

Attachments

A Exogenous variables in EU28 countries

	<i>GDP per capita</i>	<i>Internet penetration</i>	<i>Volume of cash usage</i>	<i>Population with at least one bank account</i>	<i>Competitiveness index</i>	<i>Currency in circulation outside MFIs per capita</i>	<i>Post communist countries</i>
Austria	38560	80,62%	52,52%	97,10%	5,16	680,4	0
Belgium	35900	82,17%	54,42%	96,30%	5,18	922,4	0
Bulgaria	5913	53,06%	94,61%	52,80%	4,37	784,7	1
Croatia	10170	66,75%	-	88,40%	4,13	224,6	1
Cyprus	20600	65,46%	77,35%	85,20%	4,31	98,2	0
CR	14709	74,11%	76,89%	80,70%	4,53	1005	1
Denmark	45700	94,63%	37,39%	99,70%	5,29	163,6	0
Estonia	15121	80,00%	44,16%	96,80%	4,71	170,4	1
Finland	37579	91,51%	36,06%	99,70%	5,5	446,9	0
France	32227	81,92%	44,15%	97,00%	5,08	2519	0
Germany	35401	83,96%	60,79%	98,10%	5,49	6794,1	0
Greece	16295	59,87%	96,61%	77,90%	4,04	1667,5	0
Hungary	10561	72,84%	72,79%	72,70%	4,28	956,6	1
Ireland	41009	78,25%	69,07%	93,90%	4,98	378	0
Italy	26544	58,46%	86,27%	71,00%	4,42	6198,3	0
Latvia	11905	75,23%	67,74%	89,70%	4,5	56,2	1
Lithuania	12437	68,45%	80,23%	73,80%	4,51	254,8	1
Luxembourg	87321	93,78%	29,06%	94,60%	5,17	17,3	0
Malta	18465	68,91%	82,30%	95,30%	4,45	119	0
Netherlands	39310	93,96%	36,95%	98,70%	5,45	1361,1	0
Poland	10736	62,85%	79,93%	70,20%	4,48	2565	1
Portugal	16678	62,10%	57,91%	81,20%	4,54	1397	0
Romania	7520	4,98%	93,39%	44,60%	4,3	1034,8	1
Slovenia	18107	72,68%	64,18%	97,10%	4,22	254,9	1
Spain	22410	71,57%	74,24%	93,30%	4,55	5272,3	0
Slovakia	13876	77,88%	75,91%	79,60%	4,15	742,3	1
Sweden	44395	94,78%	38,29%	99,00%	5,41	209,4	0
UK	34881	89,84%	45,28%	97,20%	5,41	2019	0
28 EU average	25869	73,59%	64,02%	86,49%	4,74	1368	

B Heteroskedasticity tests

Breusch-Pagan test for heteroskedasticity OLS, using observations 1-28 (n = 27) Missing or incomplete observations dropped: 1 Dependent variable: scaled uhat^2				
	coefficient	std. error	t-ratio	p-value
Const	1.83762	4.92600	0.3730	0.7135
Currency_in_circ~	2.04933e-06	9.76812e-06	0.2098	0.8362
GDP_per_capita	-2.45576e-05	2.71395e-05	-0.9049	0.3775
Internt_penetrat~	-0.909021	3.14456	-0.2891	0.7758
Population_with_~	2.29920	3.74038	0.6147	0.5464
Shadow_economy	0.00917130	0.0701018	0.1308	0.8974
Post_comunist_co~	-0.878457	0.803656	-1.093	0.2888
Competetivness_i~	-0.254072	0.942552	-0.2696	0.7906
Explained sum of squares = 5.96983 Test statistic: LM = 2.984913, with p-value = P(Chi-square(8) > 2.984913) = 0.935301				
Breusch-Pagan test for heteroskedasticity OLS, using observations 1-28 (n = 27) Missing or incomplete observations dropped: 1 Dependent variable: scaled uhat^2 (Koenker robust variant)				
	coefficient	std. error	t-ratio	p-value
Const	0.00426284	0.0250695	0.1700	0.8669
Currency_in_circ~	1.04295e-08	4.97121e-08	0.2098	0.8362
GDP_per_capita	-1.24979e-07	1.38119e-07	-0.9049	0.3775
Internt_penetrat~	-0.00462621	0.0160034	-0.2891	0.7758
Population_with_~	0.0117011	0.0190356	0.6147	0.5464
Shadow_economy	-5.73282e-011	1.21325e-010	-0.4725	0.6422
Post_comunist_co~	4.66748e-05	0.000356763	0.1308	0.8974
Competetivness_i~	-0.00447066	0.00408998	-1.093	0.2888
Explained sum of squares = 0.000154619 Test statistic: LM = 4.711381, with p-value = P(Chi-square(8) > 4.711381) = 0.787931				

White's test for heteroskedasticity				
OLS, using observations 1-28 (n = 27)				
Missing or incomplete observations dropped: 1				
Dependent variable: uhat^2				
	coefficient	std. error	t-ratio	p-value
Const	-0.415970	0.239157	-1.739	0.1098
Currency_in_circ~	-5.57424e-08	2.29336e-07	-0.2431	0.8124
GDP_per_capita	-7.00941e-07	6.84178e-07	-1.025	0.3276
Internt_penetrat~	0.00534518	0.0566334	0.09438	0.9265
Population_with_~	-0.106901	0.215382	-0.4963	0.6294
Shadow_economy	-3.78841e-010	6.5361e-010	-0.5796	0.5739
Post_comunist_co~	0.00177376	0.00220372	0.8049	0.4379
Competetivness_i~	-0.0109748	0.00702107	-1.563	0.1463 *
sq_Currency_in_c~	0.197999	0.106659	1.856	0.0904
sq_GDP_per_capita	2.07537e-013	9.5081e-013	0.2183	0.8312
sq_Internt_penet~	4.16305e-012	5.9300e-012	0.7020	0.4973
sq_Population_wi~	0.00478446	0.0571033	0.08379	0.9347
sq_Shadow_economy	0.0619997	0.131316	0.4721	0.6461
sq_Competetivnes~	-5.63947e-05	5.9337e-05-	0.9504	0.3623
Unadjusted R-squared = 0.494643				
Test statistic: $TR^2 = 13.355348$,				
with p-value = $P(\text{Chi-square}(15) > 13.355348) = 0.574872$				
We had to use a robust estimate				

Source: Software Gretl

C Shadow economy timeline series

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Austria	10,8	11	10,3	9,7	9,4	8,1	8,5	8,2	7,9	7,6	7,5	7,8	8,2
Belgium	21,4	20,7	20,1	19,2	18,3	17,5	17,8	17,4	17,1	16,8	16,4	16,1	16,2
Bulgaria	35,9	35,3	34,4	34	32,7	32,1	32,5	32,6	32,3	31,9	31,2	31	30,6
Croatia	32,3	32,3	31,5	31,2	30,4	29,6	30,1	29,8	29,5	29	28,4	28	27,7
Cyprus	28,7	28,3	28,1	27,9	26,5	26	26,5	26,2	26	25,6	25,2	25,7	24,8
CR	19,5	19,1	18,5	18,1	17	16,6	16,9	16,7	16,4	16	15,5	15,3	15,1
Denmark	17,4	17,1	16,5	15,4	14,8	13,9	14,3	14	13,8	13,4	13	12,8	12
Estonia	30,7	30,8	30,2	29,6	29,5	29	29,6	29,3	28,6	28,2	27,6	27,1	26,2
Finland	17,6	17,2	16,6	15,3	14,5	13,8	14,2	14	13,7	13,3	13	12,9	12,4
France	14,7	14,3	13,8	12,4	11,8	11,1	11,6	11,3	11	10,8	9,9	10,8	12,3
Germany	17,1	16,1	15,4	15	14,7	14,2	14,6	13,9	13,2	12,9	12,4	12,2	12,2
Greece	28,2	28,1	27,6	26,2	25,1	24,3	25	25,4	24,3	24	23,6	23,3	22,4
Hungary	25	24,7	24,5	24,4	23,7	23	23,5	23,3	22,8	22,5	22,1	21,6	21,9
Ireland	15,4	15,2	14,8	13,4	12,7	12,2	13,1	13	12,8	12,7	12,2	11,8	11,3
Italy	26,1	25,2	24,4	23,2	22,3	21,4	22	21,8	21,2	21,6	21,1	20,8	20,6
Latvia	30,4	30	29,5	29	27,5	26,5	27,1	27,3	26,5	26,1	25,5	24,7	23,6
Lithuania	32	31,7	31,1	30,6	29,7	29,1	29,6	29,7	29	28,5	28	27,1	25,8
Luxembourg	9,8	9,8	9,9	10	9,4	8,5	8,8	8,4	8,2	8,2	8	8,1	8,3
Malta	26,7	26,7	26,9	27,2	26,4	25,8	25,9	26	25,8	25,3	24,3	24	24,3
Netherlands	12,7	12,5	12	10,9	10,1	9,6	10,2	10	9,8	9,5	9,1	9,2	9
Poland	27,7	27,4	27,1	26,8	26	25,3	25,9	25,4	25	24,4	23,8	23,5	23,3
Portugal	22,2	21,7	21,2	20,1	19,2	18,7	19,5	19,2	19,4	19,4	19	18,7	17,6
Romania	33,6	32,5	32,2	31,4	30,2	29,4	29,4	29,8	29,6	29,1	28,4	28,1	28
Slovenia	26,7	26,5	26	25,8	24,7	24	24,6	24,3	24,1	23,6	23,1	23,5	23,3
Spain	22,2	21,9	21,3	20,2	19,3	18,4	19,5	19,4	19,2	19,2	18,6	18,5	18,2
Slovakia	18,4	18,2	17,6	17,3	16,8	16	16,8	16,4	16	15,5	15	14,6	14,1
Sweden	18,6	18,1	17,5	16,2	15,6	14,9	15,4	15	14,7	14,3	13,9	13,6	13,2
UK	12,2	12,3	12	11,1	10,6	10,1	10,9	10,7	10,5	10,1	9,7	9,6	9,4
28 EU	22,6	22,3	21,8	21,1	20,3	19,6	20,1	19,9	19,6	19,3	18,8	18,6	18,3

D Payment mix and country regulations

Country	Payment mix	Regulations
Austria	53% - Cash 10%- Card transactions 19% - Credit transfer 17% - Direct debit	There is no regulation in Austria on usage of cash. Some banks can charge a small payment for withdrawing cash from other banks ATM, but basically, cash withdrawing is without additional payments.
Belgium	54% -Cash 22% -Cards 17% -Credit transfer 5% -Direct debits	The law restricted payments above €5000,- in 2012. This limit was decreased to €3000,- in 2014.
Bulgaria	95% - Cash There is credit transfer is by far the strongest electronic payment. Payments by card are quickly increasing in Bulgaria. From 12.68 mil (2009) to 65.24 mil (2014).	There is a limit on cash payments in Bulgaria. 14.999,- is the highest amount that can be accepted (approximately EUR 7.670,-).
Croatia	There was no data found on usage of cash. That is why the Croatia was taken out from the statistics. 44,5%- Card transactions 19% - Credit transfer	There were found no regulation in Croatia.
Cyprus	77% -Cash 9,1% -Cards 6,4% -Credit transfer	All of the exchange controls was removed in 2015.
Czech Republic	77% -Cash	Every bank has its own regulation in the terms of cash deposit. It also depends on credibility of a customer. Otherwise, there are no regulations on usage of cash.
Denmark	37% -Cash 44% -Cards	New legislation is being prepared in Denmark. If it will be adopted, it will shift the responsibility for tax payments on retailers and buyers on a cash amount 10.000 DKK (€1.340,-) and higher.
Estonia	56% -Electronic payments 44% -Cash	There were found no regulation in Estonia.
Finland	36% -Cash 31%- Credit transfer 30%- Cards	Retailers in Finland can deny to accept cash payments if they alert the buyer in advance. Some banks can charge a small payment for withdrawing cash from other banks ATM, but basically, cash withdrawing is without additional payments.

France	44% -Cash 25%- Cards The rest is almost equally distributed between Direct debits, Credit transfers and cheques.	Limit on cash payments is €3000,- for residents and €15.000,- for non-resident customers. There is an effort from French government to reduce those limits even further. In official or governmental offices, the limit is set on €300,-.
Germany	59% -Cash The second highest type of payment is a direct debit, than credit transfer and cards.	There is a payment for withdrawing cash from other banks ATM, it ranges between € 1,95,- and €5,-.
Greece	97% -Cash	The cash payment in Greece can officially not be higher than € 15.000,-.
Hungary	73% -Cash 17% -Credit transfer	Private customers are by law permitted to make two first withdraws from ATM for free, if it not exceed an amount of 150.000,- HUF (approximately 480,- EUR). If the amount is higher, bank as the right to charge a fee.
Ireland	69% -Cash 17% -Cards	There is no official regulation or restriction. Hence, €200 and €500 are often declined by the retailers.
Italy	86% -Cash 5%- Cards 4%- Credit transfer 2%- Direct debit	There is a payment for withdrawing cash from other banks ATM, it ranges between € 1,95,- and €5,-.
Latvia	68% -Cash Cards and credit transfer makes another third. Direct debit is no often used in Latvia.	There is no official regulation in Latvia.
Lithuania	80% -Cash 11% -Credit transfer 8% -Cards	There is a payment for withdrawing cash from other banks ATM, it ranges between € 1,95,- and €5,-.
Luxembourg	29% -Cash. In our statistic was used value 71%. Because of company PayPal Europe, which is located in Luxembourg, but the amount of its transaction cannot be admitted to the country itself. The company in statistics increases the number of e-money transactions. 9% -Cards and credits combined	Retailers who accept cash payments of € 15.000,- and more, even if it's more smaller payments linked together, they must meet 3 obligations (Cooperation with Financial Intelligence Unit, Identification of the customer and setting up an internal organization). This regulation was introduced to reduce money laundering and financing of terrorism.
Malta	82% -Cash 9% -Card transactions 4% -Cheques 4% -Credit transfer	There are no restrictions on usage of cash on Malta.

Netherlands	37% -Cash 29% -Direct debit 18% -Credit transfer 15% -Direct debits	There are no restrictions on usage of cash in Netherlands.
Poland	80% -Cash 12% -Credit transfer 8% -Card Direct debit is almost not used in Poland	There is a payment for withdrawing cash from other banks ATM, it ranges between € 1,95,- and €5,-.
Portugal	58% -Cash exceed twice the card payments	When the cash payment exceed € 1000,- recipient must be identifiable.
Romania	93% -Cash 4% -Credit transfer 3% -Cards	There are cash payment limited on 10.000 RON per day per person (approximately €2.260,- EUR).
Slovenia	64% -Cash 17% -Credit transfer 14% -Cards 5% -Direct debit	There are no restrictions on usage of cash in Slovenia.
Spain	74% -Cash 11% -Carts 11% -Direct debit 4% -Credit transfer	There is a limit on payment € 2.500,- EUR per day per resident, €15.000,- EUR per day per non-resident and each bank has very specific withdraw regulations.
Slovakia	76% -Cash 12% -Credit transfer 8% -Cards	There is a regulation on cash payments € 5.000,- EUR.
Sweden	38% -Cash 40% -Cards	Even though there is no legal regulation in Sweden at the moment, it is a highly and most actively discussed topic.
United Kingdom	45% -Cash Card transaction volume is growing rapidly	There is no legal regulation of usage of cash. But retailers, who want to accept higher cash payments than 15.000,- pounds, must be registered as a high value dealer within the tax authorities. ATM withdraws can cost between 1,- and 10,- pounds.

Sources:

The Social and Private Costs of Retail Payment Instruments 2012 , Schmeidel

(<https://www.ecb.europa.eu/pub/pdf/scpops/ecbocp137.pdf>)

Cash Report 2016, Paul van der Knaap (<http://www.g4scashreport.com/>)