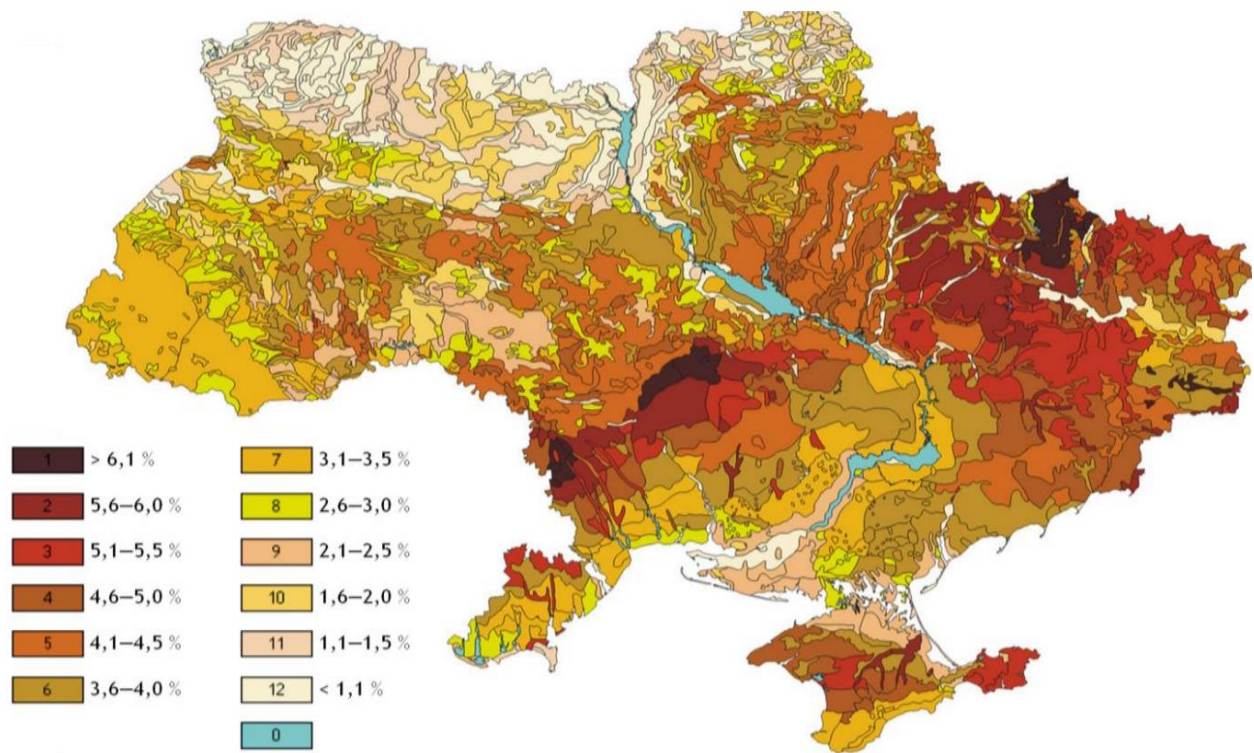


Appendix

1. Humus content in the arable layer of soils of Ukraine

Picture 1



2. Econometric testing

2.1. Data set

Region	ALP (y1)	UV (x0)	HCL (x1)	HV (x2)	HP (x3)	CIA (x4)	CP (x5)	EAP (x6)	SM (x7)	CC (x8)	AH (x9)
Vinnitsya	1,845	1	68	166	103	1,420,196	60,432	77	120	3.7	1,619
Volyn	1,395	1	43	152	95	365,319	15,277	88	113	1.6	593
Dnipro	1,226	1	38	84	111	1,085,378	56,897	377	92	2.2	1,978
Zhytomyr	1,767	1	59	175	111	539,928	43,432	13	127	3.0	1,109
Zakarpattya	1,287	1	47	154	100	39,235	1,590	121	114	1.9	186
Zaporizhzhya	1,060	1	34	114	72	625,415	40,336	273	101	1.8	1,683
Ivano-Frankivsk	1,696	1	50	169	67	301,099	9,521	205	126	3.0	371
Kyiv	1,980	1	66	167	76	1,407,056	96,334	84	127	3.6	1,199
Kirovohrad	1,587	1	50	120	69	873,197	68,429	63	99	3.1	1,704
Lviv	1,780	1	52	167	88	456,316	4,113	49	129	2.7	698
Mykolayiv	1,351	1	35	94	61	587,914	31,542	62	89	3.2	1,572
Odesa	1,366	1	31	130	141	854,267	22,460	33	117	2.8	1,867
Poltava	1,981	1	60	184	219	1,125,059	71,819	51	92	4.2	1,724
Rivne	1,776	1	51	181	133	264,209	19,843	10	120	3.3	591
Sumy	1,789	1	65	163	57	765,273	41,459	22	129	3.5	1,178
Ternopil	1,796	1	57	169	138	567,767	37,727	9	130	3.1	836
Kharkiv	1,353	1	42	142	102	913,045	35,529	107	108	2.1	1,802
Kherson	1,064	1	36	116	69	590,550	44,025	131	55	2.5	1,434
Khmelnytskyi	1,726	1	66	166	152	835,944	60,298	20	81	3.2	1,185
Cherkasy	1,760	1	67	127	93	1,234,751	63,726	52	128	3.4	1,209
Chernivtsi	1,717	1	50	169	141	110,904	5,012	38	128	2.6	307
Chernihiv	1,588	1	65	161	45	1,005,871	63,004	28	128	2.4	1,303

Source: Statistical Department of Ukraine

2.2. Gretl outputs for OLS purposes

Model 1: OLS, using observations 1-22

Dependent variable: Y1

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	92.6467	261.570	0.3542	0.7293	
X1	3.29698	4.17524	0.7896	0.4451	
X2	1.96505	1.36837	1.436	0.1765	
X3	0.818875	0.584795	1.400	0.1868	
X4	5.56874e-05	0.000149180	0.3733	0.7154	
X5	0.00123880	0.00188179	0.6583	0.5228	
X6	-0.0418648	0.276231	-0.1516	0.8821	
X7	3.75412	1.38842	2.704	0.0192	**
X8	196.862	41.0189	4.799	0.0004	***
X9	-0.100678	0.0912611	-1.103	0.2916	

Mean dependent var	1585.931	S.D. dependent var	277.0885
Sum squared resid	82636.70	S.E. of regression	82.98428
R-squared	0.948747	Adjusted R-squared	0.910308
F(9, 12)	24.68156	P-value(F)	2.10e-06
Log-likelihood	-121.7595	Akaike criterion	263.5190
Schwarz criterion	274.4294	Hannan-Quinn	266.0891

2.3. Test of heteroskedasticity

Breusch-Pagan test for heteroskedasticity
 OLS, using observations 1-22
 Dependent variable: scaled uhat^2

	coefficient	std. error	t-ratio	p-value
const	6.02643	5.22974	1.152	0.2716
X1	0.0235164	0.0834783	0.2817	0.7830
X2	-0.0118110	0.0273587	-0.4317	0.6736
X3	-0.000702154	0.0116922	-0.06005	0.9531
X4	2.16095e-06	2.98265e-06	0.7245	0.4826
X5	-4.34686e-05	3.76239e-05	-1.155	0.2704
X6	-0.00173960	0.00552286	-0.3150	0.7582
X7	-0.0111527	0.0277595	-0.4018	0.6949
X8	-0.624062	0.820118	-0.7609	0.4614
X9	-0.000875251	0.00182464	-0.4797	0.6401

Explained sum of squares = 13.7516

Test statistic: LM = 6.875812,
 with p-value = P(Chi-square(9) > 6.875812) = 0.650047
 Source: own calculation (Gretl)

2.4. Test of normality

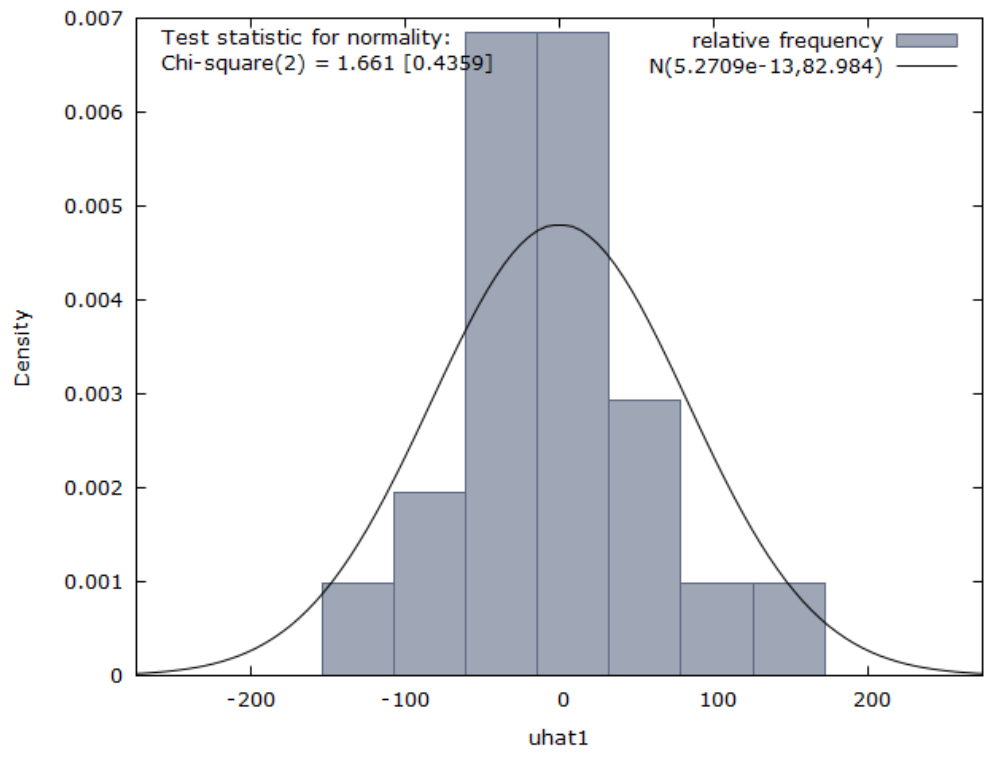
Frequency distribution for uhat1, obs 1-22
 number of bins = 7, mean = 5.27094e-013, sd = 82.9843

interval	midpt	frequency	rel.	cum.	
< -107.28	-130.53	1	4.55%	4.55%	*
-107.28 - -60.780	-84.030	2	9.09%	13.64%	***
-60.780 - -14.280	-37.530	7	31.82%	45.45%	*****
-14.280 - 32.220	8.9704	7	31.82%	77.27%	*****
32.220 - 78.721	55.470	3	13.64%	90.91%	****
78.721 - 125.22	101.97	1	4.55%	95.45%	*
>= 125.22	148.47	1	4.55%	100.00%	*

Test for null hypothesis of normal distribution:
 Chi-square(2) = 1.661 with p-value 0.43588

Source: own calculation (Gretl)

2.5. Histogram



Source: own calculation (Gretl)