Consumer Response to Chapter 11 Bankruptcy: Negative Demand Spillover to Competitors

ONLINE APPENDICES

Online Appendix A: Additional Details on Our Sample and Robustness to a Random Sample of Markets

This appendix provides additional details on our sample as well as robustness checks using a random sample of markets.

Figure A.1: Timeline of Chrysler and GM Bankruptcies

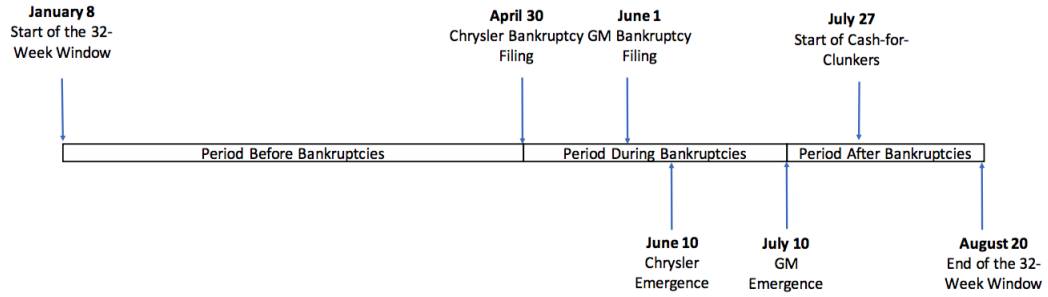
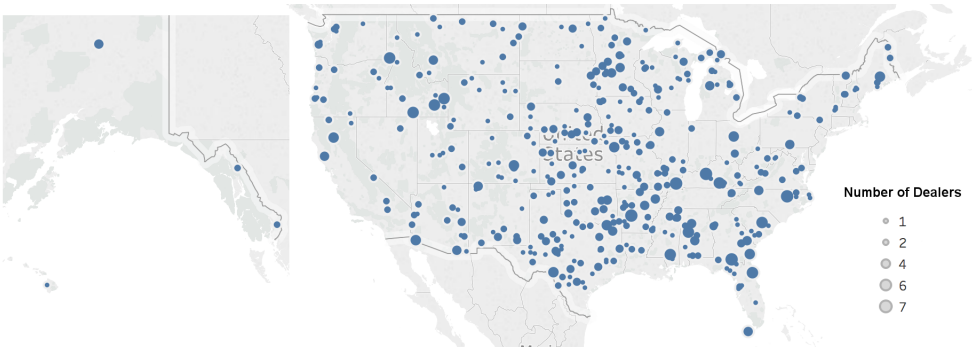


Figure A.2: Locations of Dealers in Our Sample



Notes. Locations of Alaska and Hawaii are modified to save space.

Table A.1: Unit Sales and Market Share Comparison for the January 09 - August 09 Period: Our Sample vs. U.S.

Manufacturer	**Unit Sales**		**Market Share**	
	Our Sample	**U.S.**	**Our Sample**	**U.S.**
GM	38,396	1,374,780	31.1%	19.4%
Toyota	14,287	1,170,407	11.6%	16.6%
Ford	26,355	1,077,850	21.4%	15.2%
Honda	6,165	806,907	5.0%	11.4%
Chrysler	24,323	649,532	19.7%	9.2%
Nissan	9,003	524,903	7.3%	7.4%
Hyundai	4,861	527,653	3.9%	7.5%
Other	0	937,581	0%	13%

Notes. Sources: Our estimation sample and Autonews.com.

Table A.2: Top Car Models by Unit Sales for the January 09 - August 09 Period: Our Sample vs. U.S.

Car Model	**Unit Sales Rank**		**Car Model**	**Unit Sales Rank**	
	Our Sample	**U.S.**		**Our Sample**	**U.S.**
Ford F-series	1	1	Ford Escape	11	11
Chevrolet Silverado	2	3	Jeep Wrangler	12	27
Dodge Ram	3	8	Chevrolet Impala	13	13
GMC Sierra	4	22	Chevrolet Cobalt	14	18
Toyota Camry	5	2	Toyota Tacoma	15	19
Ford Focus	6	12	Chevrolet Traverse	16	28
Chevrolet Malibu	7	14	Honda Accord	17	4
Ford Fusion	8	10	Chrysler Town & Country	18	29
Nissan Altima	9	7	GMC Acadia	19	>30
Toyota Corolla/Matrix	10	5	Ford Edge	20	26

Notes. Sources: Our estimation sample and Autonews.com.

Table A.3: Comparison of Our Sample with the Census of Markets

	Census	**Our Sample vs. Census**	
	Mean (N = 3,592)	Mean (N = 369)	Difference (relative to census)
Population	70,363.7	18,015.9	-52,347.8***
Housing units	29,384.6	7,975.9	-21,408.7***
Land area (square miles)	30.084	11.507	-18.577***

Notes. This table reports the comparison of the census of markets with our sample across several variables. The statistical significance in differences based on t-tests are indicated by: *p<0.10; ** p<0.05; ***p<0.01.

Table A.4: RDiT Global Strategy - Robustness to a Random Sample of Markets

Variable	Polynomial Order (Lowest BIC to Highest)			
	4	2	3	1
Chrysler filing ($\beta_{ChryComp}$)	-.107***	-.241***	-.263***	-.177***
	(.041)	(.033)	(.034)	(.023)
Fixed effects (see the notes below)	Yes	Yes	Yes	Yes
Controls (see the notes below)	Yes	Yes	Yes	Yes
Log-likelihood	-610,302	-610,393	-610,381	-610,423
BIC	1,222,933	1,223,084	1,223,089	1,223,115

*p<0.10; ** p<0.05; ***p<0.01. *Notes:* This table reports estimates from three separate Poisson fixed-effects regressions based on daily car model-dealer level sales using a random sample of all urban areas and clusters in the U.S. The dependent variable is unit sales (for Chrysler's competitors). All specifications include the following fixed effects (not reported): car model, dealer, day of month, day of week, last five days of month, quarter, manufacturer x cash for clunkers dummies (separate dummies for different program periods), manufacturer x Chrysler emergence, GM bankruptcy filing, GM bankruptcy filing x GM dummy, and manufacturer x GM emergence. All specifications include the following control variables: cash incentive, financing rate promotion dummy, financing rate promotion dummy x financing rate, total advertising and its squared term, starting inventory, manufacturer-level cumulative recalls, and consumer confidence index. Clustered standard errors (dealer) are reported in parentheses for all regressions. All estimations use a 28-week window (2,272,725 observations) around Chrysler filing and separate polynomial specifications for pre- and post-filing periods.

Table A.5: RDiT Global Strategy - Generalizability to Non-isolated Urban Markets

Variable	Polynomial Order (Lowest BIC to Highest)			
	4	3	2	1
Chrysler filing ($\beta_{ChryComp}$)	-.079*	-.257***	-.230***	-.177***
	(.043)	(.037)	(.036)	(.025)
Fixed effects (see the notes below)	Yes	Yes	Yes	Yes
Controls (see the notes below)	Yes	Yes	Yes	Yes
Log-likelihood	-519,650	-519,719	-519,734	-519,762
BIC	1,041,592	1,041,730	1,041,730	1,041,758

*p<0.10; ** p<0.05; ***p<0.01. *Notes:* This table reports estimates from three separate Poisson fixed-effects regressions based on daily car model-dealer level sales using only the non-isolated markets in our random sample of all urban areas and clusters in the U.S. The dependent variable is unit sales (for Chrysler's competitors). All specifications include the following fixed effects (not reported): car model, dealer, day of month, day of week, last five days of month, quarter, manufacturer x cash for clunkers dummies (separate dummies for different program periods), manufacturer x Chrysler emergence, GM bankruptcy filing, GM bankruptcy filing x GM dummy, and manufacturer x GM emergence. All specifications include the following control variables: cash incentive, financing rate promotion dummy, financing rate promotion dummy x financing rate, total advertising and its squared term, starting inventory, manufacturer-level cumulative recalls, and consumer confidence index. Clustered standard errors (dealer) are reported in parentheses for all regressions. All estimations use a 28-week window (1,808,820 observations) around Chrysler filing and separate polynomial specifications for pre- and post-filing periods.

Table A.6: RDiT Augmented Local Linear Strategy - Robustness to a Random Sample of Markets

Kernel	Chrysler Filing Effect
Rectangular	-.014***
	(.0012)
Triangular	-.006***
	(.0015)
Epanechikov	-.007***
	(.0015)

*p<0.10; ** p<0.05; ***p<0.01. *Notes:* Dependent variable: Unit sales residuals based on the two-step augmented local linear approach proposed by Hausman and Rapson (2017) using a 10% random sample of all urban areas and clusters in the U.S. This table reports the coefficient (bootstrapped standard error) of the Chrysler filing dummy from 3 separate augmented local linear regressions (Hausman and Rapson 2017). The treatment effects are estimated with 30 days of observations on either side of the cut-off with a total of 820,980 observations.

Online Appendix B: Other Potential Changes Around Bankruptcies

Spending in Other Related Categories Around Chrysler's Bankruptcy

Table B.1 reports monthly house sales in the U.S. that are discussed in subsection 3.4.

Local Economic Conditions and Changes in Sales Around Chrysler's Bankruptcy

Although we looked at the spending behavior of households in several categories using a subsample of markets similar to our analysis sample in subsection 3.4, one might be still concerned that the contraction in car sales after Chrysler's bankruptcy could reflect deteriorating local-market level economic conditions in our isolated markets. Perhaps the potential negative income effect of the financial crisis in 2008 on consumers in our isolated markets led to the fewer purchases of cars we observe. If this is the case, one would expect to see a higher reduction in sales around the bankruptcy for local markets that are impacted more adversely (e.g., lower median household income) by the crisis relative to those that are impacted less negatively. To evaluate this claim, we calculate the correlation between the unit sales change (after minus before the filing) for each market and the change in several demographic variables between 2009 and 2008. As shown in Table B.2, the correlations between the changes in unit sales and the changes in the three demographic variables (i.e., median household income, median house value, and percent employment) are small and statistically insignificant at the 5% level. These insignificant correlations complement the patterns in subsection 3.4 and support the idea that common local economic shocks might not

explain declining car sales after the bankruptcy filing.

Increase in Consumers' Price Sensitivity

Another possibility is that the contraction in sales for Chrysler's rivals simply reflects the increasing price sensitivity of consumers. If consumers' price sensitivity is going up because of the financial crisis in 2008, it is unlikely that there would be a discontinuous change in price sensitivity around Chrysler's filing that happened in mid 2009. On the other hand, if the bankruptcy filing itself results in heightened price sensitivity, then this is best viewed as a mechanism underlying the negative effect of the bankruptcy filing on automakers rather than as an alternative explanation. To see whether there is any evidence supporting a change in consumers' price sensitivity, we rely on an approach similar to that used by Busse et al. (2006). Specifically, if consumers become more price sensitive after the bankruptcy filing, we should observe that consumers buy less expensive options (e.g., smaller engine, fewer cylinders, etc.) holding the model and the dealer of the car constant. To test this possibility, we compare the characteristics of cars sold right before and after Chrysler's bankruptcy.

Table B.3 reports the changes in average engine size, average number of cylinders, percentage of vehicles with gasoline fuel, and average MSRP. Almost all of the differences in the four variables are statistically insignificant for Chrysler's rivals. The only statistically significant differences appear for the average number of cylinders and the average MSRP for Ford sales. The change in the average number of cylinders after the bankruptcy filing is economically insignificant. In addition, the significant increase in the average MSRP for sold Ford cars is in line with a decrease in consumers' price sensitivity. Overall, there seems to be no evidence for the argument that depressed sales after the Chrysler bankruptcy are driven by a rise in the price sensitivity of consumers.

Change in Consumer Confidence

Another factor that might explain the sales reduction for automakers around Chrysler's filing is a potential decline in consumer confidence. To examine this issue, we look at three indices: the Conference Board's monthly consumer confidence index, the University of Michigan's monthly consumer sentiment index, and the ABC News's weekly consumer comfort index. Table B.4 reports the evolution of these indices before and after the bankruptcy filing. The consumer confidence

index shows a positive trend from March to May, which suggests that automakers' sales decline after Chrysler's filing despite increasing consumer confidence. Similarly, we observe a positive trend in the consumer sentiment index from March to May. We also investigate the weekly consumer comfort index to have a more granular view of consumer confidence. The figures shown in Table B.4 suggest an improving (i.e., less negative) level of consumer comfort right around the Chrysler filing. Overall, the three measures of consumer confidence reveal that the decrease in unit sales around Chrysler filing cannot be explained by a reduction in consumer confidence.

Change in Financing Costs

Credit supply might have tightened around the Chrysler bankruptcy leading to a reduction in auto sales. To assess this explanation, we first look at the July 2009 Senior Loan Officer Opinion Surveys on Bank Lending Practices provided by the Federal Reserve Board.[1] The survey reports changes in the supply and demand of loans to businesses and consumers over the previous quarter (i.e., April, May, and June 2009). The survey indicates that about 65% of banks reported that the standards for approving applications for consumer loans remained unchanged over the past three months. In addition, 70% of all banks (79% of large banks) reported that demand for consumer loans has either stayed the same or moderately increased between April and June 2009.

These figures related to the supply and demand for consumer credit suggest that the financing conditions are largely stable around Chrysler's bankruptcy filing. Therefore, it seems unlikely that changes in financing costs play a major role in the contraction of sales for non-bankrupt manufacturers around the bankruptcy. However, as the survey indicates that about 35% of banks reported a tightening of credit standards, we include controls related to vehicle financing as well as a dealer-specific time trend in our robustness analysis in Online Appendix C.

[1]The link for the the report is as follows: https://www.federalreserve.gov/boarddocs/SnLoanSurvey/200908/.

Table B.1: National and Regional Home Sales Around Bankruptcies

Market	March 09 (Before Chrysler filing)	April 09 (Before Chrysler filing)	May 09 (After Chrysler filing)
United States	31	32	34
Northeast	2	2	2
Midwest	4	4	5
South	18	18	19
West	7	7	9

Notes. Source: Census (www.census.gov/construction/nrs/historical_data/index.html). This table reports thousands of homes sold in the U.S. and across four regions. As indicated in the original report, components may not add to total because of rounding.

Table B.2: Correlations between Unit Sales Change After Chrysler's Filing and Changes in Demographics

	Change in median household income (2009-2008)	Change in median house value (2009-2008)	Change in percent employment (2009-2008)
Unit sales change around Chrysler filing	-0.016	0.062	0.030
	(0.753)	(0.238)	(0.567)

Notes. This table shows the correlations (p-values of correlation tests) between the unit sales difference (using a 3-week before and after periods) associated with the bankruptcy filing event and the change between 2009 and 2008 in three demographic variables at the market level. $N = 369$ isolated markets.

Table B.3: Changes in Sold Car Characteristics Before and After Chrysler's Bankruptcy

	GM			**Ford**			**Asian**		
	Before	After	Difference (N)	Before	After	Difference (N)	Before	After	Difference (N)
Average engine size	4.23	4.25	.02 (707)	3.77	3.78	.01 (598)	2.90	2.89	-.01 (736)
Average number of cylinders	6.53	6.55	.02 (707)	6.12	6.19	.07** (598)	4.99	4.98	-.01 (736)
% with gasoline fuel	67.73	67.14	-.59 (707)	75.95	77.04	1.09 (598)	92.61	92.86	.25 (736)
Average MSRP	30,599	30,728	128.9 (707)	26,972	27,291	319*** (598)	23,215	23,134	-81 (736)

Notes. This table reports changes in the characteristics of sold cars before and after bankruptcies for Chrysler's competitors using a 3-week pre and post window. The statistical significance in differences based on paired t-tests at the dealer-model level are indicated by: *p<0.10; ** p<0.05; ***p<0.01.

Table B.4: Consumer Confidence Around Chrysler's Bankruptcy

Time Period/Index	Consumer Confidence Index	Consumer Sentiment Index	Consumer Comfort Index
March 09 (Before Chrysler Filing)	26.9	57.3	-48
			-47
			-49
			-49
April 09 (Before Chrysler Filing)	40.8	65.1	-50
			-51
			-47
			-45
May 09 (After Chrysler Filing)	54.8	68.7	-43
			-42
			-45
			-47

Notes. This table reports the Conference Board's monthly consumer confidence index, the University of Michigan's monthly consumer sentiment index, and the ABC News's weekly consumer comfort index around Chrysler's bankruptcy filing. The weekly index from the ABC News shows figures from 3/9/2009 to 6/22/2009.

Online Appendix C: Additional Graphs, Robustness Checks, and Generalizability to the GM Filing

Falsification

We have included several important additional control variables in our specification to evaluate whether the decrease in unit sales for rival firms could be explained by time-varying omitted variables. An alternative way to assess such contemporaneous omitted variables is to run a "falsification" test. This falsification exercise allows one to test for a "treatment" effect in a period where there is no treatment (before the Chrysler bankruptcy). Following Ozturk et al. (2016), we use pre-bankruptcies data and create a placebo bankruptcy filing dummy variable, which is equal to 0 in the first half of the pre-bankruptcies period and equal to 1 in the second half of the pre-bankruptcies period (i.e., the date of placebo treatment is February 28). Next, we include that placebo bankruptcy filing dummy variable along with its interaction with Chrysler dummy in our specification. Finally, we test whether the coefficient for the placebo bankruptcy filing dummy is significant. If the estimates showed a significant negative coefficient for the placebo bankruptcy filing dummy, this would suggest that the drop in sales we found for rivals of Chrysler could be due to time-varying unobservables.

Column (1) in Table C.1 reports the estimation results from our falsification test. The coefficients for the placebo bankruptcy filing dummy is insignificant despite the large number of observations. Column (2) in Table C.1 presents a similar result when we conduct the falsification test using a post-bankruptcy placebo date. These findings indicate that it is unlikely that the reduction in unit sales for Chrysler's rivals after the bankruptcy is driven by concurrent unobserved factors that are not taken into account in our specification.

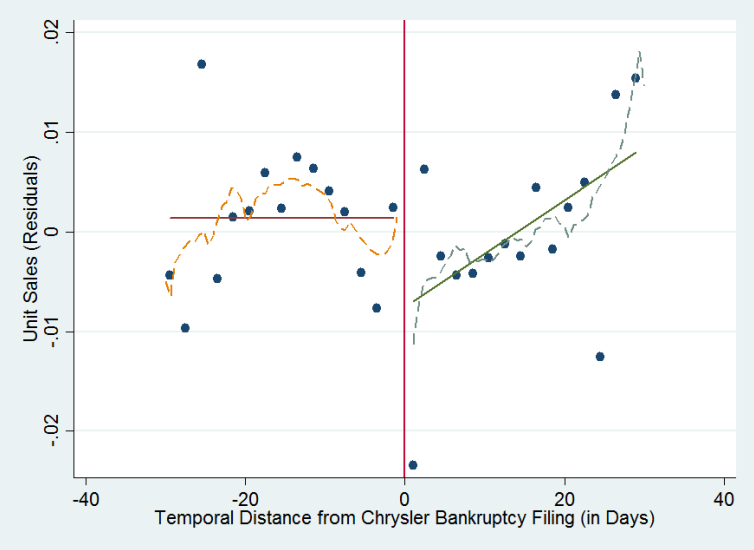
Robustness to Differential Trends

In Online Appendix B, we mentioned that although the majority of banks reported relatively stable credit standards and consumer demand for loans around the period of the bankruptcy filing, some banks reported tightening in credit standards around Chrysler's bankruptcy filing. To check if omitted time-varying credit availability and economic conditions (i.e., recession) at the local market might affect our results, we estimate another specification where we control for dealer-specific time trends. The dealer-specific time trends adjusts for gradual daily trends (if any) at the local market of the dealer. This specification is shown in Column (1) of Table C.2. The estimate for the effects of Chrysler's bankruptcy on its rivals is stable when we add dealer-specific time trends. To complement this analysis and to check the sensitivity of our findings to any remaining differential trends across manufacturers after the Chrysler bankruptcy, we also estimate a specification with manufacturer-specific trends after the Chrysler filing. The estimation for this robustness check is reported in Column (2) in Table C.2. The estimates indicate that our conclusions do not change. Another issue is that trends in consumer interest for cars may be different across car makes (Du and Kamakura 2012). We allow for make-specific polynomial time trends in Column (3) of Table C.2. Our qualitative findings on negative demand spillover remain robust.

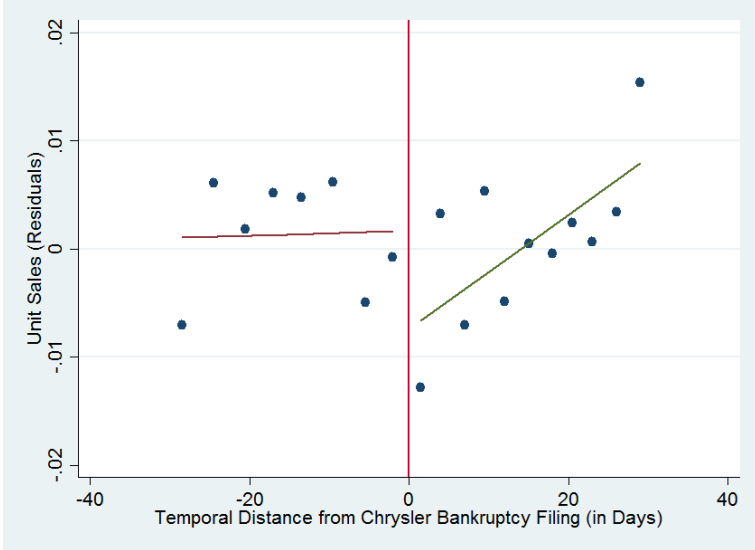
Generalizability to the GM Filing

Table C.4 estimates the equivalent of Table 4 for the case of GM filing.

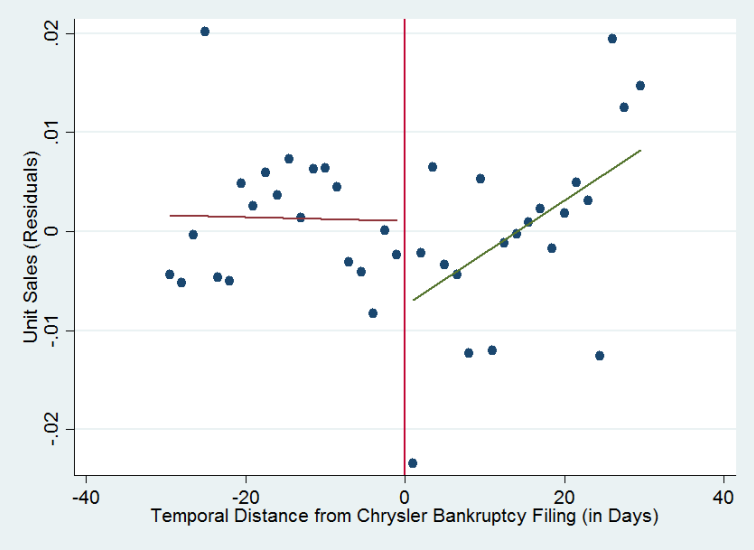
Figure C.1: RDiT Graphs with Different Numbers of Bins and Bin Sizes



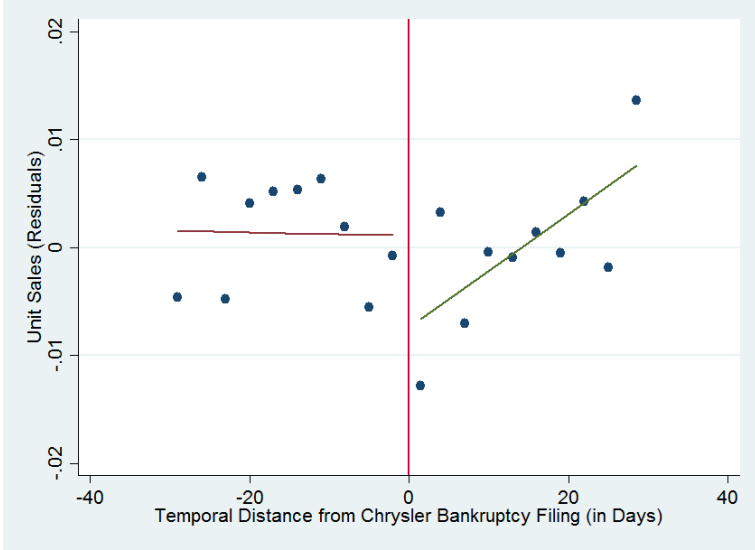
(a) 15 bins (left and right)



(b) 8 bins (left) and 11 bins (right)



(c) 20 bins (left and right)



(d) 10 bins (left and right)

Notes. These figures show the regression-discontinuity-in-time plots for the unit sales residuals across various numbers of bins and bin sizes on either side of Chrysler bankruptcy filing using a rectangular kernel. The plot for unit sales residuals are based on the two-step augmented local linear approach proposed by Hausman and Rapson (2017). The figure in (a) presents our original RDiT plot with the additional dashed lines showing local linear regression fits on either side of the filing date using a bandwidth of five and a rectangular kernel. The figure in (b) uses the IMSE (integrated mean square error)-optimal bin widths (Calonico et al. 2015).

Table C.1: Placebo Tests

Variable/Specification	(1) Pre-bankruptcy Placebo Date	(2) Post-bankruptcy Placebo Date
Placebo filing	-.171	-.105
	(.264)	(.248)
Fixed effects (see the notes below)	Yes	Yes
Controls (see the notes below)	Yes	Yes
Log-likelihood	-106,441	-168,357

*p<0.10; ** p<0.05; ***p<0.01. *Notes.* This table reports estimates from two separate Poisson fixed-effects regressions based on daily car model-dealer level sales. The dependent variable is unit sales (for Chrysler's competitors). All specifications include the following fixed effects (not reported): car model, dealer, day of month, day of week, last five days of month, quarter, manufacturer x cash for clunkers dummies (separate dummies for different program periods), manufacturer x Chrysler emergence, GM bankruptcy filing, GM bankruptcy filing x GM dummy, and manufacturer x GM emergence. All specifications include the following control variables: cash incentive, financing rate promotion dummy, financing rate promotion dummy x financing rate, total advertising and its squared term, starting inventory, manufacturer-level cumulative recalls, and consumer confidence index. Clustered standard errors (dealer) are reported in parentheses for all regressions. The specifications include separate fourth order polynomials for pre- and post-filing periods. The estimation in (1) uses observations before the Chrysler bankruptcy filing (744,699) to run a falsification analysis with a placebo treatment dummy (the date of placebo treatment in the pre-period is February 28). The estimation in (2) removes observations during the period of bankruptcies (April 30-July 10) and uses the remaining observations (1,020,680) to run a falsification analysis with a placebo treatment dummy (the date of placebo treatment in the post-period is July 31).

Table C.2: Robustness to Differential Trends

Variable/Specification	(1) Dealer-specific Trends	(2) Manufacturer-specific Trends after the Filing	(3) Make-specific Polynomial Trends
Chrysler filing	-.331***	-.310***	-.330***
	(.078)	(.083)	(.078)
Dealer-specific trend	Yes	-	-
Manuf. × Post Chrysler Filing Trend	-	Yes	-
Make × Polynomial time trends	-	-	Yes
Fixed effects (see the notes below)	Yes	Yes	Yes
Controls (see the notes below)	Yes	Yes	Yes
Log-likelihood	-215,081	-215,799	-215,483

*p<0.10; ** p<0.05; ***p<0.01. *Notes.* This table reports estimates from three separate Poisson fixed-effects regressions based on daily car model-dealer level sales. The dependent variable is unit sales (for Chrysler's competitors). All specifications use 1,309,620 observations and include the following fixed effects (not reported): car model, dealer, day of month, day of week, last five days of month, quarter, manufacturer x cash for clunkers dummies (separate dummies for different program periods), manufacturer x Chrysler emergence, GM bankruptcy filing, GM bankruptcy filing x GM dummy, and manufacturer x GM emergence. All specifications include the following control variables: cash incentive, financing rate promotion dummy, financing rate promotion dummy x financing rate, total advertising and its squared term, starting inventory, manufacturer-level cumulative recalls, and consumer confidence index. All specifications include separate fourth order polynomials for pre- and post-filing periods. Clustered standard errors (dealer) are reported in parentheses for all regressions.

Table C.3: RDiT Global Strategy Additional Robustness Checks

Variable	(1) Full Model	(2) Full Model with Price	(3) Full Model w/o Competitor Marketing Covariates
Chrysler filing ($\beta_{ChryComp}$)	-.330***	-.315***	-.282***
	(.078)	(.105)	(.077)
Price	-	-.00001***	-
		(3.30e-06)	
Competitor marketing covariates (advertising, cash incentive, financing rate, manufacturer-level recalls)	Yes	Yes	No
Fixed effects and controls (see the notes below)	Yes	Yes	Yes
Number of observations	1,309,620	514,638	1,309,620
Log-likelihood	-215,808	-113,391	-215,894

*p<0.10; ** p<0.05; ***p<0.01. *Notes:* This table reports estimates from three separate Poisson fixed-effects regressions based on daily car model-dealer level sales. The dependent variable is unit sales (for Chrysler's competitors). All specifications include the following fixed effects and controls (not reported): car model, dealer, day of month, day of week, last five days of month, quarter, manufacturer x cash for clunkers dummies (separate dummies for different program periods), manufacturer x Chrysler emergence, GM bankruptcy filing, GM bankruptcy filing x GM dummy, manufacturer x GM emergence, starting inventory, and consumer comfort index. Clustered standard errors (dealer) are reported in parentheses for all regressions. All estimations use a 28-week window around Chrysler filing and include separate fourth order polynomials for pre- and post-filing periods.

Table C.4: GM's Competitors Lose Sales After GM's Bankruptcy Filing

Variable	Window Around Chrysler Filing (Weeks)		
	(1) 28	(2) 30	(3) 32
GM filing	-.275***	-.364***	-.248***
	(.057)	(.096)	(.057)
BIC-chosen polynomial order	4 (global)	4 (separate)	4 (global)
Fixed effects (see the notes below)	Yes	Yes	Yes
Controls (see the notes below)	Yes	Yes	Yes
Number of observations	896,572	929,955	963,540
Log-likelihood	-158,434	-163,792	-168,041

*p<0.10; ** p<0.05; ***p<0.01. *Notes:* This table reports estimates from three separate Poisson fixed-effects regressions based on daily car model-dealer level sales. The dependent variable is unit sales (for GM's competitors). All specifications include the following fixed effects (not reported): car model, dealer, day of month, day of week, last five days of month, quarter, manufacturer x cash for clunkers dummies (separate dummies for different program periods), manufacturer x Chrysler emergence, Chrysler bankruptcy filing, Chrysler bankruptcy filing x Chrysler dummy, and manufacturer x GM emergence. All specifications include the following control variables: cash incentive, financing rate promotion dummy, financing rate promotion dummy x financing rate, total advertising and its squared term, starting inventory, manufacturer-level cumulative recalls, and consumer confidence index. Clustered standard errors (dealer) are reported in parentheses for all regressions. The polynomial order is selected using the BIC criterion among global and separate (for pre- and post-filing periods) polynomial specifications with polynomial order ranging from one to four.

Online Appendix D: Canada Comparison

Before we analyze the changes in sales patterns in Canada relative to the U.S. around Chrysler's bankruptcy, it is helpful to assess the similarity of macroeconomic conditions between two countries during our analysis period. Table D.1 reports important macroeconomic indicators for both countries in 2009. Specifically, we compare Canada and U.S. in terms of output, income, inflation, trade, and unemployment. The annual statistics for these various measures suggest that the effects of recession were comparable between the two countries in 2009. To formally test whether the macroeconomic indicators are similar between Canada and U.S., we collect quarterly data (for the first three quarters of 2009) on percentage growth in terms of gross domestic product, imports of goods and services, as well as exports of goods and services from www.stats.oecd.org. In addition, we collect monthly data between January and August 2009 on consumer price index and employment rate. We first test whether the distributions of these macroeconomic indicators are comparable between Canada and U.S. using Kolmogorov-Smirnov tests. The tests for the three growth indicators and consumer price index suggest that Canada and U.S. samples follow the same distribution ($p > 0.10$ for all tests). We find a statistically significant difference only for the employment rate distributions ($p < 0.01$), even though the average employment rates are similar (71.5% for Canada and 68.1% for the U.S.).

Second, we test for differences in trends for macroeconomic indicators between Canada and U.S. First, using the three growth indicators as dependent variables, we run three separate linear regressions with the following independent variables: $quarterly trend$, $Canada dummy$, $Canada dummy \times quarterly\ trend$. The results from these regressions, reported in Table D.2 , suggest insignificant coefficients for the $Canada\ dummy \times quarterly\ trend$. Next, we run two separate linear regressions for consumer price index and employment rate with the following independent variables: $monthly\ trend$, $monthly\ trend\ squared$, $Canada\ dummy$, $Canada\ dummy \times monthly\ trend$, and $Canada\ dummy \times monthly\ trend\ squared$. For both monthly economic indicators, the interactions of the $Canada\ dummy$ with $monthly\ trend$ and $monthly\ trend\ squared$ are insignificant, as shown in Table D.3. These formal tests for all macroeconomic indicators reveal that macroeconomic situations are comparable between the two countries during our analysis period.

It is also important to investigate the similarity of sales trends in Canada and U.S. in

the months before the Chrysler bankruptcy. To test for a potential sales trend difference between Canada and U.S. in pre-bankruptcy months, we run a Poisson fixed-effects model with car model fixed effects and cluster (car model) standard errors and the following variables: *monthly trend*, *monthly trend squared*, *Canada dummy*, *Canada dummy* × *monthly trend*, and *Canada dummy* × *monthly trend squared*. We find that the interactions of *Canada dummy* with *monthly trend* and *monthly trend squared* are insignificant (*Canada dummy* × *monthly trend* coefficient = .109, p = 0.24; and *Canada dummy* × *monthly trend squared* coefficient = .013, p = 0.44). These insignificant interactions support the idea that trends are comparable between U.S. (our estimation markets) and Canada in the months preceding the bankruptcies.

Table D.1: Comparison of 2009 Macroeconomic Indicators: Canada vs. U.S.

Indicator	**Canada**	**U.S.**
Gross domestic product growth (annual %)	-2.9	-2.8
Gross domestic product per capita growth (annual %)	-4.1	-3.6
Gross national income growth (annual %)	-3.1	-2.9
Gross national income per capita growth (annual %)	-4.2	-3.7
Inflation, consumer prices (annual %)	0.3	-0.4
Exports of goods and services (annual % growth)	-13	-8.8
Imports of goods and services (annual % growth)	-12.4	-13.7
Unemployment, total (% of total labor force)	8.3	9.3

Notes. Source: World Development Indicators (http://databank.worldbank.org).

Table D.2: Quarterly Macroeconomic Trends: Canada vs. U.S.

Variable	DV: GDP Growth	DV: Exports Growth	DV: Imports Growth
Quarterly trend	.856**	5.762**	6.708***
	(.178)	(1.120)	(0.457)
Canada dummy	-1.606*	-1.705	-0.767
	(.545)	(3.423)	(1.397)
Canada dummy × Quarterly trend	.512	-0.107	1.240
	(.252)	(1.585)	(0.647)
Number of observations	6	6	6
R^2	.978	.964	.996

*p<0.10; ** p<0.05; ***p<0.01. *Notes.* This table reports estimates from the linear regressions of three quarterly macroeconomic indicators on quarterly trend, Canada dummy, and Canada dummy × quarterly trend. DV: dependent variable; GDP: gross domestic product.

Table D.3: Monthly Macroeconomic Trends: Canada vs. U.S.

Variable	DV: CPI	DV: Employment Rate
Monthly trend	.022	-.388***
	(.269)	(.077)
Monthly trend^2	-.006	.018*
	(.029)	(.008)
Canada dummy	-.671	3.266***
	(.747)	(.214)
Canada dummy × Monthly trend	.282	.049
	(.381)	(.109)
Canada dummy × Monthly trend^2	-.030	-0.002
	(.041)	(0.012)
Number of observations	16	16
R^2	.231	.998

*p<0.10; ** p<0.05; ***p<0.01. *Notes*: This table reports estimates from the linear regressions of two monthly macroeconomic indicators on monthly trend, monthly trend^2, Canada dummy, Canada dummy × monthly trend, and Canada dummy × monthly trend^2. DV: dependent variable; CPI: consumer price index.