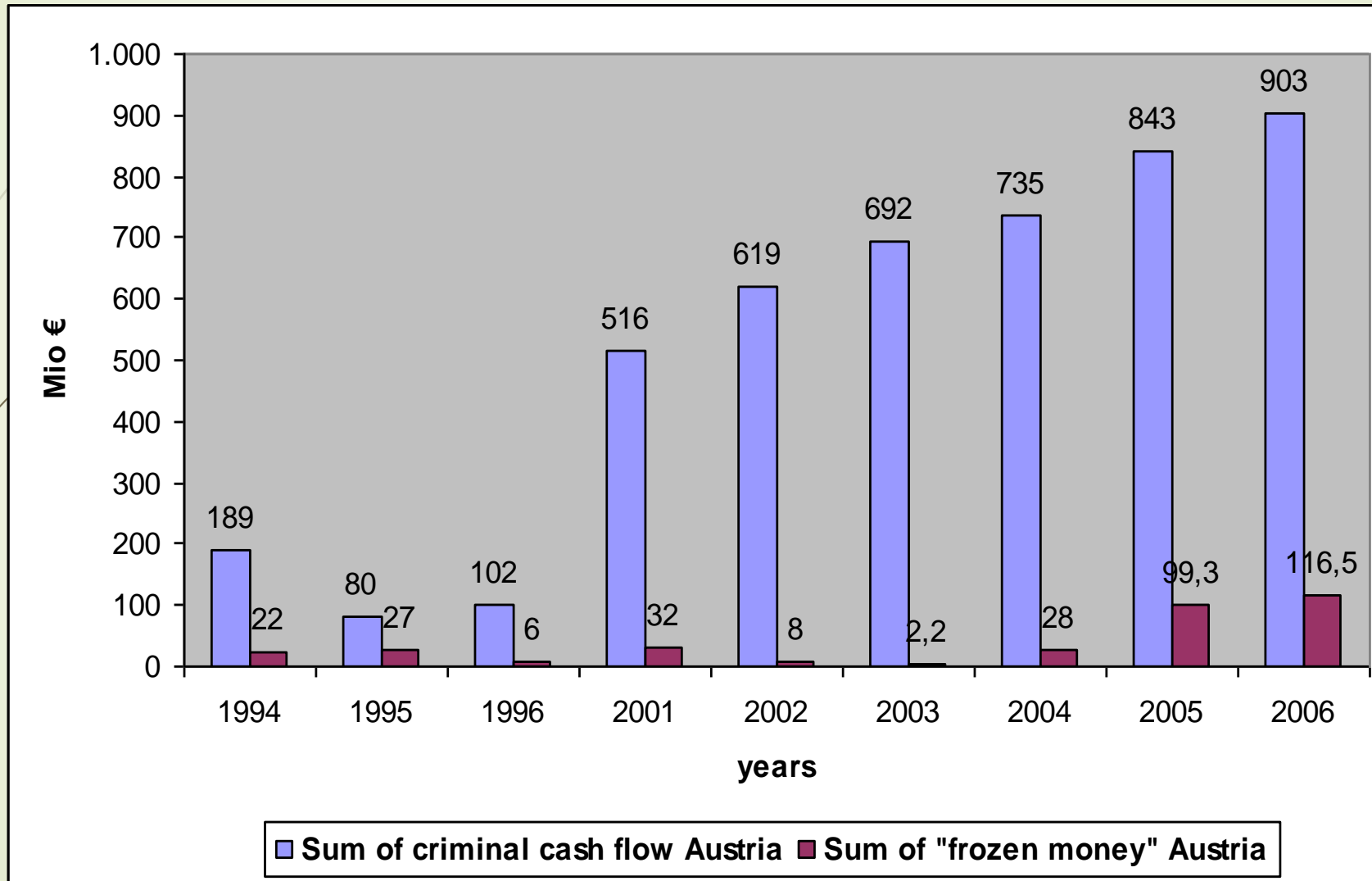
Source: Own calculations (indirect analysis on basis of estimates on shadow economy and class. criminal activities); Siska, Josef, 1999; BMI, 2003 and 2005; FIU 2005 und 2006.

4. National estimations of the financial size of organized crime and money laundry
Table 4.3: Shadow economy and underground economy in Germany from 1996 to 2006

Year	Germany			
	Shadow economy		Underground economy (typical criminal activity)	
	in % of official GDP	in billion €	in % of official GDP	in billion €
1996	14.50	263	10.4	189
1997	15.00	280	11.6	217
1998	14.80	286	12.8	248
1999	15.51	308	14.1	280
2000	16.03	329	16.3	334
2001	16.00	336	16.9	355
2002	16.59	350	17.4	371
2003	17.40	370	18,0	399
2004	16,40	356	18,8	410
2005	15,40	346	19,5	425
2006	15,00	345	20,1	438

4. National estimations of the financial size of organized crime and money laundry
Table 4.4: Shadow economy and underground economy in Italy, France and Great Britain from 1996 to 2006

Year	Italy		Great Britain		France	
	Shadow economy [1]	Underground economy [1]	Shadow economy [1]	Underground economy [1]	Shadow economy [1]	Underground economy [1]
1996	27.0	18.2	13.1	9.4	14.9	8.9
1997	27.3	18.9	13.0	9.8	14.7	9.3
1998	27.8	19.3	13.0	10.2	14.9	9.8
1999	27.1	19.9	12.7	10.4	15.2	10.3
2000	27.2	20.6	12.7	10.6	15.2	10.9
2001	27.0	21.0	12.6	12.5	15.1	11.2
2002	27.0	22.5	12.5	10.9	15.0	11.21
2003	26.1	23.1	12.2	11.3	14.7	12.21
2004	25.2	23.5	12.3	12.1	14.3	13.1
2005	24.4	24.9	12.0	13.1	13.8	14.0
2006	23.2	25.4	11.1	13.7	12.4	14.8

1) in % of official GDP

4. Quantification/Estimation of the Volume of Money Laundering

4.3. The 10%-Rule of FATF

The FATF (Financial Action Task Force) uses the following rule of thumb:

(1) **On basis of the estimated annual turnovers on retail trade level, the assumption is made that the confiscated amount is 10 per cent of all drugs floating around.**

(2) **Knowing that the operating cost quota (relating to sales turnover) is roughly 60 per cent, profits/turnovers of drug trafficking can be estimated: In the year 1997 the FATF "estimated" a total world drug-turnover of approx. 300 billion USD, 120 billion USD profits thereof and 85 billion USD were classified to be relevant for money laundering.**

5. Measures against Money Laundering

5.1. The Financial Action Task Force (FATF)

(1) The Financial Action Task Force (FATF), an international organization, has the main task to fight against money laundering and terrorism financing, consisting of 33 member countries. The FATF tries to "hunt" the non-cooperative countries with the help of a "name and shame" policy by publishing a "black list".

(2) Moreover, the FATF is trying to combat money laundering internationally by means of typologies and 40 recommendations (international standards). Currently only Myanmar and Nigeria are still quoted on FATF's black list.

5. Measures against Money Laundering

5.2. Austria

(1) **The main element of the existing money laundering precautions is formed by the so called "Know your Customer" principle; the FIU (Austrian Financial Intelligence Unit) has to be informed by all affected parties (banks, insurance companies, etc.) as soon as a suspect exceeds standardized limits in all financial business.**

(2) **By banning anonymous savings bank books, identifying customers and obliging to store numerous documents etc. obligated parties comply with the "Know Your Customer" principle.**

5. Measures against Money Laundering

5.3. Germany

(1) In 2002 Germany established a Competence Centre named „Zentralstelle für verfahrensunabhängige Finanzer-mittlung" to fight money laundering.

(2) In addition, the control mechanism over financial transactions were extended combined with the establishment of a central database at the "Bundesauf-sichtsamt für Kreditwesen" in order to visualize cash flow of terrorism and money laundering organizations.

(3) The authorization and the activity range of the current supervisory body (eg „Bundesaufsichtsamt für Wertpapier-handel" oder „Bundesaufsichtsamt für Versicherungs-wesen") was extended.

6. Summary and Conclusions

6.1. Summary

(1) First, a differentiation is made between classical shadow economy and classical underground (crime) activities, arguing that on the one side shadow economy activities provide an extra value added of (in principal legal) goods and services, and on the other side typical crime activities produce no positive value added for the official economy.

(2) Second, the necessity of money laundering is explained as since nearly all illegal (criminal) transactions are done by cash. Hence, this amount of cash must be laundered in order to have some "legal" profit.

6. Summary and Conclusions

6.1. Summary – Cont.

(3) With the help of a DYMIMIC estimation procedure, the amount of money laundering are estimated using as causal variables e.g. various types of criminal activities, and as indicators, e.g. confiscated money.

(4) The volume of laundered money or profits from criminal activities was for these 20 OECD countries in the year 1995 503 billions USD and increased in 2006 to 1,106 billions USD.

(5) The worldwide money laundering turnover was in 2001 800 billion USD and increased in 2006 to 1,700 billion USD.

6. Summary and Conclusions

6.2. Conclusions

Four preliminary conclusions:

(1) Money laundering is extremely difficult to tackle. It's defined almost differently in every country, the measures taken against it are different and vary from country to country.

(2) To get a figure of the extent and development of money laundering over time is even more difficult. This paper tries to undertake some own estimations with the help of a latent estimation procedure (DYMIMIC) and shows that money laundering has increased from 1995 503 billion USD to 1,700 billion USD in 2006 for 20 OECD countries.

6. Summary and Conclusions

6.2. Conclusions – Cont.

(3) To fight against money laundering is also extremely difficult, as we have no efficient and powerful international organizations, which can effectively fight against organized crime and money laundering.

(4) Hence, this paper should be seen as a first start/attempt in order to shed some light on the grey area of money laundering and to provide some better empirical bases or taking more efficient measures against money laundering.

Multiple Indicators, Multiple Causes (MIMIC) approach

The **MIMIC** approach explicitly considers several causes, as well as the multiple effects of the informal economy.

The methodology makes use of the associations between the observeable causes and the observable effects of an unobserved variable, in this case the informal economy, to estimate the unobserved factor itself.

Formally, the MIMIC model consists two parts:

- The *structural equation model* describes the „relationship" among the latent variable (informal economy = IE) and its causes.

- The *measurement model* represents the link between the latent variable IE and its indicators; i.e. the latent varialble (IE) is expressed in terms of observable variables.

Multiple Indicators, Multiple Causes (MIMIC) approach

The model for one latent variable (IE) can be described as follows:

IE = γ' x + ν(1) Structural equation model

γ =λ IE + ε (2) Measurement model

where IE is the unobservable scalar latent variable (the size of the informal economy), γ' = (γ$_1$…, γ$_p$) is a vector of indicators for IE, x' = (x$_1$,…x$_q$) is a vector of causes of IE, λ and γ are the (px1) and (qx1) vectors of the parameters and ε and ν are the (px1) and scalar errors.

Figure 1: General structure of a MIMIC model

Causes		$\eta^{t-1}_{\downarrow}$		Indicators
X^t_1	$\text{-----}\rightarrow$		$\text{----}\rightarrow$	Y^t_1
X^t_2	$\text{-----}\rightarrow$	Informal Economy η^{t-1}	$\text{----}\rightarrow$	Y^t_2
X^t_l	$\text{-----}\rightarrow$		$\text{----}\rightarrow$	Y^t_l

Multiple Indicators, Multiple Causes (MIMIC) approach

Equation (1) **links the informal economy with ist indicators or symptoms,**

while *equation (2)* **associates the informal economy with ist causes.**

Assuming that these errors are normally distributed and mutually uncorrelated with var(v) = σ^2_v and cov(ε) = Θ_ε, the model can be solved for the reduced form as a function of observable variables by combining equations (1) and (2):

γ = π x + μ (3)

where π = λ γ' , μ = λ v + ε and cov(μ) = λ λ' σ^2_v + Θ_ε.

Appendix 1: Multiple Indicators, Multiple Causes (MIMIC) approach

Because γ and x are observable data vectors, equation (3) can be estimated by maximum likelihood estimation using the restrictions implied in both the coefficient matrix π and the covariance matrix of the error μ.

Since the reduced form parameters of equation (3) remain unaltered when λ is multiplied by a scalar and γ and σ^2_v are divided by the same scalar, the estimation of (1) and (2) requires a normalization of the parameters in (1), and a convenient way to achieve this is to constrain one element of λ to some pre-assigned value (quite often 1).

Since the estimation of λ and γ is obtained by constraining one element of λ to some arbitrary value, it is useful to standardize the regression coefficients $^\wedge\lambda$ and $^\wedge\gamma$ as follows:

$$^\wedge\lambda^s = {}^\wedge\lambda \left({}^\wedge\sigma_{IE} / {}^\wedge\sigma_\gamma \right) \qquad ^\wedge\gamma^s = {}^\wedge\gamma \left({}^\wedge\sigma_x / {}^\wedge\sigma_{IE} \right)$$

Appendix 1: Multiple Indicators, Multiple Causes (MIMIC) approach

The standardized coefficient measures the expected change in the standard-deviation units of the dependent variable due to a one standard-deviation change fo the given explanatory variable when the other variables are held constant.

Using the estimates of the γ^s vector and setting the error term v to its mean value of zero, the predicted ordinal values for the informal economy (IE) can be estimated by using equation (2).

Then, by using information regarding the specific value of informal activity for some country (if it is a cross country study) or for some point in time (if it is a time series study), obtained from some other source, the within-sample predictions for IE can be converted into absolute series.

References

- **Shadow Economies in 10 Transition and 6 Developing OECD Countries: What are the Driving Forces? By Friedrich Schneider and Andreas Buehn *(May, 2013)***

- **Review Article** Friedrich Schneider, Andreas Buehn **Shadow Economy: Estimation Methods, Problems, Results and Open questions** Open Economics 2018; 1: 1–29