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The Shadow Economies in Central and South America with a Specific Focus on Brazil and Columbia:

What do we know?

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2. Theoretical Background

2.1. Defining the Shadow Economy

2.2. Theoretical Considerations about the Shadow Economy

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1. Introduction

The main focus of this study is twofold:

(i) The estimation of the size and the development of the shadow economies of 21 Middle and South American countries over time and

(ii) as a case studies the size and development of the shadow economies of Brazil and Colombia.

2. Theoretical Background

2.1. Defining the Shadow Economy

Table 2.1: A taxonomy of types of underground economic activities

monetary transactions		non-monetary transactions	
<i>illegal activities</i>			
<ul style="list-style-type: none"> • trade with stolen goods • drug dealing and manufacturing • prostitution • gambling • smuggling • fraud • etc. 		<ul style="list-style-type: none"> • barter of drugs, stolen goods, smuggling, etc. • producing or growing drugs for own use • theft for own use 	
<i>legal activities</i>			
<i>tax evasion</i>	<i>tax avoidance</i>	<i>tax evasion</i>	<i>tax avoidance</i>
<ul style="list-style-type: none"> • unreported income from self-employment • wages, salaries and assets from unreported work related to legal services and goods 	<ul style="list-style-type: none"> • employee discounts, fringe benefits 	<ul style="list-style-type: none"> • barter of legal services and goods 	<ul style="list-style-type: none"> • all do-it-yourself work and neighbour help

Source: Structure of the table is taken from Lippert and Walker (1997, p. 5) with additional own remarks.

2. Theoretical Background

2.1. Defining the Shadow Economy

The shadow economy includes all market-based legal production of goods and services that are deliberately concealed from public authorities for the following reasons:

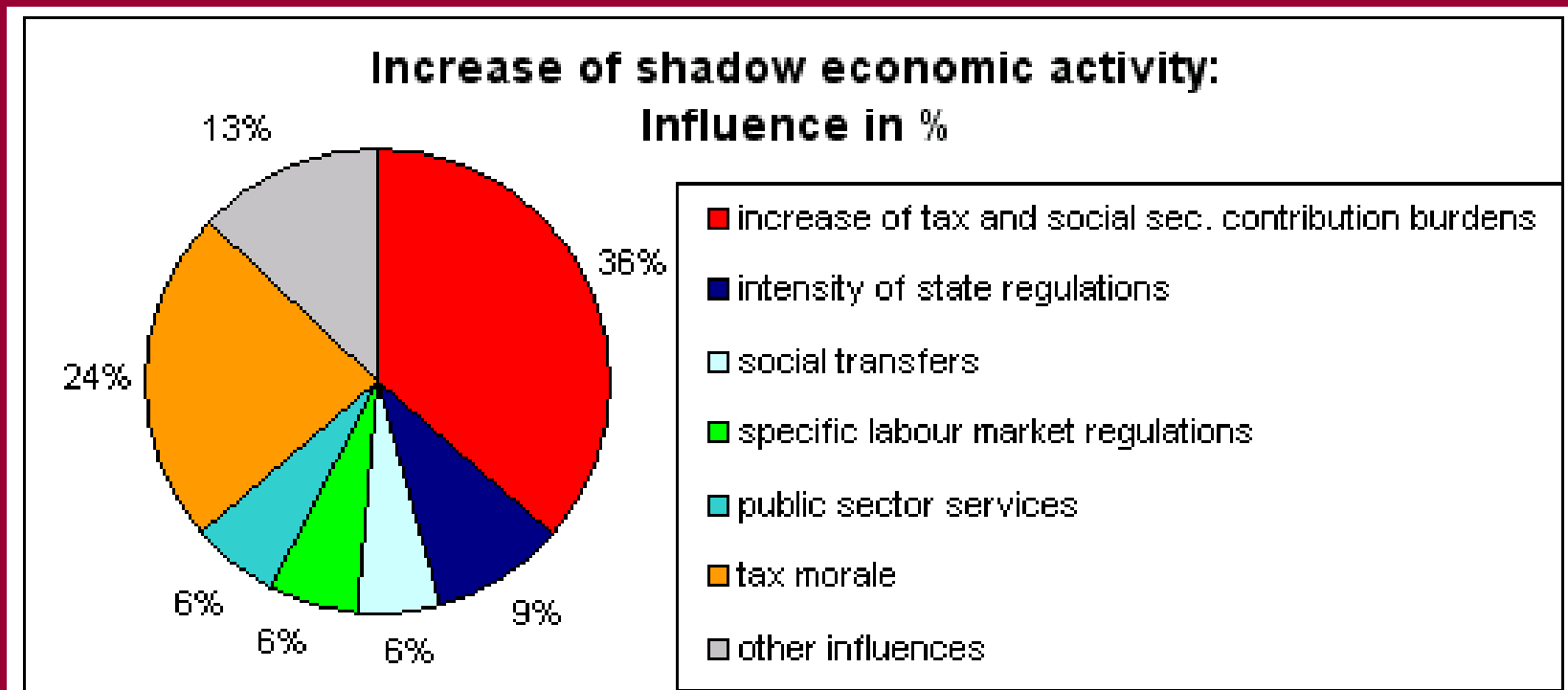
- (1) tax evasion or tax avoidance,
- (2) to avoid payment of social security contributions,
- (3) to avoid having to meet certain legal labor market standards, such as minimum wages, maximum working hours, safety standards, etc., and/or
- (4) to avoid complying with certain administrative procedures, such as completing statistical questionnaires or other administrative forms.

Hence, this paper does not deal with typical economic activities that are illegal and fit the characteristics of classical crimes like burglary, robbery, drug dealing, etc.

2. Theoretical Background

2.2. Theoretical Considerations about the main Causes for the Existence of the Shadow Economy

Figure 2.1: Main causes influencing of shadow economic activities



Source: Schneider (2006).

2. Theoretical Background

2.2. Theoretical Considerations about the main Causes for the Existence of the Shadow Economy

2.2.1. Tax and Social Security Burden

- (1) Numerous studies demonstrate, that an increasing burden of taxes and social security contributions is one of the main causes for the development and increase of shadow economic activities.**
- (2) The greater the difference between total cost of labour in the official economy and after-tax earnings from work, the greater is the incentive to work in the shadow economy.**

2. Theoretical Background

2.2. Theoretical Considerations about the main Causes for the Existence of the Shadow Economy

2.2.2. Intensity of Regulation

- (1) Individuals often consider increasing intensity of state regulation as cost-rising and freedom-limiting.**

- (2) Therefore, increasing intensity of regulation supports the switch to shadow economic activities.**

2. Theoretical Background

2.2. Theoretical Considerations about the main Causes for the Existence of the Shadow Economy

2.2.3. Changes in labour market conditions and the employment system

- (1) A strong regulation (i.e. strong policy intervention) of the official labour market has the effect that people have available much more time which can be used for shadow economic activities.**

- (2) An increase in transfers reduces the incentives to work in the official economy, too. As a consequence, people choose to work less in the official economy and as a result may increase their shadow economic activities.**

2. Theoretical Background












2.2. Theoretical Considerations about the main Causes for the Existence of the Shadow Economy

2.2.4. Changes in individual values and general attitude towards shadow economic

- (1) In all societies politicians interfere in the economy to “fix” the limits between legality and illegality and to regulate the functioning of economic life. These interventions, however, may not be according to everybody’s idea of morality and understanding of justice; hence, people have no bad feelings towards „normal“ shadow economic activities.**
- (2) In general, if trust of the public authorities is high and if the population shows a positive attitude towards state interventions, one normally expects lower shadow economic activities.**

2.3. Theoretical Reasoning about the Interaction between the Shadow and the Official Economy/

Table 2.2: Interactions between the shadow and the official economy

The shadow economy influences the official one through		Effects on the official economy
Tax system	 Tax evasion 	Redistribution policies to finance qualitative and quantitative improvement of public goods are reduced, thus economic growth may be negatively affected.
	 Additional tax revenues 	<p>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.</p> <p><i>Which effect is dominating is an empirical question; for developing countries mostly the tax evasion effect is dominating</i></p>
Allocations	 Stronger competition and stimulation of markets	 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
		 Cost advantages of producers acting from the shadow economy may lead to ruinous competition for those in the official economy
Policy decisions	 Bias in the officially published data 	Stabilizing, redistributive and fiscal policies may fail desired effects

2.3. The Interaction between the Shadow and the Official Economy: the Case of Columbia

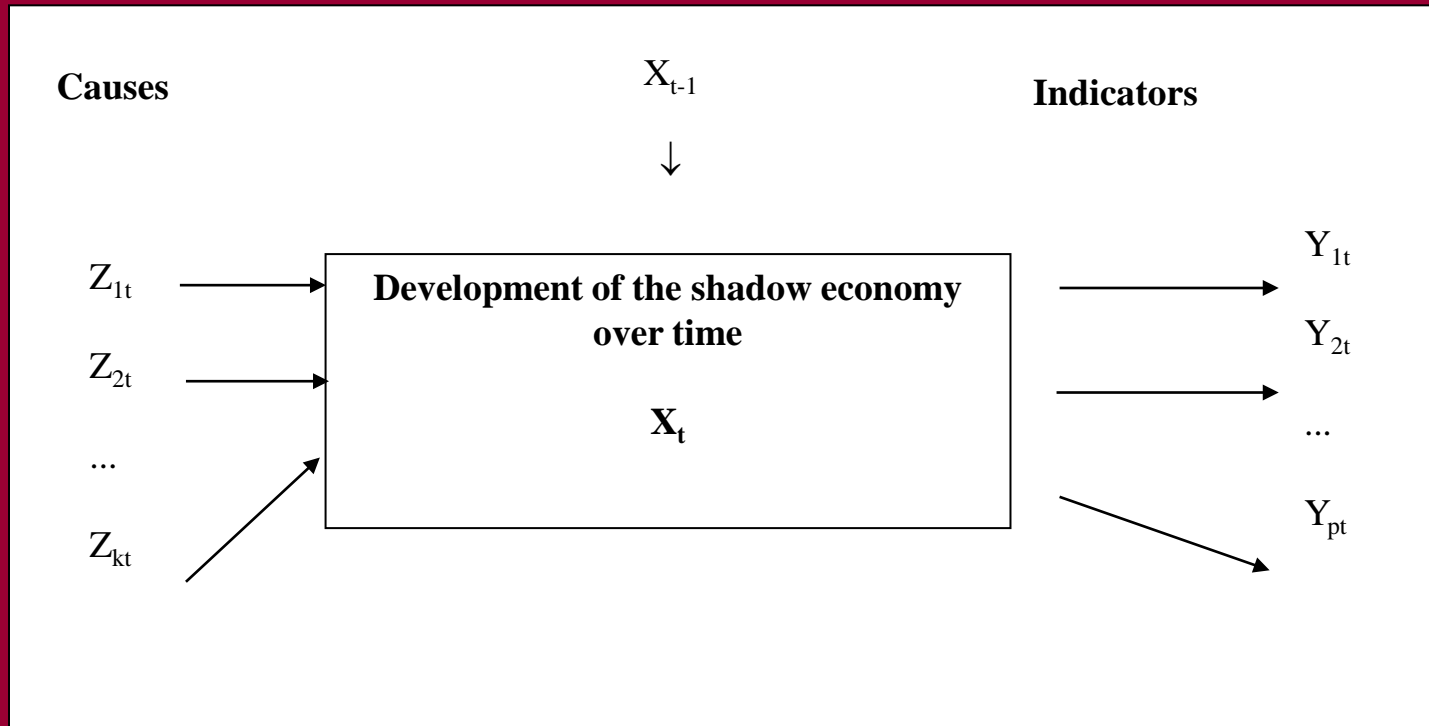
Simulations on the Relative and Absolute Influence of the Shadow Economy on Economic Growth

- (1) The average values of the growth of real GDP per capita vary between -5.96 and +5.6 % or -46 and +30 USD over the period 1977/78 to 2004/05.**
- (2) The average values of the relative and absolute influences on growth by shadow economic activity lie between -2.6 and +1.14 percentage points and -11.0 and +6.1 USD respectively.**
- (3) The result shows a moderate but still important positive effect of underground activity on economic growth in Columbia.**

3. Empirical Estimates of the Size of the Shadow Economies

3.1 The Latent (DYMIMIC) Estimation Approach

Figure 3.1: Development of the Shadow Economy over time



3. Empirical Estimates of the Size of the Shadow Economies

3.2. Econometric Results for 21 Middle and South American Countries

Table 3.1. DYMIMIC Estimations of the size of the shadow economy of 21 Middle and South American countries 1999/00, 2001/02, 2002/03, 2003/04, 2004/05 and 2005/06

Cause Variables	Estimated Coefficients
Share of direct taxation (in % of GDP)	$\lambda_1 = 0.147^{(*)}$ (1.70)
Share of indirect taxation and customs duties (in % of GDP)	$\lambda_2 = 0.274^{**}$ (3.55)
Burden of state regulation (Index, Heritage Foundation: score 1 most economic freedom, 5 least economic freedom)	$\lambda_3 = 0.345^{**}$ (3.47)
Unemployment quota (%)	$\lambda_4 = 0.284^{**}$ (3.41)
GDP per capita (in US-\$)	$\lambda_5 = -0.140^{*}$ (-2.27)
Lagged endogenous variable	$\lambda_6 = 0.201$ (1.21)

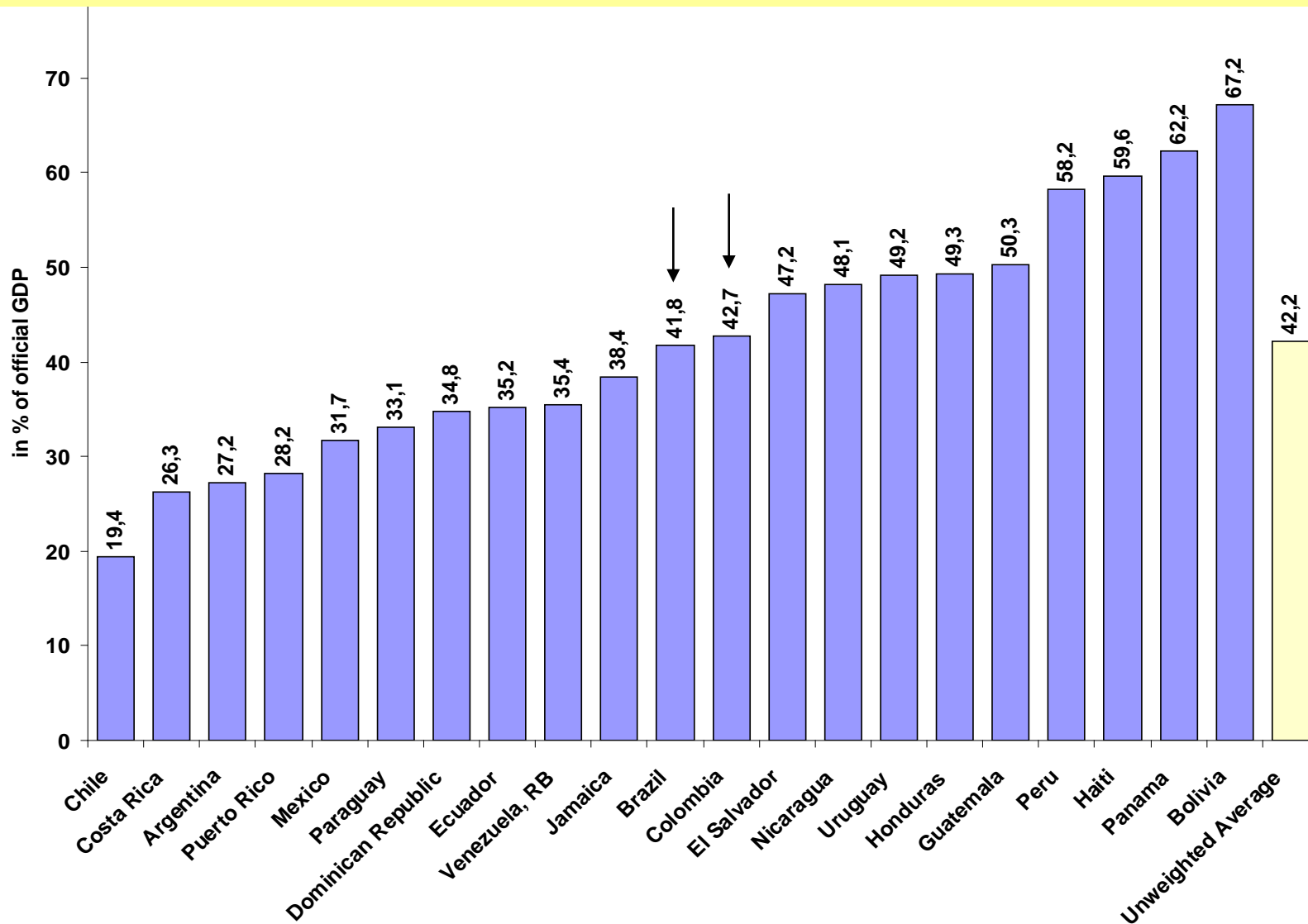
Table 3.1. DYMIMIC Estimations of the size of the shadow economy of 21 Middle and South American countries 1999/00, 2001/02, 2002/03, 2003/04 and 2004/05 – Cont.

Indicator Variables	
Employment quota (in % of population 18-64)	$\lambda_7 = -0.523^*$ (-2.41)
Annual rate of GDP Change of local currency per capita	$\lambda_8 = -1$ (Residuum) $\lambda_9 = 0.417^{**}$ (3.69)
	RMSE¹⁾ = 0.0060(*) (p-value = 0.943)
Test-statistics	Chi-square²⁾ = 9.90 (p-value = 0.953) TMNCV³⁾ = 0.070 AGFI⁴⁾ = 0.724 N = 131 D.F.⁵⁾ = 36

Notes: t-statistics are given in parentheses (*); *, ** means the t-statistics are statistically significant at the 90%, 95%, or 99% confidence level. 1) Steigers Root Mean Square Error of Approximation (RMSEA) for test of close fit; RMSEA < 0.05; the RMSEA-value varies between 0.0 and 1.0. 2) If the structural equation model is asymptotically correct, then the matrix S (sample covariance matrix) will be equal to $\Sigma(\theta)$ (model implied covariance matrix). This test has a statistical validity with a large sample ($N \geq 100$) and multinomial distributions; both are given for all three equations in tables 3.1-3.3 using a test of multi normal distributions. 3) Test of Multivariate Normality for Continuous Variables (TMNCV); p-values of skewness and kurtosis. 4) Test of Adjusted Goodness of Fit Index (AGFI), varying between 0 and 1; 1 = perfect fit. 5) 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.

3. Empirical Estimates of the Size of the Shadow Economies

Figure 3.2.1: The Size of the Shadow Economy in 21 Central and South American countries; 2005/06



3. Empirical Estimates of the Size of the 21 Shadow Economies

3.3. Results for Brazil

Table 3.3.1: Total tax burden for Brazil in terms of GDP

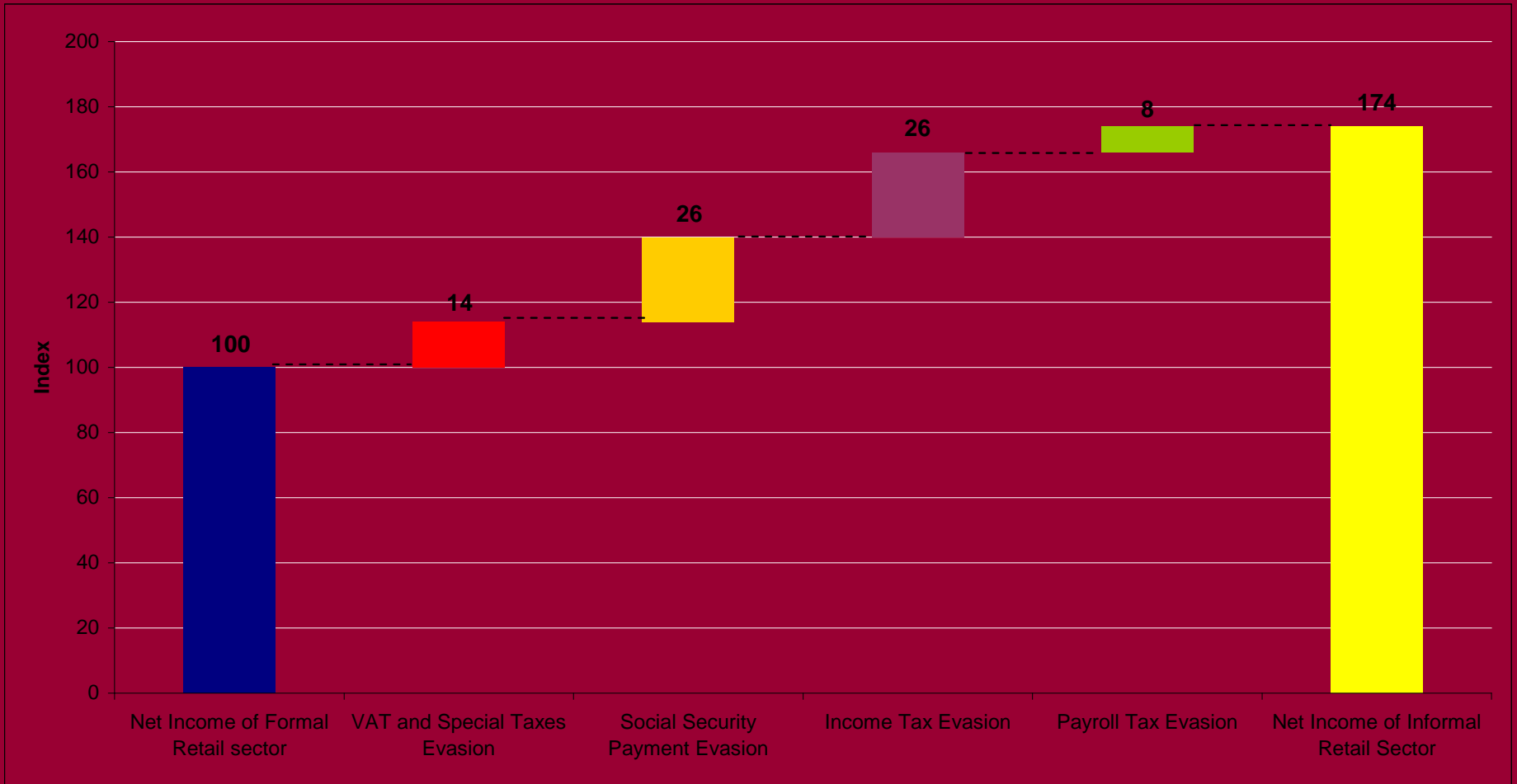
Year	(% of GDP)
1998	29.74
1999	31.77
2000	32.48
2001	33.84
2002	35.86
2003	34.91
2004	35.96
2005	37.40
2006	36.40

Source: SRF

3. Empirical Estimates of the Size of the 21 Shadow Economies

3.3. Results for Brazil

Figure 3.3.1: Mexico

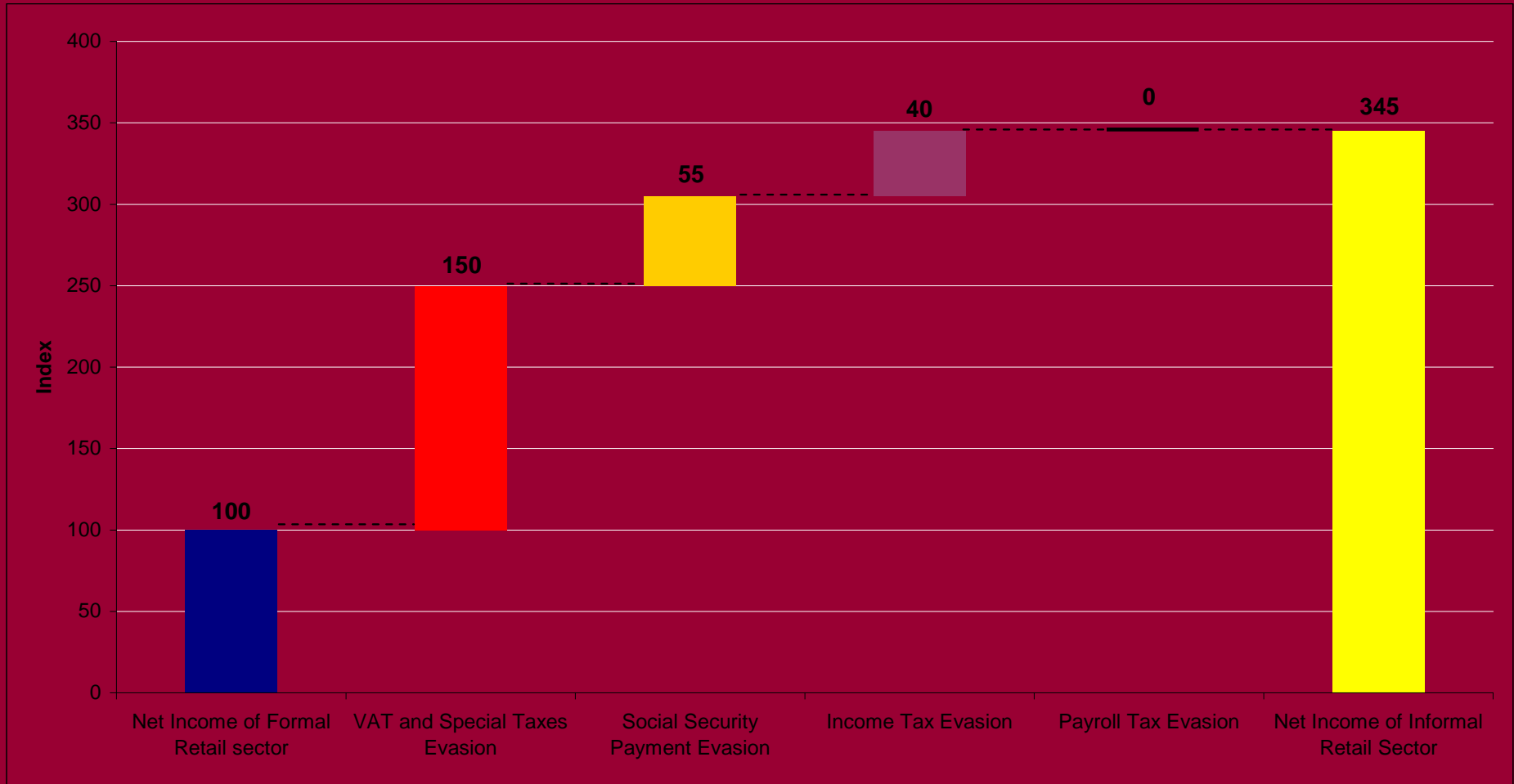


Source: McKinsey Consulting (2004).

3. Empirical Estimates of the Size of the 21 Shadow Economies

3.3. Results for Brazil

Figure 3.3.2: Brazil

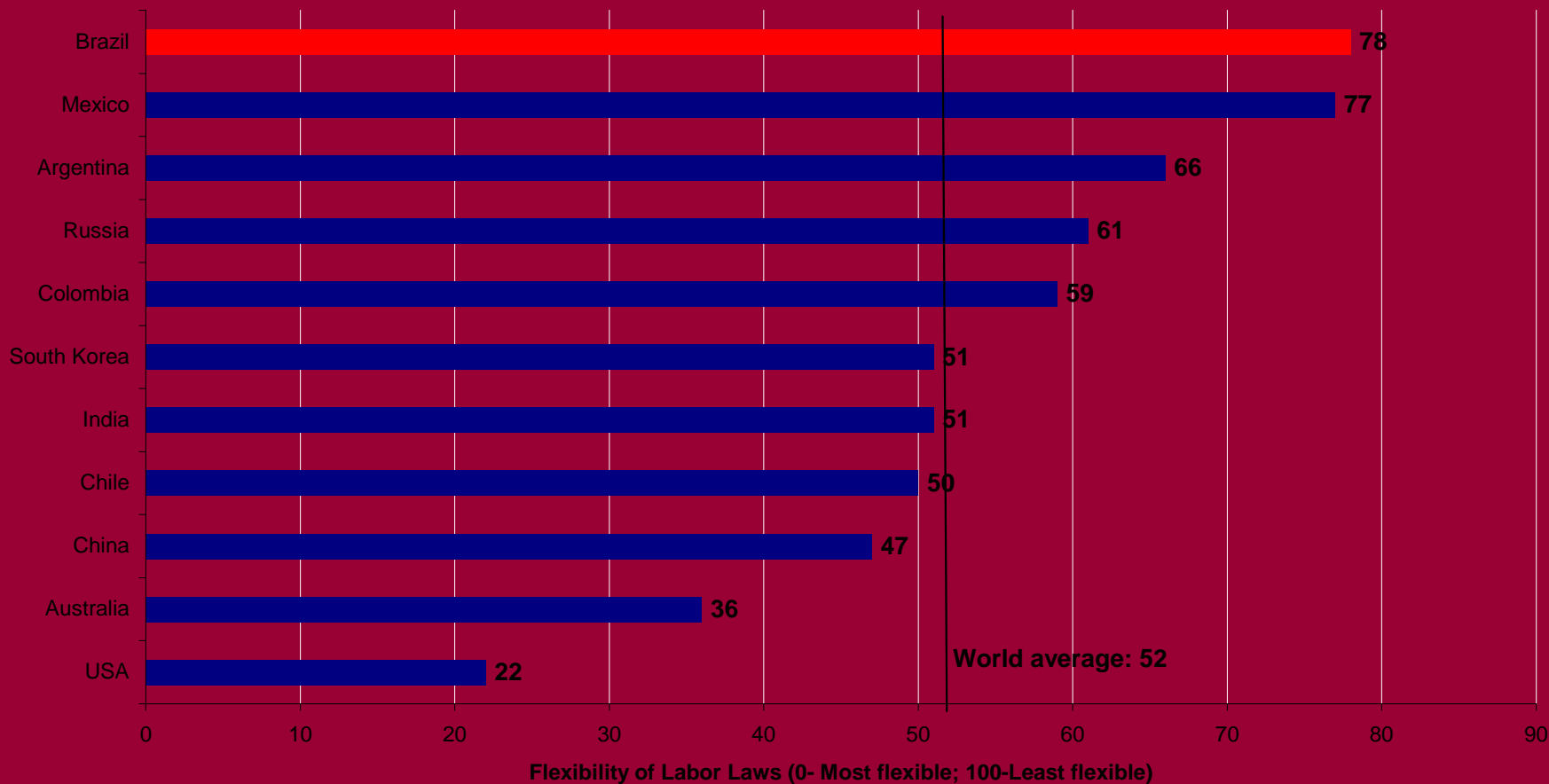


Source: McKinsey Consulting (2004).

3. Empirical Estimates of the Size of the 21 Shadow Economies

3.3. Results for Brazil

Figure 3.3.3: Degree of rigidity in labor legislation, 2003.



Source: McKinsey Consulting (2004).

3. Empirical Estimates of the Size of the 21 Shadow Economies 3.3. Results for Brazil

Table 3.3.1: Labor costs per working hour in Brazil

Type of Expense	% of wage
Group A – Social charges	36.30
Social security	20.00
FGTS (obligatory redundancy fund)	8.50
Educational salary	2.50
Workers' compensation (average)	2.00
SESI/SESC/SEST (workers' funds)	1.50
SENAI/SENAC/SENAT (workers' funds)	1.00
SEBRAE (support for small enterprises)	0.60
INCRA (agrarian reform)	0.20
Group B – Time not worked I	38.23
Weekly rest period	18.91
Vacations	9.45
Vacation bonus	3.64
Public holidays	4.36
Notice period (payment for unjustifiable dismissal)	1.32
Nursing assistance	0.55
	38.23
Group C – Time not worked II	14.12
13th salary	10.91
Dismissal expenses	3.21
Group D – Cumulative incidences	14.81
Cumulative incidence of Group A/ Group B (there are expenses in Group A that are charged on items in Group B, which is why they are called cumulative)	13.88
Incidence of FGTS on 13th salary	0.93
General total	103.46

Source: Pastore (2003) Table 3.8: Labor costs per working hour in Brazil

3. Empirical Estimates of the Size of the 21 Shadow Economies 3.3. Results for Brazil

Table 3.3.2: Econometric Results of the Brazilian shadow economy Using Different Specifications of the MIMIC Model, period 1994-1999

Variables	1	2	3	4	5
Indicator					
NTSCT – Workers without employment register	0.198**	0.196**	0.191**	0.187**	0.187**
	(0.027)	(0.027)	(0.028)	(0.026)	(0.027)
PMPP – currency in Circulation outside banks	1	1	1	1	1
D(GDP) – First different of GDP					-0.005
					(0.018)
Causal					
CPMF – Regulation Measure: Contribution to Financial Movement	0.299**	0.244**	0.216**	0.212**	0.213**
	(0.040)	(0.036)	(0.036)	(0.034)	(0.034)
TRADE . (Export + Import)/GDP	5.947**	6.012**	5.232**	5.529**	5.483**
	(0.762)	(0.767)	(0.726)	(0.719)	(0.717)
DESEMP – Rate of Unemployment		6.046**	5.792**	5.47**	5.474**
		(1.612)	(1.639)	(1.633)	(1.633)
RTRIB – Total Tax Burden (Tot. Revenues/GDP)			0.326**	0.407**	0.411**
			(0.094)	(0.097)	(0.097)

Source: Arvate, Lucinda and Schneider (2005).

3. Empirical Estimates of the Size of the 21 Shadow Economies 3.3. Results for Brazil

Table 3.3.2: Econometric Results of the Brazilian shadow economy Using Different Specifications of the MIMIC Model, period 1994-1999 – cont.

Variables	1	2	3	4	5
Causal					
DIEP – Disposable Income per Capita (... labor force)				0.337(*)	0.322
				(0.207)	(0.207)
Test statistics					
Minimum Value of Discrepancy Function (c)	348.66	337.42	333.18	331.68	331.52
C-less the Degrees of Freedom (C-df)	323.66	313.42	310.18	309.68	310.52
Akarke Information Criterion (AIC)	386.66	377.42	375.18	375.68	377.52
Browne Cudick Information Criterion (BCC)	390.63	381.60	379.57	380.29	382.33

Source: Arvate, Lucinda and Schneider (2005).

3. Empirical Estimates of the Size of the 21 Shadow Economies - 3.3. Results for Brazil
Table 3.3.3: Size and Development of the Brazilian Shadow Economy from 1995 to 2007

Year	Brazilian Shadow Economy in % of official GDP	Panel Estimation of the 21 countries for Brazil
1995	20.71	36.4 ¹⁾
1996	20.96	
1997	25.69	
1998	28.64	
1999	31.69	
2000	34.92	39.8 ²⁾
2001	37.23	
2002	39.40	40.9 ³⁾
2003	41.34	
2004	42.60	42.3 ⁴⁾
2005	41.30	40.8 ⁵⁾
2006	40.69	39.4 ⁶⁾
2007	40.23	

Source: Own calculation based on the MIMIC estimate in Tables 3.2 and 3.4.1 and on Arvate, Lucinda and Schneider (2005)

1) Average from 1994/95; 2) Average from 1999/2000; 3) Average from 2001/02; 4) Average from 2003/04; 5) Average from 2004/05; 6) Average from 2005/06.

3. Empirical Estimates of the Size of the Shadow Economies

3.4. Results for Columbia

3.3.1 Method: Currency demand method

Dependent variables: *Currency demand per capita* and *ratio of cash holdings to checkable deposits*.

Independent traditional variables:

- (1) the real Gross Domestic Product per capita (GDPPC),**
- (2) the yearly average interest rate on deposits of 90 days (IRD),**
- (3) the yearly average market exchange rate of the Colombian Peso (COP) to the US dollar (ER),**
- (4) the cumulative real value of imported cash dispensers as a proxy variable for cash substitutes describing changes in cash demand over time (ICD).**

3. Empirical Estimates of the Size of the Shadow Economies

3.4. Results for Columbia – Cont.

The independent variables for explaining the currency demand due to shadow economic activities are

(5) the average real direct (TY) and indirect (TC) net tax rates (tax on income and VAT),

(6) the unemployment rate (UNEMP), and

(7) the real expenditures for public employees in % of GDP (EPE) and the number of new laws issued per year (LAW) as proxies for the intensity of regulation and control.

Model 1 based on currency per capita (DC as dependent var.):

$$\ln CDC_t = \beta_0 + \beta_1 \times \ln GDP_{PC_t} + \beta_2 \times IRD_t + \beta_3 \times \ln ICD_t + \beta_4 \times \ln ER_t + \beta_5 \times \ln(1 + TY_t) + \beta_6 \times \ln(1 + TC_t) + \beta_7 \times \ln UNEMP_t + \beta_8 \times \ln EPE_t + \beta_9 \times \ln LAW_t + u_t$$

Mod. 2 based on the ratio of cash to checkable deposits (cd as dep.v.):

$$CD_t = \beta_0 + \beta_1 \times \ln GDP_{PC_t} + \beta_2 \times IRD_t + \beta_3 \times \ln ICD_t + \beta_4 \times \ln ER_t + \beta_5 \times \ln(1 + TY_t) + \beta_6 \times \ln(1 + TC_t) + \beta_7 \times \ln UNEMP_t + \beta_8 \times \ln EPE_t + \beta_9 \times \ln LAW_t + u_t$$

$$\beta_1 > 0, \beta_2 < 0, \beta_3 > 0, \beta_4 > 0, \beta_5, \beta_6, \beta_7, \beta_8 \text{ and } \beta_9 > 0$$

3. Empirical Estimates of the Size of the Shadow Economies

3.4 Estimation Results for Columbia

Table 3.4.1: Regression results using the currency demand method

<i>regression results</i>			
		model 1	model 2
endogenous variables		currency demand per capita	ratio cash holdings to checkable deposits
exogenous variables		estimated coefficients	
GDPPC:	real GDP per capita	4.8757*	0.0281
IRD:	interest rate on bank deposits (yearly average)	-0.4042*	-0.1002*
ICD:	cumulative value of cash dispensers	-0.0097	-0.0213
ER	yearly average exchange rate COP/USD	0.5982*	0.1121
TY:	average net tax rate on income	1.7158	0.873
TC:	average net tax rate on consumption	6.8970*	4.1290*
UNEMP:	unemployment rate	0.4241*	0.3250*
EPE:	real expenditures for public employees (% of real GDP)	-0.2734	-0.0381
LAW:	number of new laws issued per year	0.2401	0.0021
constant term		-66.2709*	-1.7031
* significant on 5 % level; all variables in logarithmic form			

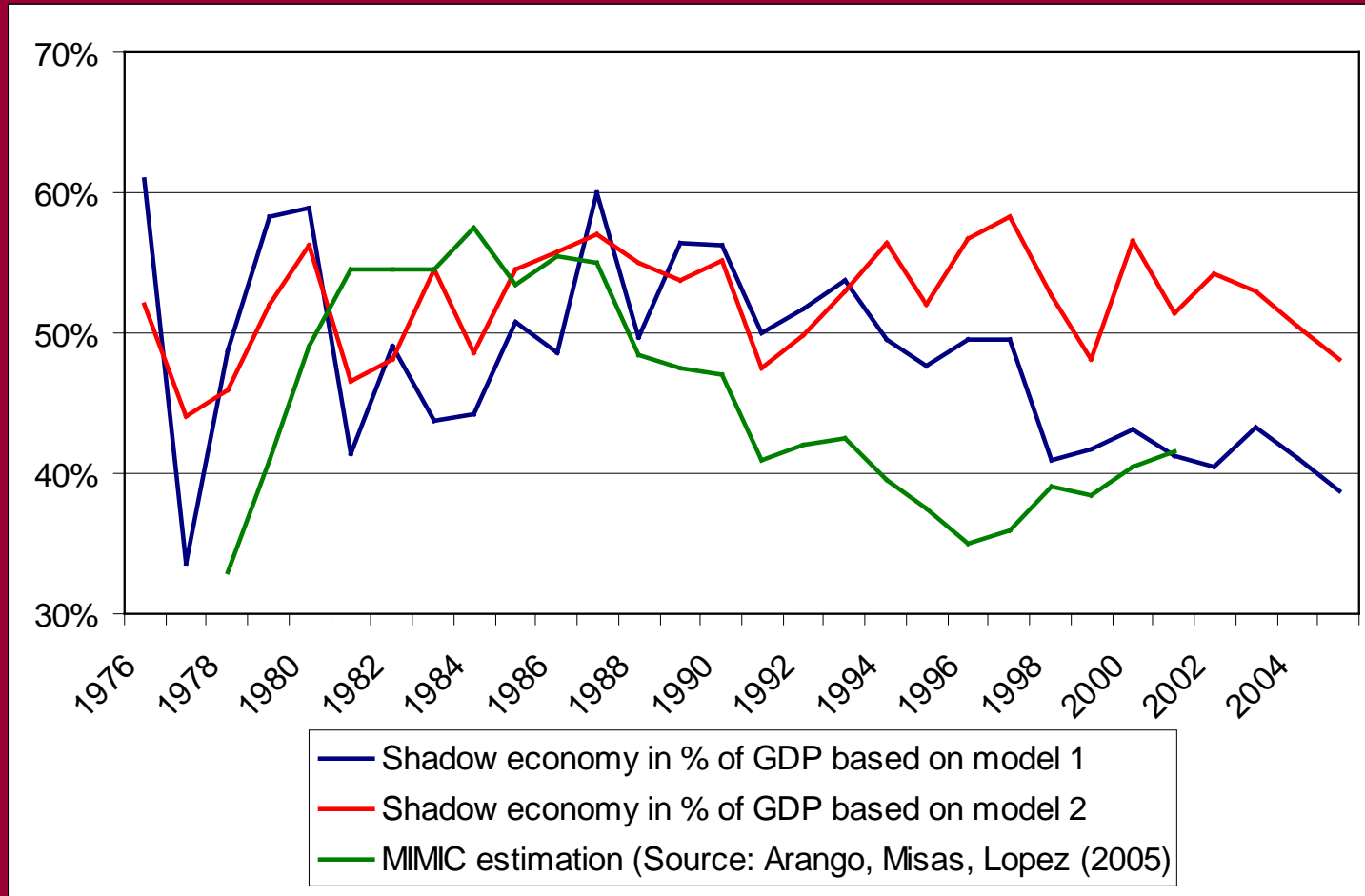
Source: Own calculations. For more detailed tables of the regression results see appendix B.2.

3. Empirical Estimates of the Size of the Shadow Economies

3.4. Results for Columbia

3.4.1. Calculation of the Size of the Columbian Shadow Economy

Figure 3.4.1: Simulations of the estimated size of the shadow economy in % of nominal GDP for Colombia, 1977-2005.



Source: Model 1 is based on the regression results of model 1, using currency demand per capita as endogenous variable whereas model 2 uses the results of the second regression based on the ratio of cash holdings to checkable deposits as endogenous variable. The figures based on the MIMIC estimation by Colombian Central Bank (2005) are in combination with an estimation based on the currency demand approach carried out by Schneider and Enste (2002).

4. Summary and Conclusions

- (1) Applying the DYMIMIC procedure for 21 Middle and South American countries and considering especially Brazil and Columbia, the *first major finding* of my paper is a rather large size of the shadow economy in Brazil and in Colombia and in most other South American countries (except Chile).**
- (2) My second major finding is that the shadow economy in Brazil steadily increased from 20.7% in 1995 to 42.6% in 2004 and since then decreased to 40.2% in 2007. The shadow economy in Columbia fluctuated between 40 and 50% over the last 20 years but shows a decreasing trend towards 40% in the last years.**
- (3) *My third major finding* is the positive effect of the shadow economy on economic growth in Colombia. The average growth rate of real GDP per capita between 1977 and 2005 is 1.22 %, and on average 0.33 percentage points of the growth is explained by shadow economic activities.**

4. Summary and Conclusions – Cont.

Considering these findings, I draw the following conclusion:

Even, if the econometric estimates provide the preliminary result of a positive effect of the shadow economy on “official” economic growth, this stimulating influence is only moderate.

There are still great latent potentials and productivities in the shadow economy which can not be (fully) used due to the generally low productivity of the shadow economic activities.

The governments of Brazil and Columbia should be aware of these lost potentials and should implement incentive orientated programs to integrate the shadow economy in the official one.

5. Appendix A: Methods to Estimate the Size of the Shadow Economy

5.1. Appendix A1: The Latent (DYMIMIC) Estimation Approach

Critical Arguments

Objections against the (DY)MIMIC method, are.:

- (1) instability in the estimated coefficients with respect to sample size changes,**
- (2) instability in the estimated coefficients with respect to alternative specifications,**
- (3) difficulty of obtaining reliable data on cause variables other than tax variables, and**
- (4) the reliability of the variables grouping into "causes" and "indicators" in explaining the variability of the shadow economy.**
- (5) Only relative estimated coefficients are obtained, hence, another method must be used to calculate absolute values.**

5. Appendix A: Methods to Estimate the Size of the Shadow Economy

5.2. Appendix A2: Currency Demand Approach

The basic regression equation for the currency demand, proposed by Tanzi (1983), is the following:

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

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

where

\ln denotes natural logarithms,

$C / M2$ is the ratio of cash holdings to current and deposit accounts,

TW is a weighted average tax rate (as a proxy changes in the size of the shadow economy),

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

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

Y / N is the per capita income.

5.2. Appendix A2: Currency Demand Approach – cont.

5.2. Objections against the current demand approach are:

- (1) Not all transactions in the shadow economy are paid in cash. The size of the total shadow economy (including barter) may thus be larger.**
- (2) Most studies consider only one particular factor, the tax burden, as a cause of the shadow economy. If other factors also have an impact on the extent of the hidden economy, the shadow economy may be higher.**
- (3) Blades and Feige, criticize Tanzi's studies on the grounds that the US dollar is used as an international currency, which has to be controlled.**
- (4) Another weak point is the assumption of the same velocity of money in both types of economies.**
- (5) Ahumada, Alvaredo, Canavese A. and P. Canavese (2004) show, that the currency approach together with the assumption of equal income velocity of money in both, the reported and the hidden transaction is only correct, if the income elasticity is 1. As this is for most countries not the case, the calculation has to be corrected.**
- (6) Finally, the assumption of no shadow economy in a base year is open to criticism.**

5. Appendix B: Detailed Regression Results using the Currency Demand Method

Table 5.1: Model 1; endogenous variable – currency demand per capita (ln)

ARIMA regression						
Sample: 1976 to 2005			Number of obs		=	30
Log pseudo-likelihood = 27.51693			Wald chi2(11)		=	3.44e+13
			Prob > chi2		=	0.0000

lncdc	Coef.	Semi-robust Std. Err.	z	P> z	[95% Conf. Interval]	

lncdc						
lngdppc	4.875668	.7511047	6.49	0.000	3.40353	6.347806
lnird	-.4041525	.1512891	-2.67	0.008	-.7006736	-.1076313
lnicd	-.0096975	.0247296	-0.39	0.695	-.0581666	.0387717
lner	.5981841	.1032541	5.79	0.000	.3958098	.8005584
lnlty	1.715784	3.107751	0.55	0.581	-4.375296	7.806863
lnltc	6.896934	2.683077	2.57	0.010	1.638201	12.15567
lnunemp	.4240908	.1317535	3.22	0.001	.1658587	.6823229
lnepe	-.2734015	.379423	-0.72	0.471	-1.017057	.4702539
lnlaw	.240102	.1369609	1.75	0.080	-.0283364	.5085404
_cons	-66.27091	10.71342	-6.19	0.000	-87.26882	-45.273

ARMA						
ar						
L1	-.4332031	.5499156	-0.79	0.431	-1.511018	.6446117

/sigma	.0926669	.0141801	6.54	0.000	.0648745	.1204593

5. Appendix B: Detailed Regression Results using the Currency Demand Method

Table 5.1: Model 1: Misspecification and Diagnostic Testing

Augmented Dickey-Fuller test statistic for CDC (ln), allowing for intercept	DF = -3.173	p = 0.0216
Autocorrelations CDC (ln)		
to lag 1	0.903	significant at 5%
to lag 2	0.807	significant at 5%
Partial Autocorrelations CDC (ln)		
to lag 1	0.903	significant at 5%
to lag 2	-0.045	insignificant at 5%
Jarque-Bera-Test for normality of residuals	JB=2.0914	p=0.3514
Chow-Test for structural discontinuity (break in 1992)	F=1.33617	p= 0.31344

5. Appendix B: Detailed Regression Results using the Currency Demand Method

Table 5.2: Model 2; endogenous variable – ratio of cash holdings to checkable deposits

Regression with robust standard errors

Number of obs = 30
 F(9, 20) = 96.99
 Prob > F = 0.0000
 R-squared = 0.9715
 Root MSE = .06631

lncd	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
lngdppc	.028122	.59738	0.05	0.963	-1.217991	1.274235
lnird	-.1002235	.0450173	-2.23	0.038	-.194128	-.006319
lnicd	-.0212542	.014307	-1.49	0.153	-.051098	.0085895
lner	.11212	.0728924	1.54	0.140	-.0399309	.2641709
lnlty	.8729661	1.095139	0.80	0.435	-1.411453	3.157385
lnltc	4.128927	1.640348	2.52	0.020	.7072206	7.550634
lnunemp	.3250009	.0988272	3.29	0.004	.1188509	.5311509
lnepe	-.038121	.1352221	-0.28	0.781	-.3201894	.2439473
lnlaw	.0021435	.0464235	0.05	0.964	-.0946942	.0989812
_cons	-1.703135	7.915936	-0.22	0.832	-18.21549	14.80922

5. Appendix B: Detailed Regression Results using the Currency Demand Method

Table 5.2: Model 2: Misspecification and Diagnostic Testing

Augmented Dickey-Fuller test statistic for $\ln CD$, allowing for linear trend and intercept	DF=- -1.410	p= 0.6570
Autocorrelations CD to lag 1	-0.082	insignificant at 5%
Jarque-Bera-Test for normality of residuals	JB=2.7978	p=0.3469
Chow-Test for structural discontinuity (break in 1992)	F= 1.2921	p= 0.3325