

COMMODITY PRICE SHOCKS AND CIVIL CONFLICT: EVIDENCE FROM COLOMBIA

Online Appendix

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July 2012

This Appendix presents additional tables that are discussed in the text, as follows:

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Table A.I
Summary Statistics of Additional Variables

	Obs.	Mean	Med.	Std. Dev.	Min.	Max.
<i>Municipal-level variables</i>						
Length of oil pipelines, hundreds of km, 2000	998	0.071	0	0.268	0	3.819
Sugar intensity, hundreds of hectares, 2005	998	0.689	0	2.486	0	19.4
Tobacco intensity, hundreds of hectares, 2005	998	0.043	0	0.375	0	8.43
African palm intensity, hundreds of hectares, 2005	998	0.084	0	0.692	0	8.85
Banana intensity, hundreds of hectares, 2005	998	0.017	0	0.221	0	5.17
<i>Annual-level variables</i>						
Log int'l palm price, thousands of 2006 pesos/lb	18	-0.692	-0.678	0.197	-1.118	-0.422
Log int'l banana price, thousands of 2006 pesos/lb	18	-0.406	-0.442	0.253	-0.777	0.015
Log int'l sugar price, thousands of 2006 pesos/lb	18	-1.251	-1.305	0.312	-1.772	-0.654
Log int'l tobacco price, thousands of 2006 pesos/lb	18	1.409	1.361	0.228	1.121	1.849

Notes. The Data Appendix lists data sources.

Table A.II
Robustness Across Samples

	(1)	(2)	(3)	(4)
<i>Dependent variables:</i>	Guerrilla attacks	Paramilitary attacks	Clashes	Casualties
<i>Panel A: Eliminating earthquake-affected municipalities</i>				
Coffee int. x log coffee price	-0.681** (0.265)	-0.185*** (0.064)	-0.802*** (0.262)	-2.081* (1.080)
Oil production x log oil price	0.700 (1.358)	0.726*** (0.156)	0.299 (0.665)	1.534 (2.129)
Observations	17,154	17,154	17,154	17,154
<i>Panel B: Eliminating DMZ municipalities</i>				
Coffee int. x log coffee price	-0.611** (0.249)	-0.160*** (0.061)	-0.708*** (0.246)	-1.814* (0.990)
Oil production x log oil price	0.705 (1.355)	0.725*** (0.156)	0.316 (0.661)	1.568 (2.124)
Observations	17,568	17,568	17,568	17,568
<i>Panel C: Eliminating municipalities with changing boundaries</i>				
Coffee int. x log coffee price	-0.583** (0.267)	-0.153*** (0.058)	-0.608** (0.258)	-1.797* (1.008)
Oil production x log oil price	0.597 (1.445)	0.670*** (0.097)	0.042 (0.768)	1.109 (2.195)
Observations	16,560	16,560	16,560	16,560

Notes. Standard errors clustered at the department level are shown in parentheses. Variables not shown include municipality fixed effects, year fixed effects, log of population, and linear trends by region and municipalities cultivating coca in 1994. The interaction of the internal coffee price with coffee intensity is instrumented by the interaction of the coffee export volume of Brazil, Vietnam and Indonesia with rainfall, temperature, and the product of rainfall and temperature. Panel A eliminates the municipal units that were affected by a 1999 earthquake in the coffee-producing area. Panel B eliminates the municipal units that fall in the demilitarized zone. Panel C eliminates municipalities with changing boundaries, that split between 1988 and 2005 to give rise to new municipalities. This restricts the analysis to municipalities that both existed in 1988 and had constant boundaries over the duration of this period. *** is significant at the 1% level, ** is significant at the 5% level, * is significant at the 10% level.

Table A.III
Poisson Instrumental Variables Estimation

	(1)	(2)	(3)	(4)
<i>Dependent variables:</i>	Guerrilla attacks	Paramilitary attacks	Clashes	Casualties
Coffee int. x log coffee price	-1.680*	-1.658**	-1.395**	-0.909
	(0.883)	(0.826)	(0.597)	(0.589)
Oil production x log oil price	0.428	2.878*	0.036	0.440
	(0.361)	(1.635)	(0.682)	(0.569)
Observations	17,604	17,604	17,604	17,604
Estimator	GLM	GLM	GLM	GLM

Notes. Standard errors clustered at the department level are shown in parentheses. Variables not shown include municipality fixed effects, year fixed effects, log of population, and linear trends by region and municipalities cultivating coca in 1994. All regressions employ Generalized Linear Models (GLM) estimation specifying that the errors are Poisson distributed and a log link function, as well as an iterated re-weighted least squares convergence algorithm. The interaction of the internal coffee price with coffee intensity is instrumented by the interaction of the coffee export volume of Brazil, Vietnam and Indonesia with rainfall, temperature, and the product of rainfall and temperature. *** is significant at the 1% level, ** is significant at the 5% level, * is significant at the 10% level.

Table A.IV
The Effect of the Coffee and Oil Shocks Including Oil Pipelines

	(1)	(2)	(3)	(4)
<i>Dependent variables:</i>	Guerrilla attacks	Paramilitary attacks	Clashes	Casualties
Coffee int. x log coffee price	-0.600** (0.243)	-0.161*** (0.061)	-0.701*** (0.245)	-1.808* (0.978)
Oil production x log oil price	0.703 (1.205)	0.668*** (0.114)	0.195 (0.671)	1.063 (2.211)
Oil pipe length x log oil price	-0.009 (0.588)	0.150* (0.079)	0.280 (0.415)	1.192 (2.080)
Observations	17,604	17,604	17,604	17,604

Notes. Standard errors clustered at the department level are shown in parentheses. Variables not shown include municipality fixed effects, year fixed effects, log of population, and linear trends by region and municipalities cultivating coca in 1994. Oil pipe length denotes the length of oil pipelines in each municipality in the year 2000. The interaction of the internal coffee price with coffee intensity is instrumented by the interaction of the coffee export volume of Brazil, Vietnam and Indonesia with rainfall, temperature, and the product of rainfall and temperature. *** is significant at the 1% level, ** is significant at the 5% level, * is significant at the 10% level.

Table A.V
The Effect of the Coffee, Oil and Coca Shocks on Violence

	(1)	(2)	(3)	(4)
<i>Dependent variables:</i>	Guerrilla attacks	Paramilitary attacks	Clashes	Casualties
Coffee int. x log coffee price	-0.605** (0.250)	-0.158*** (0.060)	-0.681*** (0.234)	-1.721* (0.934)
Oil production x log oil price	0.702 (1.357)	0.722*** (0.156)	0.266 (0.663)	1.516 (2.084)
Coca int. x post1994	0.042 (0.049)	0.006 (0.025)	0.111* (0.062)	0.979*** (0.362)
Observations	17,604	17,604	17,604	17,604

Notes. Standard errors clustered at the department level are shown in parentheses. Variables not shown include municipality fixed effects, year fixed effects, log of population, and linear trends by region. Coca int. is the hectares of land used for cultivating coca in each municipality in 1994. Post1994 equals one for 1994 and each year afterward. The interaction of the internal coffee price with coffee intensity is instrumented by the interaction of the coffee export volume of Brazil, Vietnam and Indonesia with rainfall, temperature, and the product of rainfall and temperature. *** is significant at the 1% level, ** is significant at the 5% level, * is significant at the 10% level.

Table A.VI
Alternative Account: Spillovers Across Coffee and Oil Municipalities

	(1)	(2)	(3)	(4)
<i>Dependent variables:</i>	Guerrilla attacks	Paramilitary attacks	Clashes	Casualties
<i>Panel A: Excluding municipalities with coffee and oil</i>				
Coffee int. x log coffee price	-0.625** (0.260)	-0.155** (0.061)	-0.714*** (0.240)	-1.795* (0.990)
Oil production x log oil price	0.668 (1.375)	0.710*** (0.141)	0.210 (0.707)	0.893 (2.254)
Observations	17,352	17,352	17,352	17,352
<i>Panel B: Excluding oil municipalities that neighbor coffee</i>				
Coffee int. x log coffee price	-0.566** (0.227)	-0.172*** (0.063)	-0.683*** (0.228)	-1.763* (0.956)
Observations	17,154	17,154	17,154	17,154
<i>Panel C: Excluding coffee municipalities that neighbor oil</i>				
Oil production x log oil price	0.614 (1.404)	0.695*** (0.131)	0.170 (0.729)	0.784 (2.286)
Observations	15,948	15,948	15,948	15,948

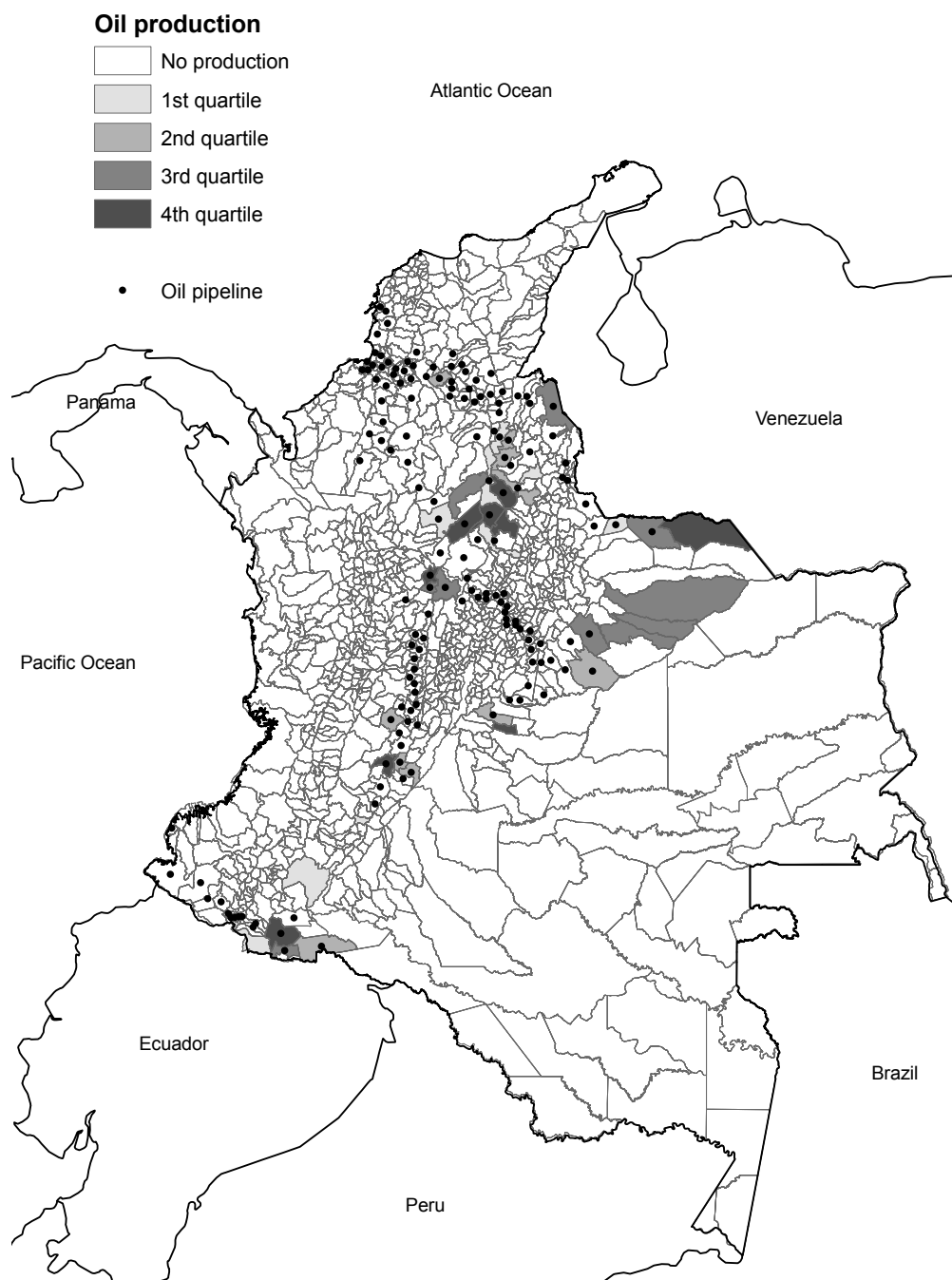
Notes. Standard errors clustered at the department level are shown in parentheses. Variables not shown include municipality fixed effects, year fixed effects, log of population, and linear trends by region and municipalities cultivating coca in 1994. The interaction of the internal coffee price with coffee intensity is instrumented by the interaction of the coffee export volume of Brazil, Vietnam and Indonesia with rainfall, temperature, and the product of rainfall and temperature. Panel A eliminates municipalities with both coffee cultivation and oil production. Panel B eliminates oil production municipalities that are spatially contiguous with coffee cultivating municipalities. Panel C eliminates coffee cultivating municipalities that are spatially contiguous with oil producing municipalities. *** is significant at the 1% level, ** is significant at the 5% level, * is significant at the 10% level.

Table A.VII
The Effect of Other Agricultural Price Shocks on Violence

	(1)	(2)	(3)	(4)
<i>Dependent variables:</i>	Guerrilla attacks	Paramilitary attacks	Clashes	Casualties
Coffee int. x log coffee price	-0.463*** (0.163)	-0.125*** (0.036)	-0.639*** (0.195)	-1.192* (0.639)
Sugar int. x log sugar price	-0.155*** (0.039)	-0.037*** (0.009)	-0.078** (0.036)	-0.655*** (0.145)
Banana int. x log banana price	-0.076** (0.033)	-0.222*** (0.009)	-0.766*** (0.035)	-2.892*** (0.097)
Palm int. x log palm price	0.050 (0.110)	-0.028** (0.013)	-0.052 (0.088)	-0.425 (0.292)
Tobacco int. x log tobacco price	-0.816** (0.324)	-0.061** (0.029)	-0.837*** (0.143)	-1.942*** (0.715)
Observations	17,604	17,604	17,604	17,604

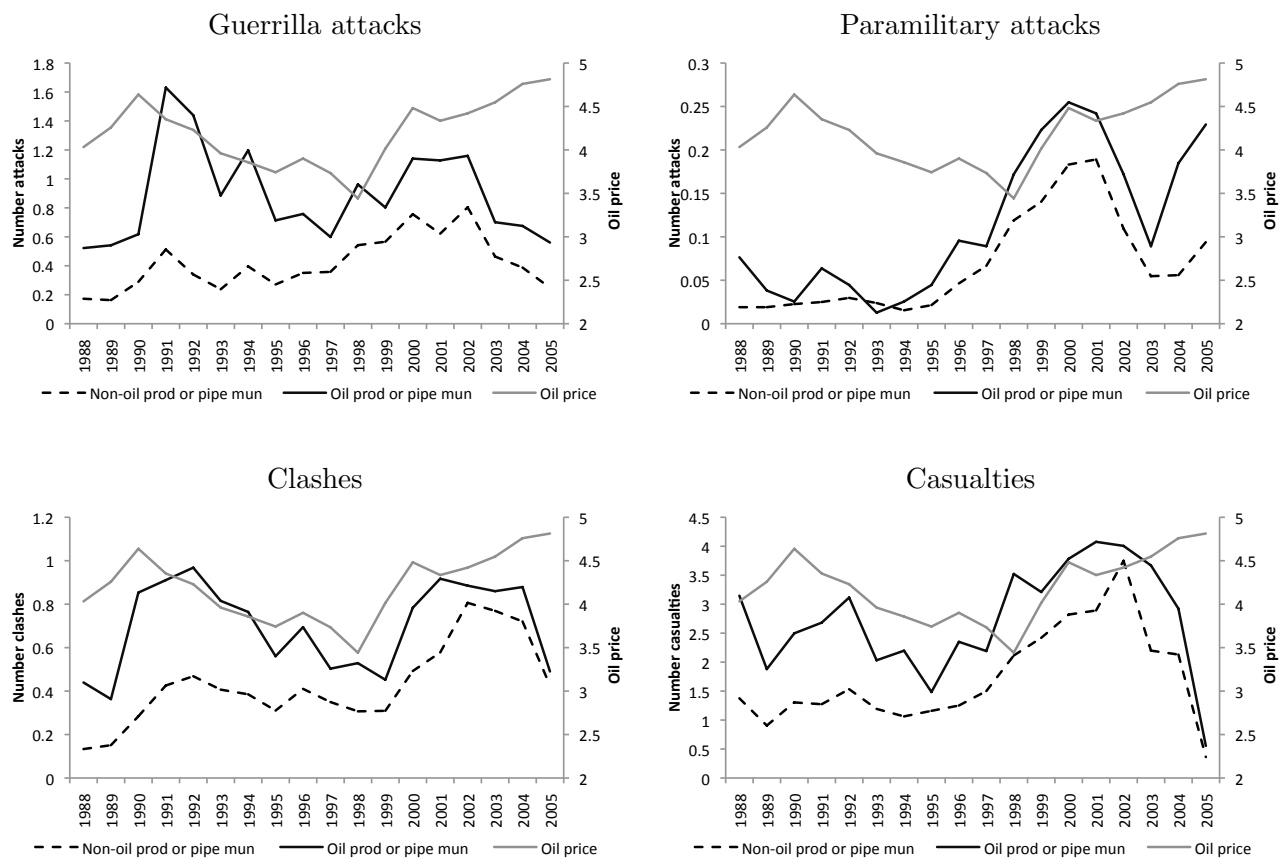
Notes. Standard errors clustered at the department level are shown in parentheses. Variables not shown include municipality fixed effects, year fixed effects, log of population, and linear trends by region and municipalities cultivating coca in 1994. Sugar, banana, palm and tobacco intensity are measured as the hectares of land cultivated with these crops in 2005. Coffee intensity is equivalently measured in 1997. The interaction of the internal coffee price with coffee intensity is instrumented by the interaction of the coffee export volume of Brazil, Vietnam and Indonesia with rainfall, temperature, and the product of rainfall and temperature. *** is significant at the 1% level, ** is significant at the 5% level, * is significant at the 10% level.

Figure A.I
Oil Production and Pipelines



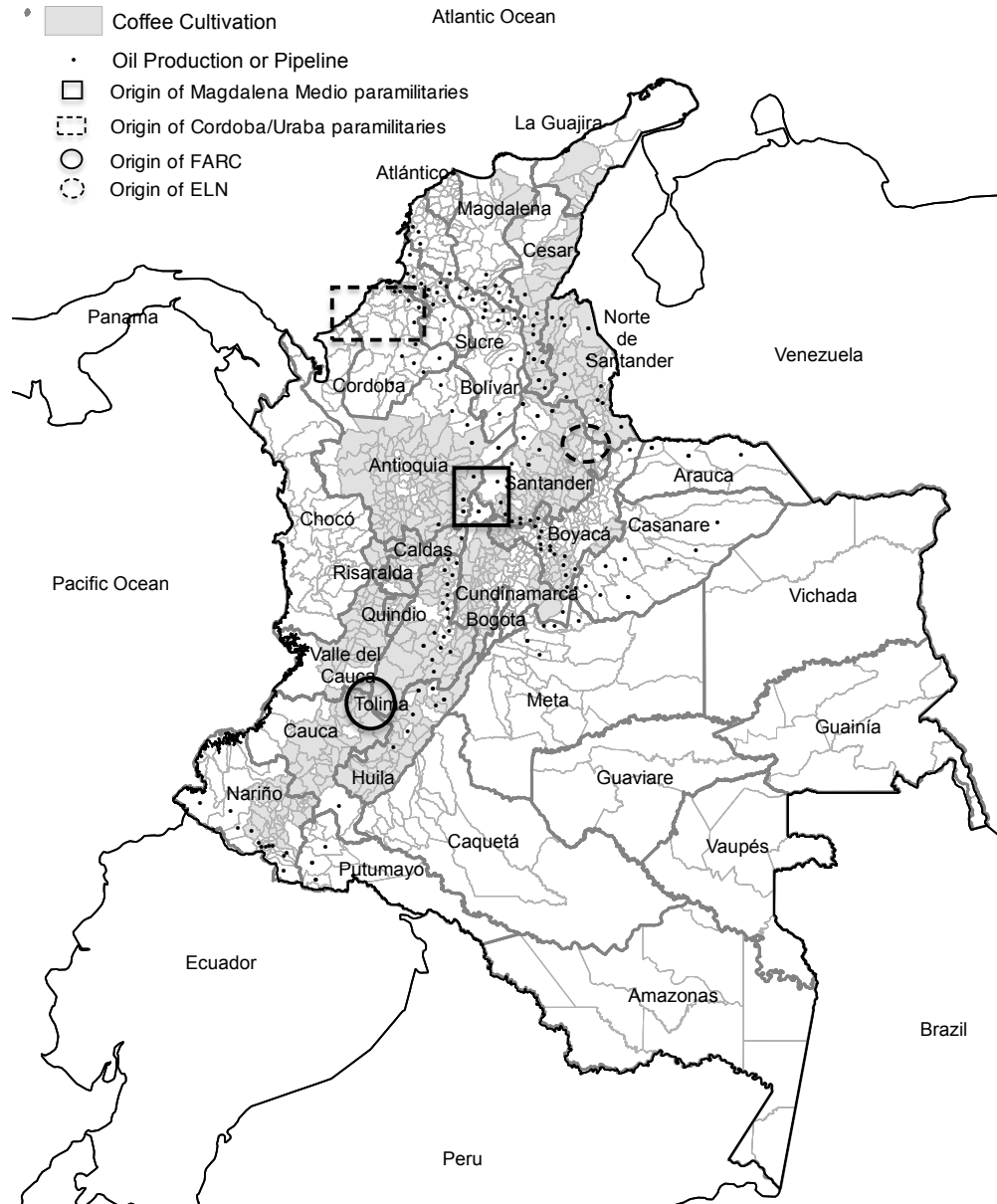
Notes. This figure shows oil production and oil pipelines in Colombian municipalities. Oil production is measured in hundreds of thousands of barrels per day in 1988. Oil pipeline is an indicator of whether a municipality had an oil pipeline in 2000. *Sources:* Shape file from IGAC; oil data from the Ministry of Mines and Energy.

Figure A.II
The Oil Price and Mean Violence in Oil and Non-oil Municipalities including Pipelines



Notes. This figure shows the (log) real international price of oil, as well as mean violence in municipalities producing oil in 1988 or containing oil pipelines in 2000, and mean violence in the non-oil producing or pipeline municipalities.

Figure A.III
The Origins of Guerrillas and Paramilitaries



Notes. This figure shows the areas where various paramilitary and guerrilla groups originated. Municipal borders are shown in light gray and department borders are shown in thick dark gray. Department names are also shown. *Sources:* Shape file from IGAC; coffee data from National Federation of Coffee Growers; oil data from the Ministry of Mines and Energy; location of guerrilla origins from Ferro and Uribe (2002) and location of paramilitary origins from Cubides (1997).