

JANUARY 2019

Working Paper 161 – Online Appendix

Dying Light: War and Trade of the Separatist-Controlled Areas of Ukraine

Supplementary Materials – Online Appendix

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Supplementary Materials - Online Appendix

Description: Contains material for referees and intended to be provided for the online-appendix. Contains the full breakdown of major events surrounding the war in Ukraine, supplementary tables containing the descriptive statistics before and after data adjustment, and additional regressions with robustness checks.

C Timeline: List of the Major Events Related to the Protests and War in East Ukraine

November 21st, 2013: President Yanukovich's cabinet abandons an agreement on closer trade ties with EU, instead seeking closer co-operation with Russia. Small protests start. Source: BBC (2014a)

November 24th, 2013: Massive demonstration for the support of the EU deal. Start of Euromaidan. Source: Kyivpost.com (2013a)

November 30th, 2013: State security forces disperses the first rally. Source: Shevchenko (2013)

December 9th, 2013: Start of the second wave of Euromaidan. Number of protesters estimated from 100 to 500 thousand people. Source: Gorchinskaya (2013)

January 24th, 2014: Pro-European unrests start in western Regions of Ukraine. Several offices occupied by the protesters. Source: BBC (2014b)

February 18th - 20th, 2014: Most violent clashes between the security forces and the protesters. 116 people dead. Source: BBC (2014a)

February 21st, 2014: President Yanukovich signs a deal with the opposition leaders. The deal presumed return to the constitution of the year 2004, creating a coalitional government, new presidential elections, investigation of the violent clashes and stop of the violent actions. Source: President.gov.ua (2014)

February 22nd, 2014: President Yanukovich withdraws security forces and leaves Kiev. Protesters take control of presidential buildings, parliament members votes to remove president from power. President Yanukovich appears on TV and calls the events a coup. Source: BBC (2014a)

February 23-26th, 2014: Parliament votes to ban Russian as the second official language, causing a wave of anger in Russian-speaking regions; the vote is later overturned. Source: BBC (2014a)

February 27th - March 1st, 2014: Russia starts a military operation in Crimea and establishes and effective control over the peninsula. Source: BBC (2014a)

March 1st, 2014: Start of the pro-Russian rallies in East Regions of Ukraine, first attempts to occupy local administrations. Source: D'Agata (2014)

March 18th, 2014: President Putin signs a bill to absorb Crimea into the Russian Federation based on the result of a vote on March 16th. Source: BBC (2014a)

April 6-7th, 2014: Pro-Russian protesters occupy government buildings in Donetsk, Luhansk and Kharkiv. Government forces regain control next day only in Kharkiv. Media report for the first time that protesters possess arms. Source: Kuznetsov (2014)

April 12th, 2014: Armed takeover of the cities Sloviansk and Horlivka. Start of the armed insurgency. Source: Rachkevych (2014)

April 15th, 2014: The acting President Turchynov announces an anti-terrorist operation against separatists. Source: BBC (2014a)

May 11th, 2014: Pro-Russian separatists in Donetsk and Luhansk declare independence after unrecognised referendums. Source: BBC (2014a)

May 25th, 2014: Ukraine elects Petro Poroshenko as president in an election not held in much of the east. Source: BBC (2014a)

July, 5th, 2014: Separatists abandon their command centre at Sloviansk - the starting point of the armed insurgency. Source: BBC (2014a)

July, 16th, 2014: Insurgents introduce a curfew in city of Donetsk. Source: UNIAN (2014)

July, 30th, 2014: Insurgents introduce a martial law in city of Donetsk. Source: RBK (2014b)

July - September 2014: Heavy battles in the urban areas of Donetsk and Luhansk. Source: BBC (2014a)

August 22nd, 2014: Russian "vacationists" come to support separatists and open a new front line close to Mariupol. Source: Zavtra.ru (2014)

September 5th, 2014: Representatives of Ukrainian government and separatist forces sign a truce in Minsk (Minsk I). The skirmishes continue. Source: BBC (2014a)

November 2-3rd, 2014: Separatists elect new leaders in the region-wide votes. Ukraine's government accuses separatists in undermining the peace process. Source: BBC (2014a)

December 1st, 2014: Ukraine's government introduces a ban on banking operations in the separatist territories, stops social security payments and withdraws all Government services from the separatist controlled areas. Source: Walker (2014)

December, 2014: UN establishes a humanitarian cluster system Ukraine. Source: Barbelet (2017)

January, 2015: Separatists start to re-register enterprises within their own 'legal space'. Source: Golunov and Artemev (2015)

January 16th, 2015: Ukraine's government introduces a trade ban on the occupied territories except for strategically important products. Enterprises of billionaire Akhmetov continue to operate. Source: Rada.gov.ua (2014)

February 12th, 2015: Representatives of the Ukrainian government and separatist forces sign a second truce in Minsk (Minsk II). Last significant territorial changes continue until the end of the month. Source: BBC (2015b)

May, 2015: Separatists start a nationalization campaign against the enterprises that were not 'legal' residents in the government-controlled areas. Source: Golunov and Artemev (2015)

July, 2015: Separatists introduce an accreditation procedure for the humanitarian NGOs operating in the region. UN refuses to follow the procedure. All international humanitarian NGOs (except for International Committee of Red Cross and People in Need) suspend their operations in the separatist controlled areas. Source: Barbelet (2017)

October 6th, 2015: Ukrainian activists disrupt electricity lines connecting Crimea and Ukraine. Source: Euromaidanpress.com (2017b)

January 25th, 2017: Ukrainian activists block several roads and railways to stop the remaining trade between the mainland Ukraine and the enterprises of the

separatist areas. Source: Euromaidanpress.com (2017b)

February 17th, 2017: Russia started to certain documents (e.g. birth certificates and passports) issued in DNR and LNR. Source: Kremlin.ru (2017)

March 3rd, 2017: Separatist authorities introduced an “external administration” at 46 companies previously operating in the Ukrainian legal space (43 in DNR, 3 in LNR). Company owners called the process as a nationalization. Source: Euro-
maidanpress.com (2017a)

March 16th, 2017: Ukraine’s government imposes a complete ban on the cargo movement to the separatist-controlled areas. Source: Euromaidanpress.com (2017)

Table C.1: List of Enterprises Affected by the 2017 Trade Ban

Region	Group	Enterprise	Longitude	Latitude	Industry
DNR	Donetsksteel	PSC "Donetsk metallurgical plant" (DMZ)	37.80775	48.00639	Manufacturing
DNR	Donetsksteel	Branch "Metallurgical complex" PrJSC "Donetsksteel-metallurgical plant"	37.80768	47.97325	Manufacturing
DNR	Metinvest	JSC Yenakieve Iron and Steel Works (EMZ)	38.21916	48.22071	Manufacturing
DNR	Metinvest	Makiivka metallurgical Plant, branch of Yenakieve Iron and Steel Works	37.94444	48.06095	Manufacturing
DNR	Air Liquid	Air Liquide Yenakieve	37.78473	48.03345	Gas Manufacturing
DNR	Metinvest	Donetskkoks JSC	37.73950	47.97273	Coke plants
DNR	Donetsksteel	Makiivkoks Coking Plant	37.80685	47.98653	Coke plants
DNR	Donetsksteel	Yasynivka Cokery Plant PJSC	37.92984	48.09920	Coke plants
DNR	Metinvest	PrJSC Yenakieve Coke and Chemicals Plant (Koksokhimprom)	38.22159	48.22107	Coke plants
DNR	DTEK	DTEK Komsomolets Donbasu coal mine	38.40142	48.14620	Coal enrichment factories
DNR	Efim Zvyagelsky*	Public Stock Society Zasyadko Mine	37.78430	48.05490	Coal enrichment factories
DNR	DTEK	DTEK Mospyne Coal Treatment Plant	38.06165	47.87717	Coal enrichment factories
DNR	Victor Chmilev	Kolosnykove central concentrating factory	37.86604	48.03879	Coal enrichment factories
DNR	Donetsksteel	Donetsk Electrical Technical Plant, PJSC	37.88277	47.94539	Energy companies
DNR	DTEK	DTEK Power Grid	37.80934	48.00436	Energy companies
DNR	DTEK	Zuivska thermal power station	38.29530	48.01959	Energy companies
DNR	DTEK	Elektronaladka Ltd	37.80961	48.00840	Energy companies

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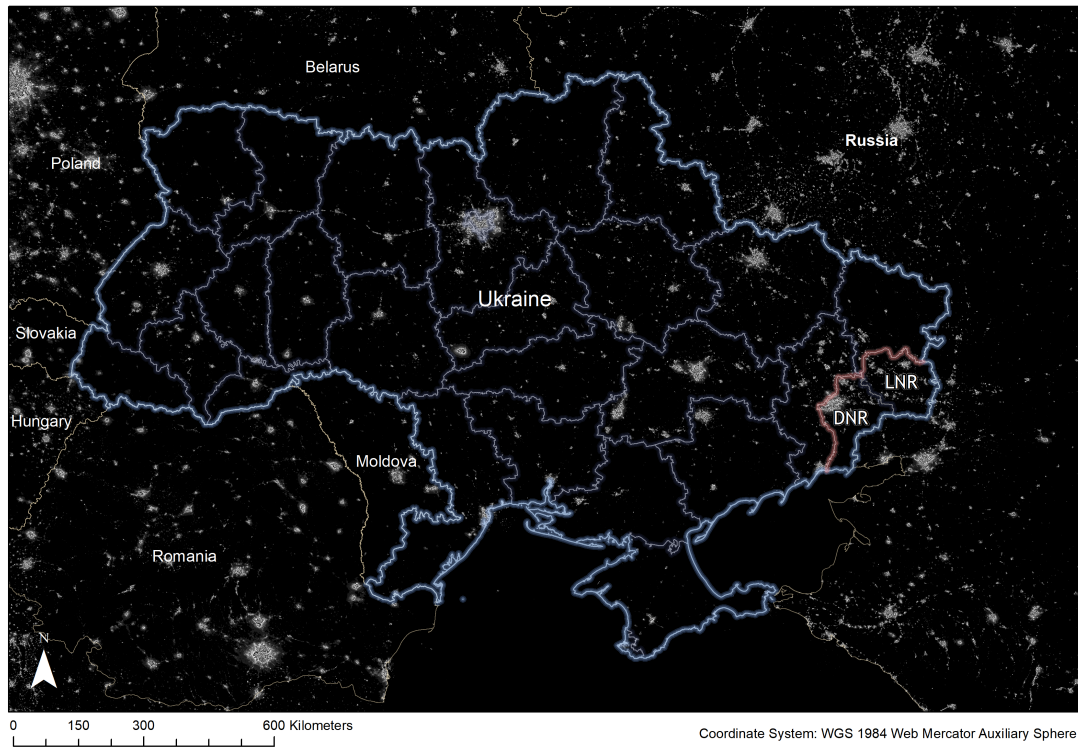
Region	Group	Enterprise	Longitude	Latitude	Industry
DNR	DTEK	DTEK Donetskoblenergo PJSC	37.80668	47.99799	Energy companies
DNR	DTEK	DTEK Energovuhillia ENE	37.80934	48.00436	Energy companies
DNR	Metinvest	Khartsyzk Pipe Plant	38.12144	48.03667	Other
DNR	Metinvest	Komsomolske Ore Mine Management Board, PJSC	38.07219	47.66304	Other
DNR	Metinvest	Dokuchaevsk Flux-Dolomite Complex (DFDK)	37.67646	47.75937	Other
DNR	OSTCHEM	PJSC Concern Stirol, a chemical plant	38.07341	48.29825	Other

Notes: List of the enterprises and their industries by Euromaidanpress.com (2017a), locations georeferenced by the author using manual online search of the addresses.

Note[*]: Presumably owned.

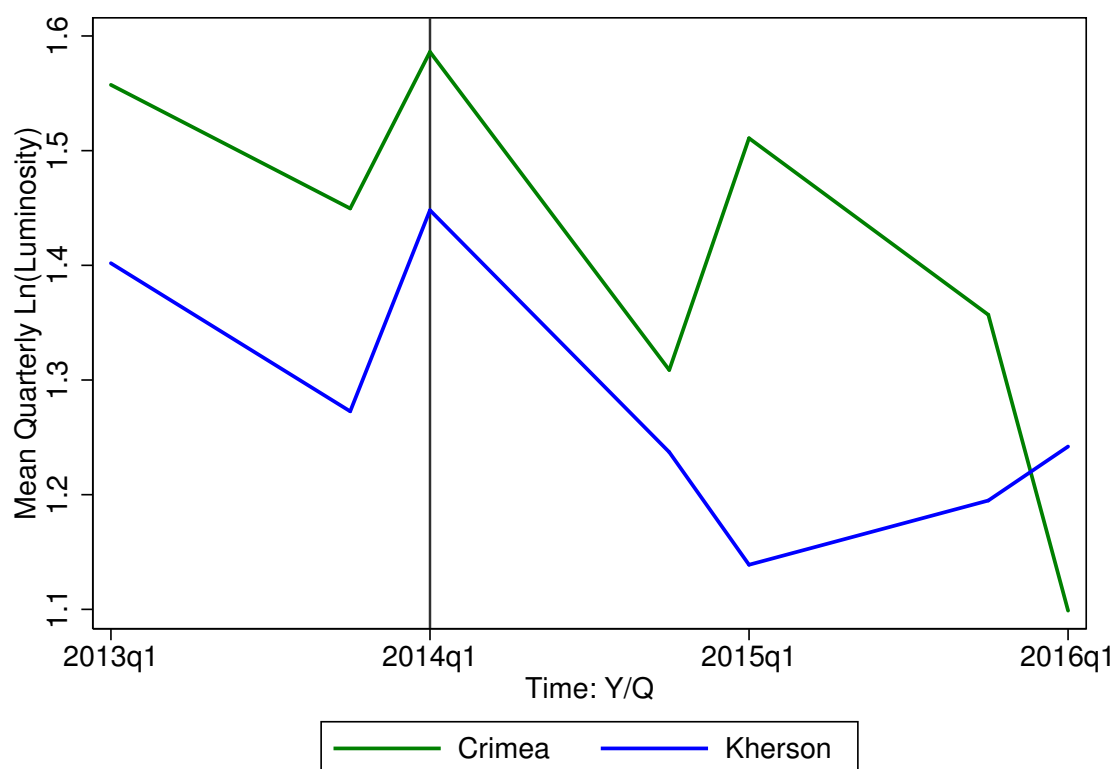
D Supplementary Figures

Figure D.1: Nighttime Luminosity of Ukraine in January 2013



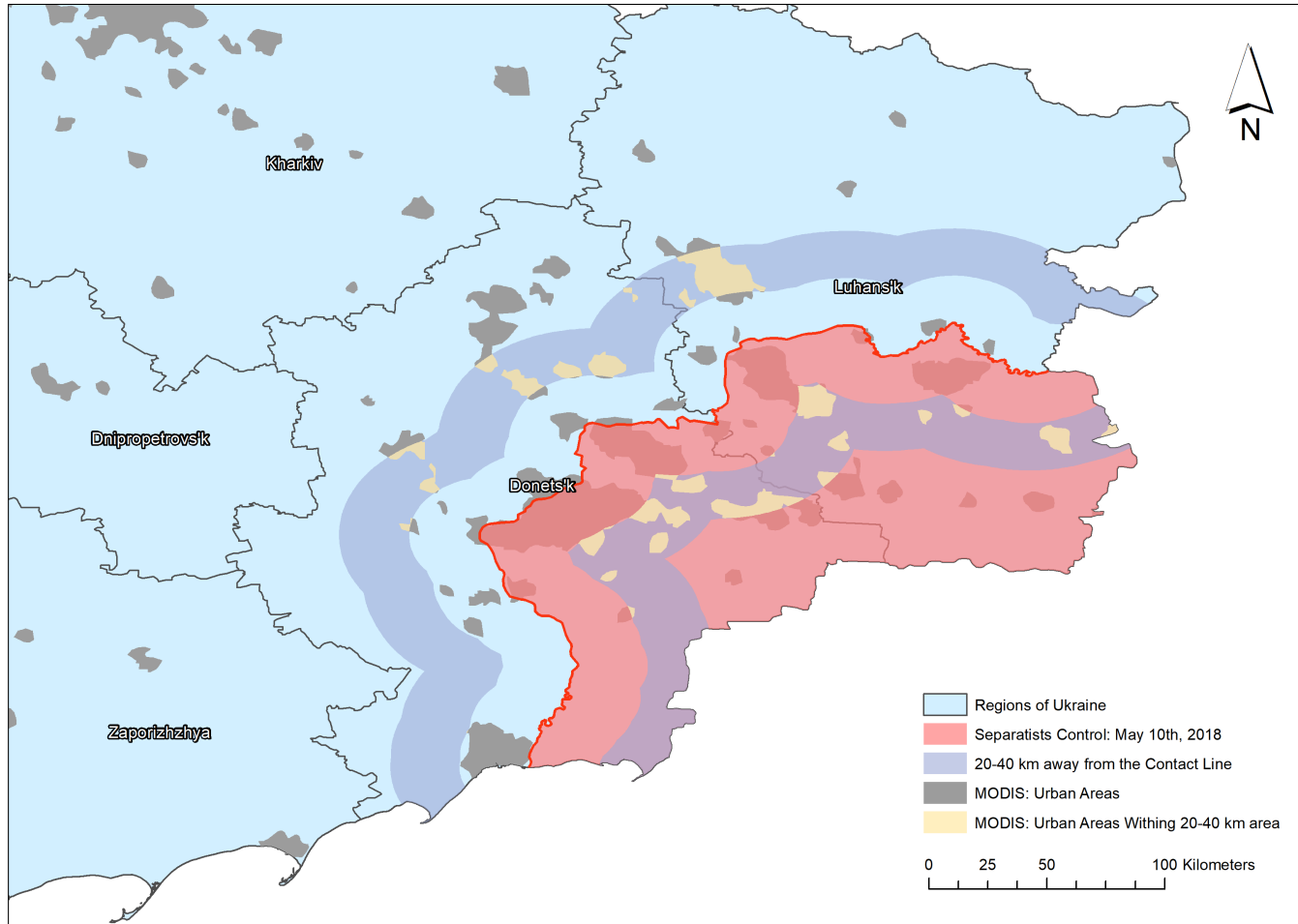
Note: Blue lines show internationally recognized state borders of Ukraine. Red lines show territories effectively controlled by separatists in Ukraine. Yellow lines show borders between other countries. Source: nighttime luminosity tiles by NOAA (2018), regional borders by Hijmans, Garcia and Wieczorek (2015), contact line georeferenced by author based on UNIAN (2015). WGS84 coordinate system.

Figure D.2: Change of the mean log luminosity in the Crimea and Kherson regions by quarter and controlling party.



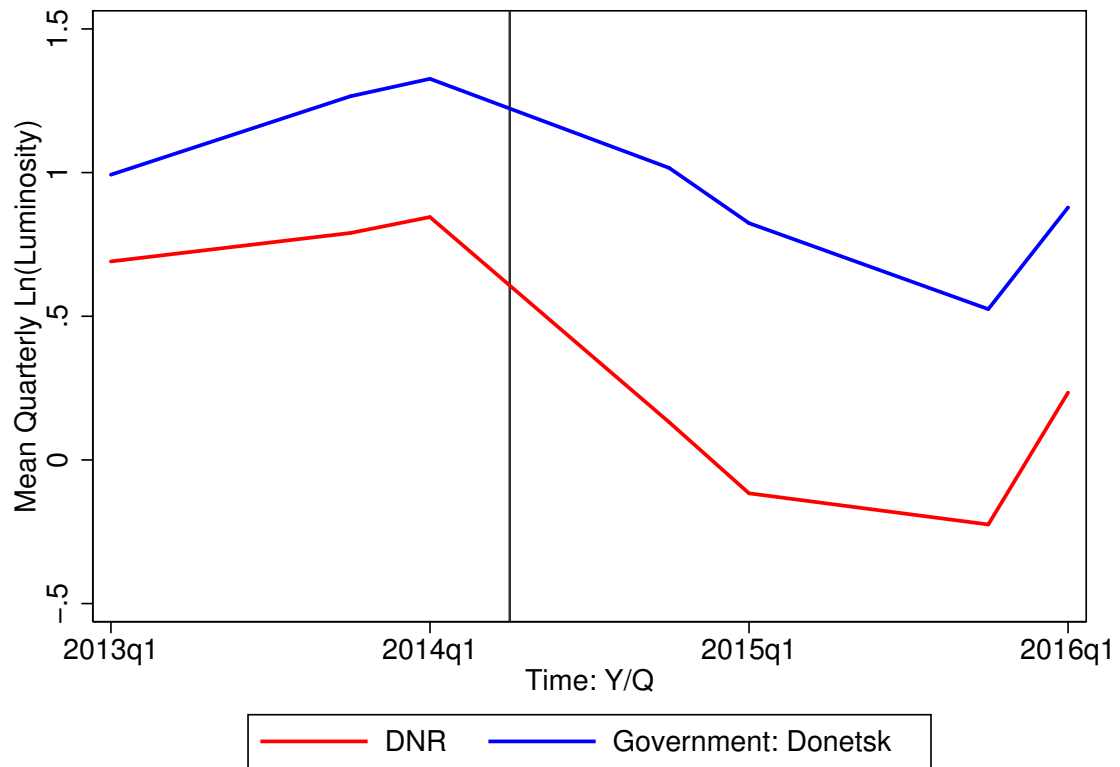
Note: Only cells in the urban areas with area > 551000 sq.m. are considered. Vertical bar indicates start of the armed protests in Donbass. Values for every second and third quarter are interpolated on the graph but not used in regressions. Source: nighttime luminosity tiles by NOAA (2018), regional borders by Hijmans, Garcia and Wieczorek (2015), urban areas by Schneider, Friedl and Potere (2009), contact line georeferenced by author based on UNIAN (2015).

Figure D.3: Cells within 20 - 40 km away from the contact line



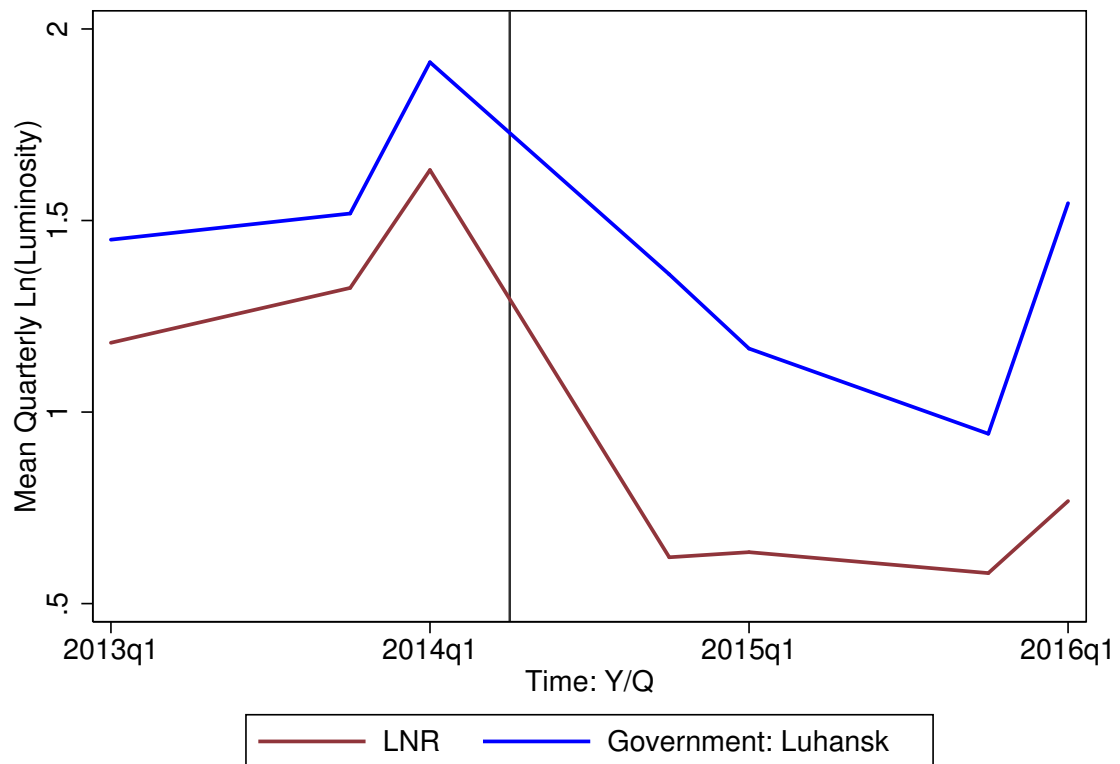
Note: Blue polygons show internationally recognized state borders of Ukraine. Red layer shows territories effectively controlled by separatists in Ukraine. Source: nighttime luminosity tiles by NOAA (2018), regional borders by Hijmans, Garcia and Wieczorek (2015), urban areas by Schneider, Friedl and Potere (2009), contact line georeferenced by author based on UNIAN (2015). WGS84 coordinate system.

Figure D.4: Change of the mean log luminosity in the Donetsk region by quarter and controlling party, 20-40 KM away from the contact line



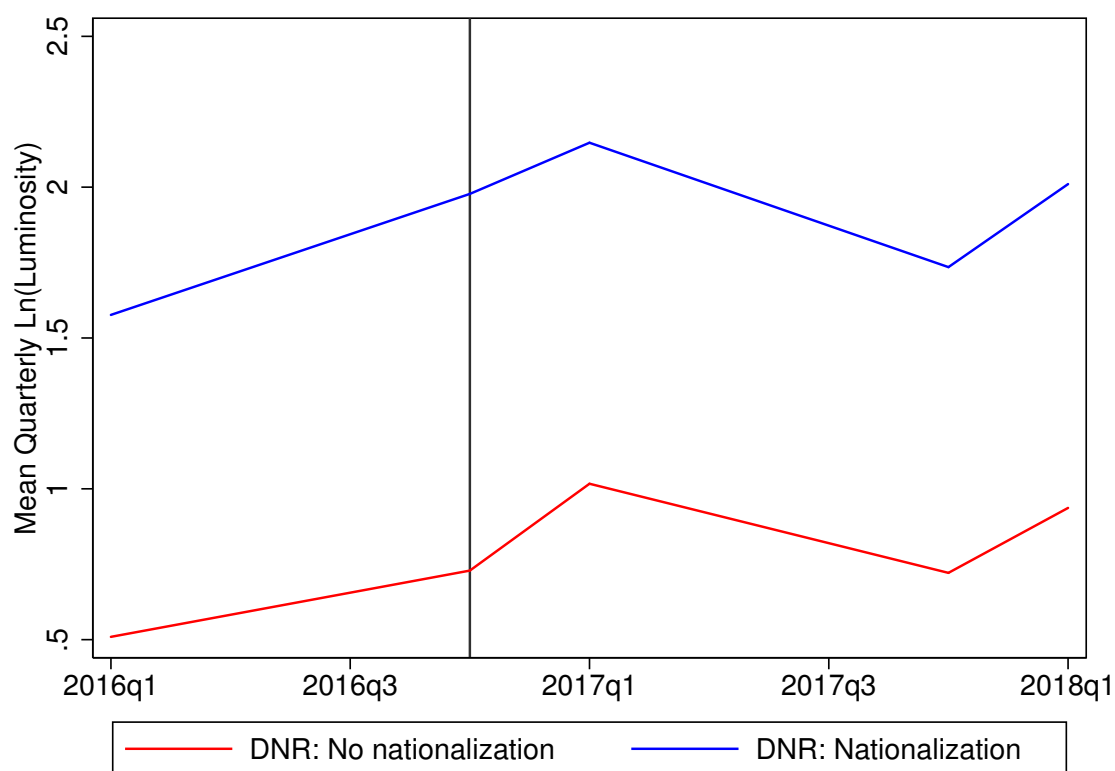
Note: Only cells in the urban areas with area > 551000 sq.m. are considered. Vertical bar indicates start of the armed protests in Donbass. Values for every second and third quarter are interpolated on the graph but not used in regressions. Source: nighttime luminosity tiles by NOAA (2018), regional borders by Hijmans, Garcia and Wieczorek (2015), urban areas by Schneider, Friedl and Potere (2009), contact line georeferenced by author based on UNIAN (2015).

Figure D.5: Change of the mean log luminosity in the Luhansk region by quarter and controlling party, 20-40 KM away from the contact line



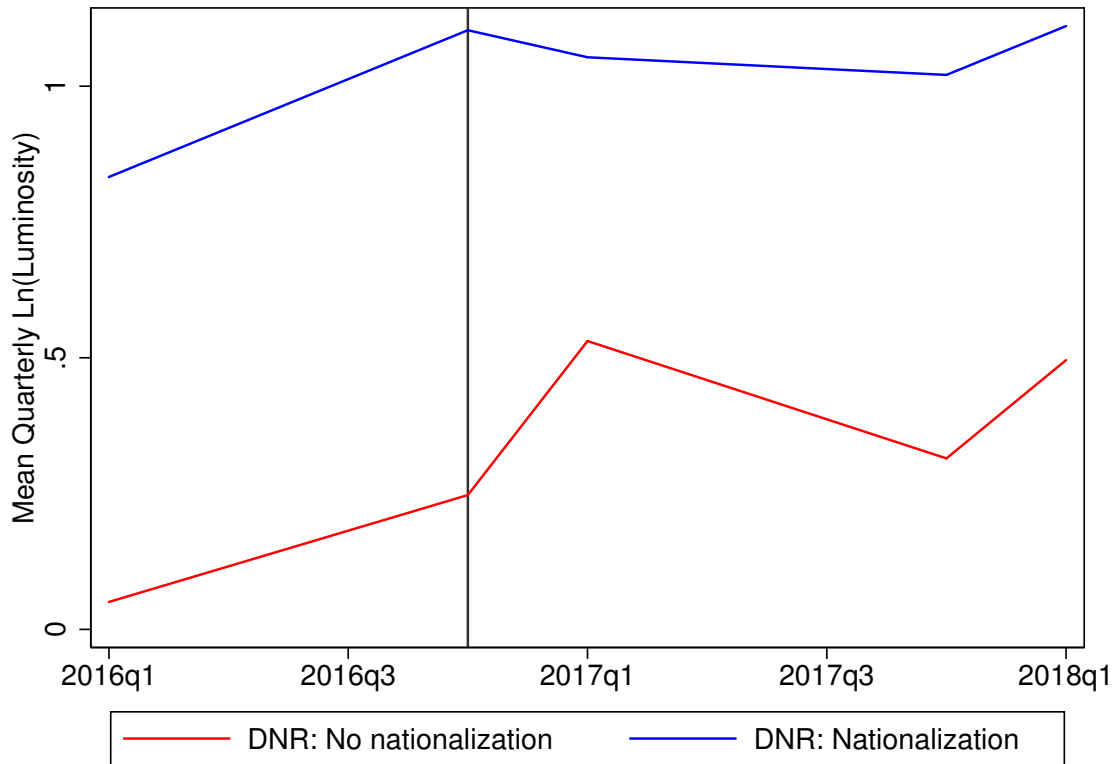
Note: Only cells in the urban areas with area > 551000 sq.m. are considered. Vertical bar indicates start of the armed protests in Donbass. Values for every second and third quarter are interpolated on the graph but not used in regressions. Source: nighttime luminosity tiles by NOAA (2018), regional borders by Hijmans, Garcia and Wiczorek (2015), urban areas by Schneider, Friedl and Potere (2009), contact line georeferenced by author based on UNIAN (2015).

Figure D.6: Change of the mean log luminosity in the separatist-controlled region of Donetsk by quarter excluding the cells within the districts crossed by the contact line



Note: Only cells in the urban areas with area > 551000 sq.m. are considered. Vertical bar indicates the nationalization of the largest private enterprises and a full trade ban by the Ukrainian government. Values for every second and third quarter are interpolated on the graph but not used in regressions. Source: nighttime luminosity tiles by NOAA (2018), regional borders by Hijmans, Garcia and Wiczorek (2015), urban areas by Schneider, Friedl and Potere (2009), contact line georeferenced by author based on UNIAN (2015), location of the nationalized enterprises Euromaidanpress.com (2017a).

Figure D.7: Change of the mean log luminosity in the separatist-controlled region of Donetsk by quarter. Only cells within 20-40 km away from the contact line



Note: Only cells in the urban areas with area > 551000 sq.m. are considered. Vertical bar indicates the nationalization of the largest private enterprises and a full trade ban by the Ukrainian government. Values for every second and third quarter are interpolated on the graph but not used in regressions. Source: nighttime luminosity tiles by NOAA (2018), regional borders by Hijmans, Garcia and Wieczorek (2015), urban areas by Schneider, Friedl and Potere (2009), contact line georeferenced by author based on UNIAN (2015), location of the nationalized enterprises Euromaidanpress.com (2017a).

E Supplementary Tables

Table E.1: Summary Statistics: Luminosity of the Urban Areas of Ukraine, January 2013 - March 2016. Full dataset

Variable	Mean	Std. Dev.	Min.	Max.	N
Luminosity	5.391	61.491	0	16124.336	519561
Log Luminosity	0.483	1.779	-16.118	9.688	519561
Cell's area	627631.582	252186.597	2270.97	883965	519561
DNR-control	0.062	0.241	0	1	519561
LNR-control	0.042	0.202	0	1	519561
Restrictions: DNR	0.052	0.221	0	1	519561
Restrictions: LNR	0.035	0.185	0	1	519561
Minsk II Effect: DNR	0.036	0.186	0	1	519561
Minsk II Effect: LNR	0.025	0.155	0	1	519561
Crimea: Russia-control	0.019	0.136	0	1	519561
All violence	4.014	11.215	0	84	519561

Sources: nighttime luminosity tiles by NOAA (2018), regional borders by Hijmans, Garcia and Wieczorek (2015), urban areas by Schneider, Friedl and Potere (2009), contact line georeferenced by author based on UNIAN (2015) and Mediarnbo.org (2018).

Table E.2: Summary Statistics: Luminosity of the Urban Areas of Ukraine, January 2013 - March 2016. Cells > 0.55 sq. km

Variable	Mean	Std. Dev.	Min.	Max.	N
Luminosity	6.17	74.24	0	16124.336	351309
Log Luminosity	0.636	1.727	-16.118	9.688	351309
Cell's area	786928.154	71726.606	551048	883965	351309
DNR-control	0.068	0.251	0	1	351309
LNR-control	0.041	0.197	0	1	351309
Restrictions: DNR	0.056	0.231	0	1	351309
Restrictions: LNR	0.034	0.181	0	1	351309
Minsk II Effect: DNR	0.04	0.195	0	1	351309
Minsk II Effect: LNR	0.024	0.152	0	1	351309
Crimea: Russia-control	0.02	0.14	0	1	351309
All violence	4.043	11.296	0	84	351309

Sources: nighttime luminosity tiles by NOAA (2018), regional borders by Hijmans, Garcia and Wieczorek (2015), urban areas by Schneider, Friedl and Potere (2009), contact line georeferenced by author based on UNIAN (2015) and Mediarnbo.org (2018).

Table E.3: Summary Statistics: The Nationalization Dataset. Jan. 2016 - Feb. 2018

Variable	Mean	Std. Dev.	Min.	Max.	N
Luminosity	2.728	6.864	0	667.928	63196
Log Luminosity	0.099	1.493	-16.118	6.504	63196
Cell's area	638742.285	255401.72	0.007	835531	63960
Nationalization DNR	0.084	0.277	0	1	63960

Notes: Contains cells within urban areas of Donetsk region controlled by separatists.

Sources: luminosity tiles: NOAA (2018), regional borders: Hijmans, Garcia and Wieczorek (2015),

urban areas:Schneider, Friedl and Potere (2009), contact line: UNIAN (2015) and Medi-arnbo.org (2018). Location of the nationalized firms: Euromaidanpress.com (2017a).

Table E.4: Summary Statistics: The Nationalization Dataset. Jan. 2016 - Feb. 2018.
Cells > 0.55 sq. km

Variable	Mean	Std. Dev.	Min.	Max.	N
Luminosity	3.312	8.000	0	667.928	44422
Log Luminosity	0.278	1.474	-16.118	6.504	44422
Cell's area	793816.435	68932.411	551229	835531	44422
Nationalization DNR	0.101	0.302	0	1	44422

Notes: Contains cells within urban areas of Donetsk region controlled by separatists. b: luminosity tiles: NOAA (2018), regional borders: Hijmans, Garcia and Wieczorek (2015), urban areas:Schneider, Friedl and Potere (2009), contact line: UNIAN (2015) and Medi-arnbo.org (2018). Location of the nationalized firms: Euromaidanpress.com (2017a).

Table E.5: Impact of the Separatist-Control on Luminosity until 2014, Monthly Based

	No Controls				With Controls			
	All	East Ukraine	Donbass	All (RSTS)	All	East Ukraine	Donbass	All (RSTS)
DNR-control	-0.925*** (0.133)	-0.923*** (0.139)	-0.480*** (0.159)	-0.511*** (0.174)	-0.549*** (0.121)	-0.570*** (0.126)	-0.468*** (0.163)	-0.492*** (0.178)
LNR-control	-1.384*** (0.183)	-1.382*** (0.187)	-0.938*** (0.209)	-0.864*** (0.237)	-1.051*** (0.186)	-1.076*** (0.184)	-0.957*** (0.196)	-0.899*** (0.235)
Crimea: Russia-control	-0.108 (0.068)			0.546*** (0.163)	-0.182*** (0.067)			0.247 (0.306)
All violence					-0.180*** (0.052)	-0.202*** (0.056)	-0.128 (0.083)	-0.136* (0.079)
Observations	200748	123708	64296	200748	200748	123708	64296	200748
Adjusted R^2	0.147	0.198	0.290	0.228	0.154	0.209	0.293	0.230

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses, clustered by districts. Dependent variable: logarithm of a mean monthly luminosity. Time covered: January 2013 - December 2014. All models include individual and time fixed effects. Columns *All* contain all regions; *East Ukraine*: Dnipropetrovks, Kharkiv, Zaporizhia, Donetsk, Luhansk. Columns *All (RSTS)* include region-specific time shocks. **Sources:** nighttime luminosity tiles by NOAA (2018), district borders by Hijmans, Garcia and Wieczorek (2015), urban areas by Schneider, Friedl and Potere (2009), the contact line based on UNIAN (2015) and Mediarnbo.org (2018).

Table E.6: Placebo Treatment, Sample Until 2014, Monthly Based

	Placebo				Treatment and Placebo			
	All	East Ukraine	Donbass	All (RSTS)	All	East Ukraine	Donbass	All (RSTS)
Placebo DNR	0.068 (0.149)	-0.042 (0.152)	-0.112 (0.147)	-0.164 (0.155)	0.211* (0.117)	0.130 (0.122)	0.119 (0.113)	0.064 (0.116)
Placebo LNR	-0.317*** (0.088)	-0.427*** (0.094)	-0.456*** (0.100)	-0.327*** (0.117)	0.023 (0.044)	-0.061 (0.054)	-0.060 (0.049)	0.076* (0.046)
Placebo Crimea	-0.294*** (0.057)			0.247 (0.306)	-0.262*** (0.049)			0.060 (0.143)
DNR-control					-0.652*** (0.100)	-0.635*** (0.099)	-0.534*** (0.119)	-0.527*** (0.134)
LNR-control					-1.050*** (0.179)	-1.037*** (0.179)	-0.924*** (0.191)	-0.942*** (0.228)
Crimea: Russia-control					-0.016 (0.064)	0.000 (.)	0.000 (.)	0.300*** (0.098)
Observations	200748	123708	64296	200748	200748	123708	64296	200748
Adjusted R^2	0.143	0.194	0.280	0.224	0.155	0.210	0.294	0.230

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, standard errors in parentheses, clustered by districts. Dependent variable: logarithm of a mean monthly luminosity. Time covered: January 2013 - December 2014. Placebo effective after December 2013. All models control for the Minsk II truce effects for DNR and LNR. All models include individual and time fixed effects. Columns *All* contain all regions; *East Ukraine*: Dnipropetrovks, Kharkiv, Zaporizhia, Donetsk, Luhansk; *Donbass*: Donetsk, Luhansk. Columns *All (RSTS)* include region-specific time shocks. **Sources:** nighttime luminosity tiles by NOAA (2018), district borders by Hijmans, Garcia and Wiczorek (2015), urban areas by Schneider, Friedl and Potere (2009), the contact line based on UNIAN (2015) and Mediarnbo.org (2018).

Table E.7: Impact of the Separatist-Control on Luminosity, Standard Errors Clustered by Region, Monthly Based

	No Controls				With Controls			
	All	East Ukraine	Donbass	All (RSTS)	All	East Ukraine	Donbass	All (RSTS)
DNR-control	-0.826*** (0.083)	-0.798*** (0.161)	-0.327* (0.042)	-0.357*** (0.000)	-0.482*** (0.032)	-0.535*** (0.021)	-0.480** (0.011)	-0.487*** (0.001)
LNR-control	-1.077*** (0.083)	-1.049*** (0.161)	-0.579** (0.042)	-0.506*** (0.000)	-0.721*** (0.031)	-0.778*** (0.019)	-0.706*** (0.010)	-0.690*** (0.002)
Crimea: Russia-control	-0.062 (0.078)			-0.546*** (0.000)	-0.149*** (0.043)			-0.276*** (0.000)
Minsk II Effect: DNR					0.112*** (0.024)	0.180*** (0.037)	0.265 (0.074)	0.210*** (0.002)
Minsk II Effect: LNR					0.009 (0.024)	0.077 (0.038)	0.162 (0.073)	0.291*** (0.002)
All violence					-0.185*** (0.015)	-0.199*** (0.017)	-0.130** (0.006)	-0.144*** (0.010)
Observations	351309	216489	112518	351309	351309	216489	112518	351309
Adjusted R^2	0.176	0.227	0.298	0.257	0.187	0.244	0.303	0.260

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, standard errors in parentheses, clustered by districts. Dependent variable: logarithm of a mean monthly luminosity. Time covered: January 2013 - March 2016. Standard errors clustered by regions (oblasts). All models include individual and time fixed effects. Columns *All* contain all regions; *East Ukraine*: Dnipropetrovks, Kharkiv, Zaporizhia, Donetsk, Luhansk; *Donbass*: Donetsk, Luhansk. Columns *All (RSTS)* include region-specific time shocks. **Sources (georeferenced):** nighttime luminosity tiles by NOAA (2018), district borders by Hijmans, Garcia and Wiczorek (2015), urban areas by Schneider, Friedl and Potere (2009), the contact line based on UNIAN (2015) and Mediarnbo.org (2018).

Table E.8: Impact of the Separatist-Control on Luminosity until 2014, Monthly Based

	All			NCL		
	All	East Ukraine	Donbass	All	East Ukraine	Donbass
DNR-control	-0.487*** (0.001)	-0.487*** (0.001)	-0.487*** (0.001)	-0.668*** (0.000)	-0.668*** (0.000)	-0.668*** (0.000)
LNR-control	-0.690*** (0.002)	-0.690*** (0.002)	-0.690*** (0.002)	-0.425*** (0.000)	-0.425*** (0.000)	-0.425*** (0.000)
Minsk II Effect: DNR	0.210*** (0.002)	0.210*** (0.002)	0.210*** (0.002)	0.288*** (0.000)	0.288*** (0.000)	0.288*** (0.000)
Minsk II Effect: LNR	0.291*** (0.002)	0.291*** (0.002)	0.291*** (0.002)	0.210*** (0.000)	0.210*** (0.000)	0.210*** (0.000)
Crimea: Russia-control	-0.276*** (0.000)	-0.276*** (0.000)	-0.276*** (0.000)	0.320*** (0.000)	0.320*** (0.000)	0.320*** (0.000)
All violence	-0.144*** (0.010)	-0.144*** (0.010)	-0.144*** (0.010)	-0.057*** (0.001)	-0.057*** (0.001)	-0.057*** (0.001)
Observations	351309	351309	351309	288981	288981	288981
Adjusted R^2	0.260	0.260	0.260	0.227	0.227	0.227

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, standard errors in parentheses, clustered by districts. Dependent variable: logarithm of a mean monthly luminosity. Time covered: January 2013 - March 2016. Standard errors clustered by regions (oblasts). *NCL* panel excludes districts that contain a segment of the contact line. Columns *All* contain all regions; *East Ukraine*: Dnipropetrovks, Kharkiv, Zaporizhia, Donetsk, Luhansk; *Donbass*: Donetsk, Luhansk. All models include individual and time fixed effects and region-specific time shocks. **Sources:** nighttime luminosity tiles by NOAA (2018), district borders by Hijmans, Garcia and Wieczorek (2015), urban areas by Schneider, Friedl and Potere (2009), the contact line based on UNIAN (2015) and Mediarnbo.org (2018).

Table E.9: Impact of the Separatist-Control on Luminosity, Quarterly Based

	No Controls				With Controls			
	All	East Ukraine	Donbass	All (RSTS)	All	East Ukraine	Donbass	All (RSTS)
DNR-control	-0.754*** (0.066)	-0.734*** (0.070)	-0.386*** (0.070)	-0.350*** (0.081)	-0.492*** (0.063)	-0.519*** (0.064)	-0.465*** (0.070)	-0.433*** (0.081)
LNR-control	-0.682*** (0.082)	-0.663*** (0.089)	-0.314*** (0.103)	-0.400*** (0.101)	-0.422*** (0.114)	-0.453*** (0.114)	-0.384*** (0.111)	-0.462*** (0.109)
Crimea: Russia-control	-0.054 (0.046)			-0.555*** (0.137)	-0.116*** (0.043)			-0.555*** (0.137)
Minsk II Effect: DNR					0.077* (0.039)	0.113*** (0.043)	0.150*** (0.043)	0.149*** (0.040)
Minsk II Effect: LNR					0.019 (0.065)	0.055 (0.068)	0.096 (0.072)	0.098 (0.102)
Any Violence					-0.140*** (0.026)	-0.152*** (0.027)	-0.077* (0.043)	-0.077* (0.041)
Observations	117103	72163	37506	117103	117103	72163	37506	117103
Adjusted R^2	0.435	0.479	0.622	0.543	0.474	0.531	0.630	0.548

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, standard errors in parentheses, clustered by district. Dependent variable: logarithm of a mean monthly luminosity. Time covered: January 2013 - March 2016. Standard errors clustered by districts. All models include individual and time fixed effects. Columns *All* contain all regions; *East Ukraine*: Dnipropetrovks, Kharkiv, Zaporizhia, Donetsk, Luhansk; *Donbass*: Donetsk, Luhansk. *All (RSTS)* columns account for region-specific time shocks. **Sources:** nighttime luminosity tiles by NOAA (2018), district borders by Hijmans, Garcia and Wiczorek (2015), urban areas by Schneider, Friedl and Potere (2009), the contact line based on UNIAN (2015) and Mediarnbo.org (2018).

Table E.10: Impact of the Separatist-Control on Luminosity: 20-40 KM away from the Contact Line, Quarterly Based

	No Controls		With Controls	
	No RSTS	RSTS	No RSTS	RSTS
DNR-control	-0.370*** (0.038)	-0.350*** (0.044)	-0.428*** (0.042)	-0.461*** (0.049)
LNR-control	-0.258*** (0.061)	-0.278*** (0.062)	-0.282*** (0.092)	-0.253*** (0.091)
Minsk II Effect: DNR			0.117* (0.060)	0.222*** (0.058)
Minsk II Effect: LNR			0.052 (0.094)	-0.051 (0.093)
Any Violence			-0.006 (0.016)	0.002 (0.015)
Observations	9282	9282	9282	9282
Adjusted R^2	0.680	0.683	0.682	0.688

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, standard errors in parentheses, clustered by districts. Dependent variable: logarithm of a mean monthly luminosity. Columns *All* contain all regions; *East Ukraine*: Dnipropertovks, Kharkiv, Zaporizhia, Donetsk, Luhansk; *Donbass*: Donetsk, Luhansk. Time covered: January 2013 - March 2016. *RSTS* models account for region-specific time shocks. All models include individual and time fixed effects. **Sources:** luminosity: NOAA (2018), district borders: Hijmans, Garcia and Wieczorek (2015), urban areas: Schneider, Friedl and Potere (2009), the contact line: UNIAN (2015), Mediarnbo.org (2018).

Table E.11: Change of Luminosity in the DNR-contolled areas after Nationalization by Treatment, Monthly Based

	No District-Specific Time Shocks			District-Specific Time Shocks		
	Treatment	Placebo	Both	Treatment	Placebo	Both
Nationalization DNR	-0.337*** (0.047)		-0.343*** (0.038)	-0.227*** (0.066)		-0.193*** (0.054)
Placebo treatment		-0.149* (0.078)	0.016 (0.078)		-0.192*** (0.067)	-0.080 (0.048)
Observations	44422	44422	44422	44422	44422	44422
Adjusted R^2	0.271	0.266	0.271	0.460	0.459	0.460

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. standard errors in parentheses. Dependent variable: logarithm of a mean monthly luminosity. Standard errors clustered by districts. Time covered: January 2016 - December 2017. All models include individual and time fixed effects. **Sources (georeferenced):** nighttime luminosity tiles by NOAA (2018), district borders by Hijmans, Garcia and Wieczorek (2015), urban areas by Schneider, Friedl and Potere (2009), the contact line based on UNIAN (2015) and Mediarnbo.org (2018), location of nationalized firms by Euromaidanpress.com (2017a).

Table E.12: Change of Luminosity in the DNR-controlled areas after Nationalization by Treatment, No Districts Crossed by the Contact Line, Monthly Based

	No District-Specific Time Shocks			District-Specific Time Shocks		
	Treatment	Placebo	Both	Treatment	Placebo	Both
Nationalization DNR	-0.197*** (0.040)		-0.245*** (0.044)	-0.096*** (0.000)		-0.083** (0.032)
Placebo treatment		0.046 (0.068)	0.132 (0.097)		-0.069 (0.051)	-0.031 (0.075)
Observations	16996	16996	16996	16996	16996	16996
Adjusted R^2	0.352	0.350	0.353	0.518	0.518	0.518

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, standard errors in parentheses. Dependent variable: logarithm of a mean monthly luminosity. Standard errors clustered by districts. Time covered: January 2016 - December 2017. All models include individual and time fixed effects. Placebo introduced in November 2016. **Sources (georeferenced):** nighttime luminosity tiles by NOAA (2018), district borders by Hijmans, Garcia and Wieczorek (2015) urban areas by Schneider, Friedl and Potere (2009), the contact line based on UNIAN (2015) and Mediarnbo.org (2018), location of nationalized firms by Euromaidanpress.com (2017a).

Table E.13: Change of Luminosity in the DNR-contolled areas after Nationalization by Treatment, Cells 20-40 km away from the Contact Line, Monthly Based

	No District-Specific Time Shocks			District-Specific Time Shocks		
	Treatment	Placebo	Both	Treatment	Placebo	Both
Nationalization DNR	-0.196** (0.068)		-0.233** (0.083)	-0.223* (0.108)		-0.258* (0.126)
Placebo treatment		-0.007 (0.105)	0.093 (0.128)		-0.048 (0.044)	0.082 (0.052)
Observations	10262	10262	10262	10262	10262	10262
Adjusted R^2	0.310	0.309	0.310	0.512	0.510	0.512

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, standard errors in parentheses. Dependent variable: logarithm of a mean monthly luminosity. Standard errors clustered by districts. Time covered: January 2016 - December 2017. All models include individual and time fixed effects. Placebo introduced in November 2016. **Sources (georeferenced):** nighttime luminosity tiles by NOAA (2018), district borders by Hijmans, Garcia and Wieczorek (2015) urban areas by Schneider, Friedl and Potere (2009), the contact line based on UNIAN (2015) and Mediarnbo.org (2018), location of nationalized firms by Euromaidanpress.com (2017a).

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