Online Appendix

The Economic Impact of Migrants from Hurricane Maria

Giovanni Peri, Derek Rury, and Justin C. Wiltshire

FIG. A1.—Concentration of Recent Puerto Rican Migrants, by Commuting Zone, in 2005 (Panel A) and 2017 (Panel B). Numbers are calculated using data from the American Community Survey (2005 and 2017), and are the fraction of the total recent Puerto Rican migrant population.

FIG. A2.—Puerto Rican FEMA Applications by Commuting Zone, in levels (Panel A) and per 100,000 population (Panel B). FEMA applications reflect mainland ZIP code of filing for Puerto Rican homes damanged in either Hurricane Irma or Maria. Data are aggregated to commuting zones to reflect local labor markets. Population figures taken from the 2010 Decennial Census.

FIG. A3.—Growth in Hispanic Share of Total Employment by Selected Sectors (Orlando, Q2 2017 - Q2 2018). Calculated using data from the QWI. Sector-selection reflects likelihood of absorbing English non-speaking workers.

Table A1
Sector composition of migrants from Puerto Rico to Orlando

	Born in Puerto Rico	Natives	Hispanics (Born Abroad)	Hispanics
Wholesale	2.6%	2.4%	2.4%	2.4%
Construction	5.6%	5.6%	10.6%	8.5%
Retail	14.3%	12.0%	11.8%	12.8%
Information	1.8%	2.5%	1.5%	1.8%
Finance/Real Estate	7.0%	6.8%	6.1%	6.3%
Education/Health	17.0%	18.2%	15.9%	15.6%
Hospitality	17.4%	17.8%	16.5%	17.9%
Manufacturing	4.0%	4.3%	4.6%	4.1%
Transport	7.3%	3.7%	6.6%	5.7%
Other Services	4.8%	4.3%	5.0%	4.4%
Utilities	0.4%	0.1%	0.4%	0.3%
Management	10.0%	12.6%	11.7%	11.9%
Natural Resources	0.2%	0.4%	1.2%	0.8%
Mining	0.0%	0.1%	0.0%	0.0%
N	2,628	33,301	6,301	10,102

NOTE.—Synthetic control donor CZs by weight for selected outcomes calculated using the QCEW. Weights rounded to nearest tenth of a percent. CZs with zero weight not shown. 1990 commuting zone definitions from IPUMS USA: `https://usa.ipums.org/usa/volii/1990lma.shtml`

Table A2
Synthetic control donor weights, Selected outcomes and sectors

Aggregate		Construction	
Commuting Zone	Weight (%)	Commuting Zone	Weight (%)
Panel A: *Employment*			
Gainesville, GA	26.9	Provo-Orem, UT	24.3
Fayetteville-Springdale-Rogers, AR	18.6	Anniston, AL	20.6
Provo-Orem, UT	15.3	Reno, NV	14.1
Nashville, TN	11.0	Boise City, ID	12.3
El Paso, TX-Las Cruces, NM	7.0	Salem-Eugene-Springfield, OR	10.1
Boise City, ID	6.7	Norfolk-Virginia Beach-Newport News, VA-NC	7.6
Las Vegas, NV-AZ	6.5	Las Vegas, NV-AZ	7.4
Fresno-Visalia-Tulare-Parterville, CA	5.3	Lake Charles, LA	3.6
Fort Walton Beach-Pensacola, FL	2.7		
Panel B: *Earnings per worker*			
Modesto-Merced, CA	24.3	Chattanooga, TN-GA	33.6
Roanoke, VA	12.7	Reno, NV	20.0
San Diego, CA	12.3	Fort Worth-Arlington, TX	17.6
Reno, NV	10.4	Corpus Christi, TX	12.1
San Francisco-Oakland, CA	9.5	Las Vegas, NV-AZ	6.8
Lake Charles, LA	8.9	Santa Barbara-Santa Maria-Lompoc, CA	6.1
Lexington-Fayette, KY	8.6	Brazoria, TX	3.9
Las Vegas, NV-AZ	6.1		
Peoria-Pekin, IL	3.2		
Salem-Eugene-Springfield, OR	3.0		
Punta Gorda-Sarasota-Bradenton, FL	0.8		

NOTE.—Synthetic control donor CZs by weight for selected outcomes calculated using the QCEW. Weights rounded to nearest tenth of a percent. CZs with zero weight not shown. 1990 commuting zone definitions from IPUMS USA: `https://usa.ipums.org/usa/volii/1990lma.shtml`

Table A3
Estimated Treatment Effects with Alternate Test Statistics, Non-Hispanic and Less-Educated Workers

	Non-Hispanic Workers				Less-Educated Workers			
Sector	Log Employment		Log Earnings per Worker		Log Employment		Log Earnings per Worker	
Aggregate	6 month TE	12 month TE	6 month TE	12 month TE	6 month TE	12 month TE	6 month TE	12 month TE
Treatment effect	-0.0003	0.0082	0.0001	0.0009	-0.0006	0.0080	0.0008	-0.0199
Andrews *p*-value	0.4000	0.0667	0.9333	0.4667	0.3333	0.0667	0.4000	0.0667
Moving block *p*-value	0.0000	0.0000	0.3750	0.1111	0.0000	0.0000	0.1875	0.0000
N	999	999	999	999	999	999	999	999
Construction	6 month TE	12 month TE	6 month TE	12 month TE	6 month TE	12 month TE	6 month TE	12 month TE
Treatment effect	0.0004	0.0068	0.0004	-0.0245	0.0082	0.0166	0.0007	-0.0147
Andrews *p*-value	0.4667	0.2000	0.6667	0.0667	0.2667	0.0667	0.5333	0.1333
Moving block *p*-value	0.0625	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N	999	999	999	999	999	999	999	999
Retail	6 month TE	12 month TE	6 month TE	12 month TE	6 month TE	12 month TE	6 month TE	12 month TE
Treatment effect	-0.0001	0.0009	0.0036	0.0205	-0.0004	0.0089	0.0060	0.0119
Andrews *p*-value	0.5333	0.4000	0.2667	0.0667	0.5333	0.1333	0.2000	0.1333
Moving block *p*-value	0.2500	0.1111	0.1875	0.0000	0.5625	0.5556	0.0000	0.0000
N	999	999	999	999	999	999	999	999
Hospitality	6 month TE	12 month TE	6 month TE	12 month TE	6 month TE	12 month TE	6 month TE	12 month TE
Treatment effect	-0.0016	0.0120	-0.0002	0.0028	-0.0041	0.0042	0.0003	0.0134
Andrews *p*-value	0.5333	0.1333	0.4667	0.3333	0.3333	0.3333	0.5333	0.2000
Moving block *p*-value	0.3125	0.2222	0.1250	0.0000	0.0625	0.2222	0.3125	0.0556
N	999	999	999	999	999	999	999	999

NOTE.—Synthetic control estimates of the impact of the immigration inflow on the residualized (after accounting for seasonal component and intercept) logarithms of the indicated outcomes in Orlando (6 and 12 months after Hurricane Maria hit Puerto Rico), using data from the QWI. Columns 1-4 show estimates for non-Hispanic workers. Columns 5-8 show estimates for less-educated workers. The donor pool is restricted to include only those commuting zones which are observed for four quarters after the Hurricane, allowing 12-month estimates of the treatment effects. *p*-values calculated using Andrews (2003) end-of-sample instability test and the moving block test statistic proposed in Chernozhukov, Wuthrich, and Zhu (2017).

Table A4
Alternative Estimated Treatment Effects, All Workers

Sector	Log Employment		Log Earnings per Worker		Log Establishments	
Aggregate	6 months	12 months	6 months	12 months	6 months	12 months
Treatment effect	0.0031***	0.0048***	0.0005	0.0027	0.0024	0.0032
RMSPE	12.1146	11.8642	2.5968	3.8824	0.0818	0.3295
RMSPE p-value	0.0061	0.0061	0.5030	0.3697	0.9576	0.9758
N	165	165	165	165	165	165
Construction	6 months	12 months	6 months	12 months	6 months	12 months
Treatment effect	0.0218	0.0466**	0.0107	0.0347**	0.0089	0.0059
RMSPE	5.5539	15.4637	5.8046	11.1351	0.8709	1.0185
RMSPE p-value	0.1074	0.0134	0.1745	0.0403	0.6980	0.8792
N	149	149	149	149	149	149
Retail	6 months	12 months	6 months	12 months	6 months	12 months
Treatment effect	0.0037**	0.0097**	0.0008	0.0036	0.0028	0.0150
RMSPE	5.8845	6.5179	0.4639	0.9479	0.0936	1.7757
RMSPE p-value	0.0353	0.0471	0.8471	0.8706	0.9882	0.7412
N	170	170	170	170	170	170
Hospitality	6 months	12 months	6 months	12 months	6 months	12 months
Treatment effect	0.0008	0.0117	0.0013**	0.0140**	-0.0020	0.0031
RMSPE	1.6499	2.7406	17.5453	13.9232	0.1965	0.1950
RMSPE p-value	0.3378	0.2703	0.0270	0.0338	0.9257	0.9865
N	148	148	148	148	148	148

NOTE.—Alternative synthetic control estimates of the impact of the immigration inflow on the residualized (after accounting for seasonal component and intercept) logarithms of the indicated outcomes in Orlando (6 and 12 months after Hurricane Maria hit Puerto Rico), using data from the QCEW, unrestricted donor pool. Estimated treatment effects are normalized to the period immediately before Hurricane Maria hit Puerto Rico. Significance based on RMSPE *p*-values: * significance at the 10% level; ** significance at the 5% level; *** significance at the 1% level.

Table A5
Estimated Treatment Effects, Extended pre-Treatment Period

Sector	Log Employment		Log Earnings per Worker		Log Establishments	
Aggregate	6 months	12 months	6 months	12 months	6 months	12 months
Treatment effect	0.0010**	0.0065**	0.0012	0.0031	0.0066	0.0060
RMSPE	8.4606	6.9646	2.7467	5.2023	1.3026	2.2651
RMSPE p-value	0.0305	0.0488	0.6037	0.2683	0.7561	0.6524
N	164	164	164	164	164	164
Construction	6 months	12 months	6 months	12 months	6 months	12 months
Treatment effect	0.0147*	0.0325**	0.0120	0.0293	0.0155	0.0113
RMSPE	6.5773	8.6288	3.0731	5.2201	4.7238	5.0628
RMSPE p-value	0.0816	0.0408	0.4694	0.1837	0.2313	0.2585
N	147	147	147	147	147	147
Retail	6 months	12 months	6 months	12 months	6 months	12 months
Treatment effect	0.0055**	0.0067**	0.0094	0.0087	0.0097	0.0165
RMSPE	6.4951	6.3422	4.5573	4.5085	0.8796	2.6290
RMSPE p-value	0.0417	0.0417	0.2857	0.2262	0.8095	0.6310
N	168	168	168	168	168	168
Hospitality	6 months	12 months	6 months	12 months	6 months	12 months
Treatment effect	-0.0016	0.0125	0.0074*	0.0141*	-0.0016	0.0053
RMSPE	2.4057	3.0052	11.2476	10.5380	0.1920	0.3771
RMSPE p-value	0.3333	0.2381	0.0748	0.0612	0.9864	0.9728
N	147	147	147	147	147	147

NOTE.—Synthetic control estimates of the impact of the immigration inflow on the residualized (after accounting for seasonal component and intercept going back to 2013) logarithms of the indicated outcomes in Orlando (6 and 12 months after Hurricane Maria hit Puerto Rico), using data from the QCEW, unrestricted donor pool. The pre-treatment period is extended back to the beginning of 2013. Significance based on RMSPE *p*-values: * significance at the 10% level; ** significance at the 5% level; *** significance at the 1% level.

Table A6
Estimated Impact of Hurricane Irma on Orlando

Sector	Log Employment		Log Earnings per Worker		Log Establishments	
Aggregate	6 months	12 months	6 months	12 months	6 months	12 months
Treatment effect	0.0008	-0.0016	-0.0001	-0.0008	-0.0043	-0.0051
RMSPE	2.2926	2.6687	4.2418	3.1581	1.7626	2.9954
RMSPE p-value	0.2711	0.2711	0.3253	0.5000	0.4819	0.3795
N	166	166	166	166	166	166
Construction	6 months	12 months	6 months	12 months	6 months	12 months
Treatment effect	-0.0018	0.0248	0.0014	0.0105	-0.0029	0.0028
RMSPE	1.0277	1.0146	7.1415	3.8702	0.7032	0.4765
RMSPE p-value	0.6577	0.8054	0.1409	0.3490	0.8389	0.9732
N	149	149	149	149	149	149

NOTE.—Synthetic control estimates of the impact of Hurricane Irma on Orlando (6 and 12 months after Irma hit both Orlando and Jacksonville) on (deseasonalized, natural logarithm of) employment, earnings per worker, and establishments, using Jacksonville as the counterfactual Orlando with respect to exposure to Irma. Jacksonville and Orlando both lay approximately the same distance from Irma's eye when the storm was at the same intensity. Estimated using data from the QCEW. Employment is observed on a monthly basis; all other variables are observed on a quarterly basis. Significance is calculated using RMSPE *p*-values. * Significance at the 10% level; ** significance at the 5% level; *** significance at the 1% level.

Table A7
Difference-in-differences Estimated TE on Orlando log Housing Prices

	Control Units: MSAs with positive weights	Control Units: Weighted Sum of MSAs from (1)
Orlando x POST	0.0180	-0.00114
	(0.0351)	(0.00240)
Observations	513	114

NOTE.—Analysis using (natural logarithm of) MSA-level Zillow Home Value Index data between January 2014 and September 2018 (for consistency with other estimates) at a monthly frequency. All positively-weighted construction-sector employment donor units with weights applied are used as controls in column 1; we control for unit and month fixed effects. The single unit constructed using from the MSA using the construction employment synthetic control weights is the control in column 2; we control for month fixed effects. Robust standard errors in parentheses. * Significance at the 10% level; ** significance at the 5% level; *** significance at the 1% level.