

**Inside the ‘Black Box’ of the nexus between economic conditions and crime:
Can the relationship be mitigated?**

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APPENDICES

Appendix A - Variable definitions and data sources

Appendix B – Robustness check using cyclical male unemployment

Appendix C - Robustness check using cyclical youth unemployment

Appendix D - Robustness check using alternative shadow economy definition

Appendix E - Robustness check using alternative property crime definition

Appendix A. Variable definitions and data sources.

<i>Variable Name</i>	<i>Variable Definition</i>	<i>Source</i>
<i>Property crime rate</i>	The sum of burglary of private residential premises and theft of a motorised land vehicle (per 100,000 population).	<i>Eurostat, Crime and Criminal Justice Database</i>
<i>Prison population rate</i>	Total prisoners (per 100,000 population).	<i>Eurostat, Crime and Criminal Justice Database</i>
<i>Total & male population</i>	The number of inhabitants of a given area on 1 January of the year in question (or on 31 December of the previous year).	<i>Eurostat, Population Database</i>
<i>Poverty gap</i>	The poverty gap at \$1.90 a day (2011 PPP) is the mean shortfall in income or consumption from the poverty line of \$1.90 a day (counting the nonpoor as having zero shortfall), expressed as a percentage of the poverty line.	<i>World Bank, WDI Database</i>
<i>Secondary education</i>	Theoretical duration of upper secondary education (years).	<i>World Bank, Education Statistics</i>
<i>Final consumption expenditure</i>	The sum of household final consumption expenditure and general government final consumption expenditure (% of GDP).	<i>World Bank, WDI Database</i>
<i>Job vacancy rate</i>	Defined as the number of job vacancies divided by the sum of the number of occupied posts and the number of job vacancies.	<i>Eurostat, Job Vacancy Statistics</i>
<i>Unemployment rate</i>	Denotes the number of unemployed (from 15 to 74 years) as % of the population in the LF. Data on male unemployment rates (from 15 to 74 years) and youth unemployment rates (from 15 to 24 years) have been also collected.	<i>Eurostat, LFS Main Indicators</i>
<i>Active LMP measures</i>	LMP measures (in euros at constant 2010 prices) per LF member or as % of GDP including Training; Employment incentives; Supported employment and rehabilitation; Direct job creation; and Start-up incentives.	<i>Eurostat, Labour Market Policy Database</i>
<i>Passive LMP measures</i>	LMP supports (in euros at constant 2010 prices) per LF member or as % of GDP including Out-of-work income maintenance and support; Early retirement.	<i>Eurostat, Labour Market Policy Database</i>
<i>Shadow economy</i>	Multiple indicators multiple causes model-based (MIMIC) estimates of informal output (% of official GDP).	<i>Elgin et al. (2021) Medina & Schneider (2019)</i>

Appendix B. Crime and cyclical male unemployment under regimes of the shadow economy and LMPs categories.

Variable	Baseline model (1)	ALMP (2)	LMT (3)	PLMP (4)	ALMP (5)	LMT (6)	PLMP (7)
$\ln(\text{crime})_{it-1}$	0.710*** (0.090)	0.690*** (0.090)	0.684*** (0.089)	0.673*** (0.089)	0.689*** (0.088)	0.669*** (0.095)	0.701*** (0.098)
D_{shadow}		-0.132*** (0.027)	-0.081 (0.073)	0.037 (0.061)	-0.012 (0.078)	0.010 (0.053)	-0.170*** (0.061)
D_{imp}		-0.167** (0.081)	-0.086 (0.066)	-0.077 (0.052)	0.016 (0.036)	0.014 (0.019)	-0.028 (0.038)
$D_{\text{imp,shadow}}$		-0.158*** (0.033)	-0.158** (0.077)	-0.092*** (0.029)	-0.044 (0.060)	-0.032 (0.046)	-0.057 (0.057)
$(\text{cycle})_{it}$	0.010 (0.007)	0.064*** (0.017)	0.054*** (0.020)	0.064*** (0.017)	0.066*** (0.016)	0.062*** (0.018)	0.059** (0.026)
$D_{\text{shadow}} \times (\text{cycle})_{it}$		-0.055*** (0.016)	-0.045** (0.020)	-0.050*** (0.017)	-0.054*** (0.015)	-0.044** (0.019)	-0.035 (0.024)
$D_{\text{imp}} \times (\text{cycle})_{it}$		-0.051** (0.023)	-0.034 (0.023)	-0.045* (0.023)	-0.052** (0.022)	-0.043** (0.020)	-0.025 (0.031)
$D_{\text{imp,shadow}} \times (\text{cycle})_{it}$		-0.071*** (0.022)	-0.046* (0.026)	-0.089*** (0.022)	-0.075*** (0.023)	-0.061*** (0.019)	-0.081*** (0.027)
$\ln(\text{prison})_{it}$	-0.691** (0.279)	-0.762*** (0.289)	-0.762*** (0.285)	-0.784*** (0.304)	-0.739*** (0.275)	-0.812*** (0.280)	-0.741** (0.298)
$(\text{education})_{it}$	-0.081*** (0.025)	-0.085*** (0.026)	-0.104*** (0.020)	-0.094*** (0.027)	-0.091*** (0.022)	-0.088*** (0.024)	-0.094*** (0.021)
$(\text{male population})_{it}$	0.110** (0.044)	0.100** (0.048)	0.097** (0.046)	0.117** (0.046)	0.092** (0.044)	0.103** (0.050)	0.106** (0.045)
$(\text{poverty gap})_{it}$	0.085** (0.041)	0.099** (0.041)	0.099** (0.042)	0.100** (0.042)	0.099** (0.040)	0.103** (0.042)	0.086* (0.046)
$(\text{consumption})_{it}$	-0.026** (0.012)	-0.027** (0.011)	-0.027** (0.011)	-0.026** (0.012)	-0.028** (0.011)	-0.027** (0.011)	-0.034** (0.014)
Constant	7.072*** (1.701)	7.712*** (1.737)	7.717*** (1.735)	7.777*** (1.789)	7.467*** (1.688)	7.924*** (1.741)	7.948*** (2.008)
Observations	369	369	369	369	369	369	369
Number of countries	28	28	28	28	28	28	28
AR(1) [p-value]	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AR(2) [p-value]	0.242	0.184	0.166	0.232	0.239	0.303	0.149
Sargan [p-value]	0.745	0.810	0.737	0.840	0.822	0.637	0.537
Number of Instruments	84	90	90	90	90	90	90

Notes: The variable $(\text{cycle})_{it}$ denotes cyclical unemployment, which is measured by applying the Hodrick-Prescott filter to the male unemployment rate series (15-74 years). In columns (2)-(4) categories of LMPs are measured as real expenditures per LF member, and in columns (5)-(7) as % of GDP. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. The set of RHS variables includes time effects, country effects, and country-specific time-effects, but their coefficient estimates are not reported due to space limitations.

Appendix C. Crime and cyclical youth unemployment under regimes of the shadow economy and LMPs categories.

<i>Variable</i>	<i>Baseline model</i>	<i>ALMP</i>	<i>LMT</i>	<i>PLMP</i>	<i>ALMP</i>	<i>LMT</i>	<i>PLMP</i>
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\ln(\text{crime})_{it-1}$	0.660*** (0.093)	0.640*** (0.095)	0.637*** (0.094)	0.618*** (0.093)	0.640*** (0.091)	0.625*** (0.099)	0.645*** (0.106)
D_{shadow}		-0.114*** (0.021)	-0.091 (0.072)	0.084 (0.075)	0.009 (0.073)	0.003 (0.046)	-0.124** (0.052)
D_{lmp}		-0.132* (0.077)	-0.090 (0.066)	-0.053 (0.049)	0.028 (0.040)	0.011 (0.021)	-0.007 (0.037)
$D_{\text{lmp,shadow}}$		-0.134*** (0.026)	-0.157** (0.077)	-0.063** (0.032)	-0.031 (0.060)	-0.040 (0.042)	-0.031 (0.054)
$(\text{cycle})_{it}$	0.008* (0.004)	0.031*** (0.006)	0.028*** (0.007)	0.031*** (0.006)	0.029*** (0.007)	0.026*** (0.007)	0.027*** (0.010)
$D_{\text{shadow}} \times (\text{cycle})_{it}$		-0.023*** (0.005)	-0.020*** (0.006)	-0.020*** (0.005)	-0.020*** (0.006)	-0.016** (0.007)	-0.012 (0.009)
$D_{\text{lmp}} \times (\text{cycle})_{it}$		-0.023*** (0.008)	-0.018** (0.007)	-0.021*** (0.008)	-0.020* (0.011)	-0.017* (0.009)	-0.012 (0.011)
$D_{\text{lmp,shadow}} \times (\text{cycle})_{it}$		-0.029** (0.014)	-0.019* (0.011)	-0.043*** (0.010)	-0.028*** (0.010)	-0.021*** (0.007)	-0.036*** (0.011)
$\ln(\text{prison})_{it}$	-0.801*** (0.278)	-0.897*** (0.285)	-0.899*** (0.283)	-0.906*** (0.303)	-0.861*** (0.275)	-0.903*** (0.293)	-0.870*** (0.296)
$(\text{education})_{it}$	-0.087*** (0.026)	-0.091*** (0.028)	-0.108*** (0.019)	-0.098*** (0.030)	-0.096*** (0.024)	-0.095*** (0.025)	-0.102*** (0.023)
$(\text{male population})_{it}$	0.113** (0.051)	0.103* (0.056)	0.099* (0.055)	0.129** (0.057)	0.104** (0.052)	0.099* (0.055)	0.110** (0.055)
$(\text{poverty gap})_{it}$	0.087** (0.042)	0.103** (0.041)	0.103** (0.041)	0.098** (0.043)	0.100** (0.041)	0.105** (0.042)	0.086* (0.045)
$(\text{consumption})_{it}$	-0.024** (0.011)	-0.024** (0.011)	-0.024** (0.011)	-0.023** (0.012)	-0.025** (0.011)	-0.024** (0.011)	-0.030** (0.013)
<i>Constant</i>	7.678*** (1.634)	8.419*** (1.653)	8.437*** (1.647)	8.426*** (1.716)	8.149*** (1.592)	8.379*** (1.727)	8.575*** (1.886)
<i>Observations</i>	369	369	369	369	369	369	369
<i>Number of countries</i>	28	28	28	28	28	28	28
<i>AR(1) [p-value]</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<i>AR(2) [p-value]</i>	0.228	0.150	0.134	0.209	0.214	0.226	0.115
<i>Sargan [p-value]</i>	0.175	0.217	0.218	0.242	0.253	0.244	0.143
<i>Number of Instruments</i>	84	90	90	90	90	90	90

Notes: The variable $(\text{cycle})_{it}$ denotes cyclical unemployment, which is measured by applying the Hodrick-Prescott filter to the youth unemployment rate series (15-24 years). In columns (2)-(4) categories of LMPs are measured as real expenditures per LF member, and in columns (5)-(7) as % of GDP. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. The set of RHS variables includes time effects, country effects, and country-specific time-effects, but their coefficient estimates are not reported due to space limitations.

Appendix D. Crime and cyclical unemployment under regimes of the shadow economy and LMPs categories. An alternative indicator of the shadow economy.

<i>Variable</i>	<i>ALMP</i> (1)	<i>LMT</i> (2)	<i>PLMP</i> (3)	<i>ALMP</i> (4)	<i>LMT</i> (5)	<i>PLMP</i> (6)
$\ln(\text{crime})_{it-1}$	0.658*** (0.101)	0.644*** (0.097)	0.635*** (0.098)	0.652*** (0.099)	0.638*** (0.101)	0.628*** (0.110)
D_{shadow}	0.081 (0.070)	0.058 (0.075)	0.073 (0.066)	0.096* (0.051)	0.111* (0.066)	0.021 (0.070)
D_{imp}	0.011 (0.052)	-0.038 (0.069)	-0.066* (0.040)	0.074 (0.049)	0.029 (0.029)	0.029 (0.053)
$D_{\text{imp,shadow}}$	-0.018 (0.053)	-0.034 (0.058)	-0.085* (0.046)	0.011 (0.040)	0.037 (0.057)	0.075 (0.064)
$(\text{cycle})_{it}$	0.048 (0.035)	0.070*** (0.019)	0.073*** (0.020)	0.067*** (0.022)	0.075*** (0.022)	0.077*** (0.026)
$D_{\text{shadow}} \times (\text{cycle})_{it}$	-0.034 (0.035)	-0.057*** (0.019)	-0.056*** (0.020)	-0.050** (0.022)	-0.052** (0.021)	-0.045* (0.023)
$D_{\text{imp}} \times (\text{cycle})_{it}$	-0.019 (0.037)	-0.059** (0.025)	-0.055*** (0.020)	-0.041** (0.020)	-0.061** (0.026)	-0.050 (0.031)
$D_{\text{imp,shadow}} \times (\text{cycle})_{it}$	-0.051 (0.042)	-0.051* (0.026)	-0.088*** (0.031)	-0.064** (0.029)	-0.070*** (0.024)	-0.089*** (0.029)
$\ln(\text{prison})_{it}$	-0.819** (0.318)	-0.783** (0.316)	-0.822** (0.322)	-0.819** (0.329)	-0.821** (0.331)	-0.751** (0.345)
$(\text{education})_{it}$	-0.118*** (0.036)	-0.129*** (0.033)	-0.117*** (0.041)	-0.116*** (0.034)	-0.119*** (0.038)	-0.110*** (0.032)
$(\text{male population})_{it}$	0.113** (0.054)	0.114** (0.053)	0.124** (0.053)	0.116** (0.056)	0.110* (0.058)	0.121** (0.055)
$(\text{poverty gap})_{it}$	0.097** (0.046)	0.098** (0.045)	0.100** (0.045)	0.100** (0.046)	0.101** (0.046)	0.084* (0.050)
$(\text{consumption})_{it}$	-0.029** (0.013)	-0.028** (0.013)	-0.028** (0.014)	-0.030** (0.013)	-0.027** (0.013)	-0.032** (0.015)
<i>Constant</i>	8.195*** (1.871)	8.212*** (1.882)	8.342*** (1.885)	8.272*** (1.909)	8.237*** (1.960)	8.287*** (2.225)
<i>Observations</i>	350	350	350	350	350	350
<i>Number of countries</i>	28	28	28	28	28	28
<i>AR(1) [p-value]</i>	0.000	0.000	0.000	0.000	0.000	0.000
<i>AR(2) [p-value]</i>	0.299	0.206	0.245	0.270	0.354	0.217
<i>Sargan [p-value]</i>	0.827	0.816	0.831	0.848	0.729	0.538
<i>Number of Instruments</i>	89	89	89	89	89	89

Notes: The variable $(\text{cycle})_{it}$ denotes cyclical unemployment, which is measured by applying the Hodrick-Prescott filter to the total unemployment rate series (15-74 years). In columns (1)-(3) categories of LMPs are measured as real expenditures per LF member, and in columns (4)-(6) as % of GDP. The shadow economy dummy variable is based on MIMIC estimates of informal output (% of official GDP) from Medina & Schneider (2019). Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. The set of RHS variables includes time effects, country effects, and country-specific time-effects, but their coefficient estimates are not reported due to space limitations.

Appendix E. Crime and cyclical unemployment under regimes of the shadow economy and LMPs categories. An alternative definition of property crime.

<i>Variable</i>	<i>Baseline model</i> (1)	<i>ALMP</i> (2)	<i>LMT</i> (3)	<i>PLMP</i> (4)	<i>ALMP</i> (5)	<i>LMT</i> (6)	<i>PLMP</i> (7)
$\ln(\text{crime})_{it-1}$	0.697*** (0.102)	0.673*** (0.100)	0.669*** (0.101)	0.656*** (0.099)	0.674*** (0.101)	0.662*** (0.104)	0.694*** (0.110)
D_{shadow}		-0.109*** (0.024)	-0.065 (0.069)	0.074 (0.059)	-0.000 (0.063)	0.015 (0.048)	-0.118** (0.053)
D_{imp}		-0.159** (0.069)	-0.078 (0.064)	-0.048 (0.052)	0.027 (0.038)	0.014 (0.017)	-0.012 (0.034)
$D_{\text{imp,shadow}}$		-0.131*** (0.028)	-0.124* (0.073)	-0.049* (0.028)	-0.014 (0.052)	-0.017 (0.044)	-0.026 (0.053)
$(\text{cycle})_{it}$	0.010 (0.007)	0.059*** (0.017)	0.053*** (0.019)	0.059*** (0.019)	0.062*** (0.016)	0.057*** (0.019)	0.055** (0.025)
$D_{\text{shadow}} \times (\text{cycle})_{it}$		-0.050*** (0.017)	-0.043** (0.019)	-0.044** (0.018)	-0.049*** (0.015)	-0.040** (0.020)	-0.031 (0.024)
$D_{\text{imp}} \times (\text{cycle})_{it}$		-0.050** (0.020)	-0.039* (0.020)	-0.043** (0.021)	-0.049** (0.020)	-0.042** (0.021)	-0.028 (0.027)
$D_{\text{imp,shadow}} \times (\text{cycle})_{it}$		-0.069*** (0.027)	-0.050** (0.024)	-0.090*** (0.026)	-0.068*** (0.021)	-0.057*** (0.019)	-0.076*** (0.026)
$\ln(\text{prison})_{it}$	-0.667*** (0.216)	-0.746*** (0.226)	-0.742*** (0.221)	-0.741*** (0.226)	-0.733*** (0.216)	-0.782*** (0.217)	-0.727*** (0.232)
$(\text{education})_{it}$	-0.079*** (0.017)	-0.080*** (0.019)	-0.098*** (0.021)	-0.087*** (0.019)	-0.086*** (0.018)	-0.085*** (0.018)	-0.089*** (0.020)
$(\text{male population})_{it}$	0.104*** (0.038)	0.100** (0.040)	0.097** (0.039)	0.118*** (0.037)	0.095** (0.038)	0.098** (0.042)	0.101** (0.041)
$(\text{poverty gap})_{it}$	0.085*** (0.031)	0.097*** (0.033)	0.097*** (0.033)	0.094*** (0.033)	0.096*** (0.032)	0.101*** (0.034)	0.086** (0.036)
$(\text{consumption})_{it}$	-0.024** (0.010)	-0.025** (0.010)	-0.024** (0.010)	-0.023** (0.011)	-0.025*** (0.010)	-0.024** (0.010)	-0.031*** (0.012)
<i>Constant</i>	6.862*** (1.337)	7.561*** (1.375)	7.561*** (1.341)	7.491*** (1.403)	7.390*** (1.312)	7.632*** (1.353)	7.705*** (1.548)
<i>Observations</i>	368	368	368	368	368	368	368
<i>Number of countries</i>	28	28	28	28	28	28	28
<i>AR(1) [p-value]</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<i>AR(2) [p-value]</i>	0.133	0.086	0.079	0.134	0.111	0.202	0.065
<i>Sargan [p-value]</i>	0.679	0.782	0.719	0.792	0.781	0.695	0.506
<i>Number of Instruments</i>	85	91	91	91	91	91	91

Notes: Property crime is defined as the sum of (i) burglary of private residential premises, (ii) theft of a motorised land vehicle, and (iii) robberies (per 100,000 population). The variable $(\text{cycle})_{it}$ denotes cyclical unemployment, which is measured by applying the Hodrick-Prescott filter to the total unemployment rate series (15-74 years). In columns (2)-(4) categories of LMPs are measured as real expenditures per LF member, and in columns (5)-(7) as % of GDP. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. The set of RHS variables includes time effects, country effects, and country-specific time-effects, but their coefficient estimates are not reported due to space limitations.