Product Innovation and Credit Market Disruptions

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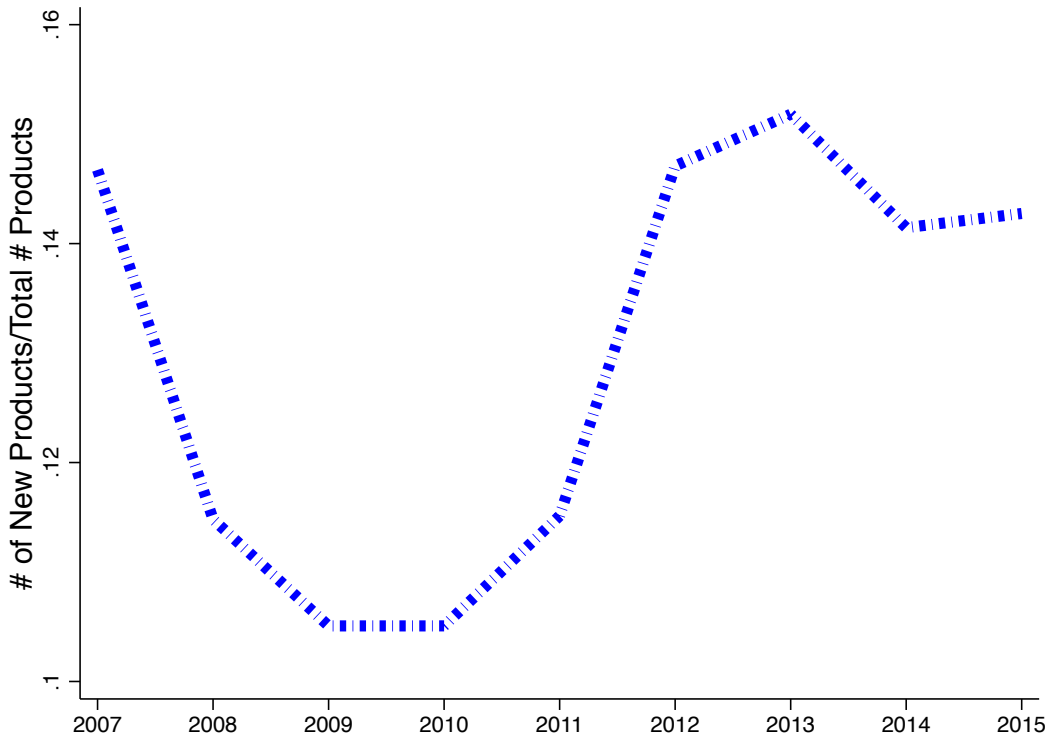
Motivation



- Rates of introduction of new products in the economy are highly procyclical (e.g. Broda and Weinstein, 2010; Argente, Moreira, and Lee, 2018)
  - Expectations of weak product demand?
  - Less Investment during times of uncertainty?
  - **Financial frictions and credit market disruptions?**

Motivation

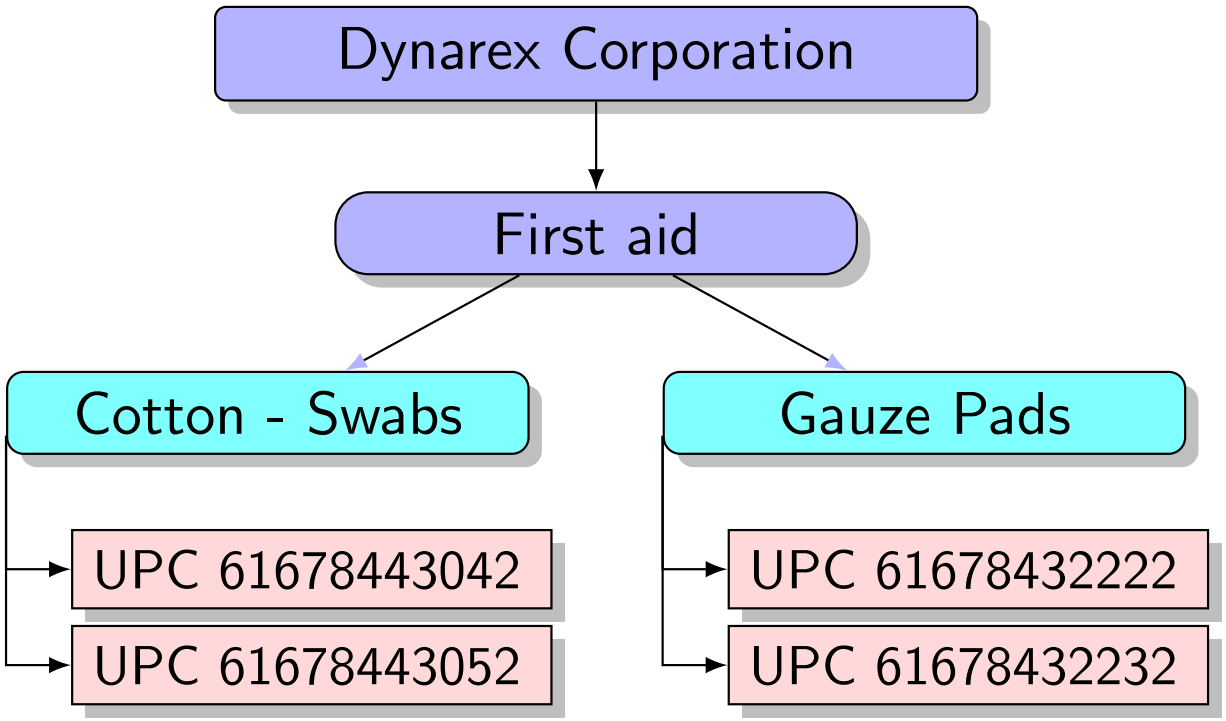
- **Why focus on product innovation?**
  - Interesting in itself: New products that satisfy previously unmet needs play important role in models of firm and economic growth (e.g. Aghion and Howitt, 1992; Klette and Kortum, 2004; Braguinsky, Ohyama, Okazaki, and Syverson, 2020)
  - Patents and R&D:
    - Non-patenting firms are responsible for the majority of new products in the consumer goods sector (e.g. Argente, Baslandze, Hanley, and Moreira, 2020)
    - Only 6.3% of firms in the manufacturing sector hold a patent (e.g. Graham et al, 2018)
    - Patents and R&D survey data are typically skewed towards the largest firms thus missing the smaller and younger firms

This Paper

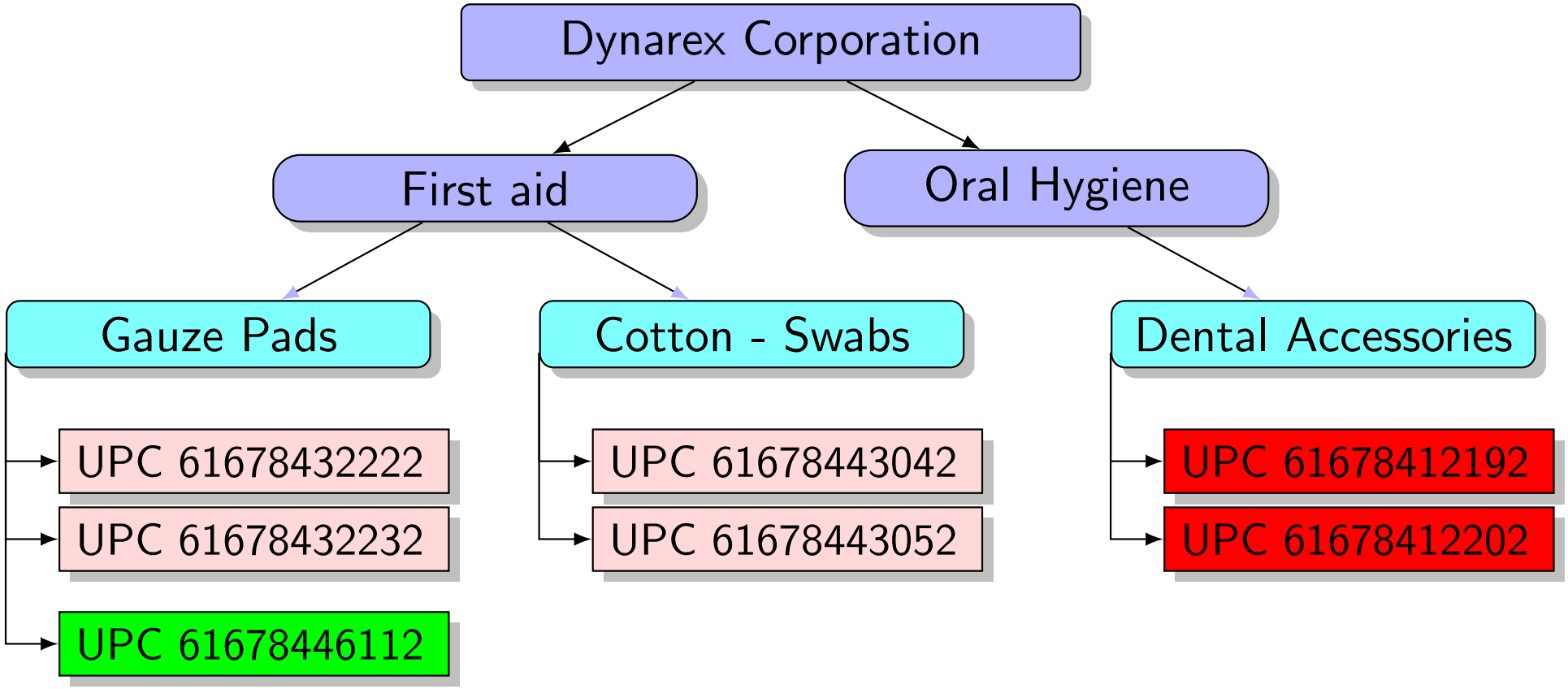
What is the impact of credit market disruptions on innovation rates and what type of product innovations are most affected?

- Use detailed information about product portfolios of firms to take deeper look at what innovations are disrupted by credit market frictions.
  - Innovations in firms' current product lines?
  - Innovations that expand the set of a firm's product lines?
  - Degree of "novelty" of new products?
- Direct link between product innovation and its subsequent product sales
  - How does initial exposure to credit market disruptions affect sales of new product lines?

Product Portfolio and Types of Product Innovation



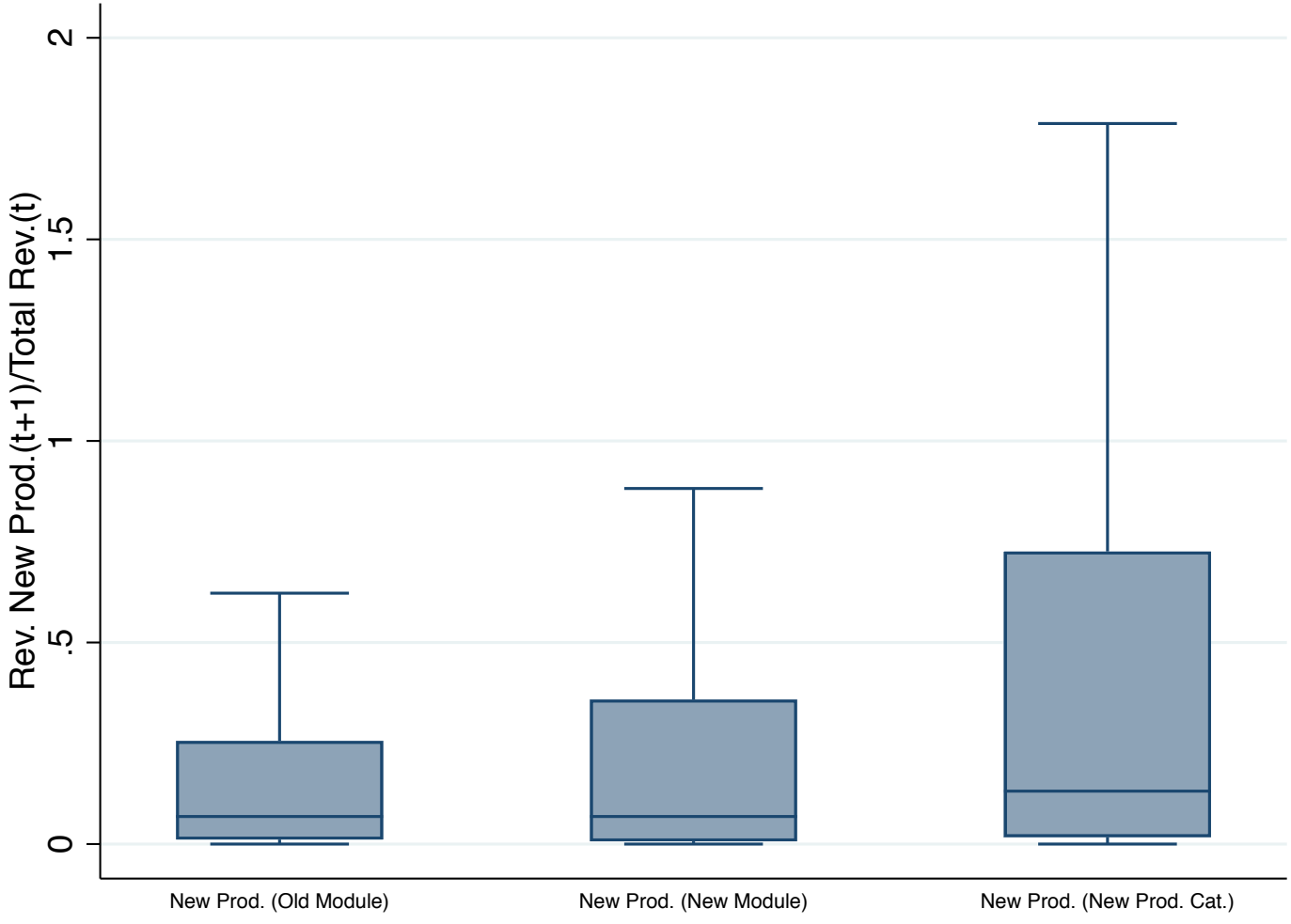
Product Portfolio and Types of Product Innovation



Dynarex Drain Sponges

Swabsticks Flavored with Dentrifice

Types of Product Innovation



- New products in new product modules account for a greater share of their firm's total sales following their introduction

Product Characteristics

Kiinde Direct-Pump Adapters for Kiinde Twist Pouch Breast Milk Storage Pouches

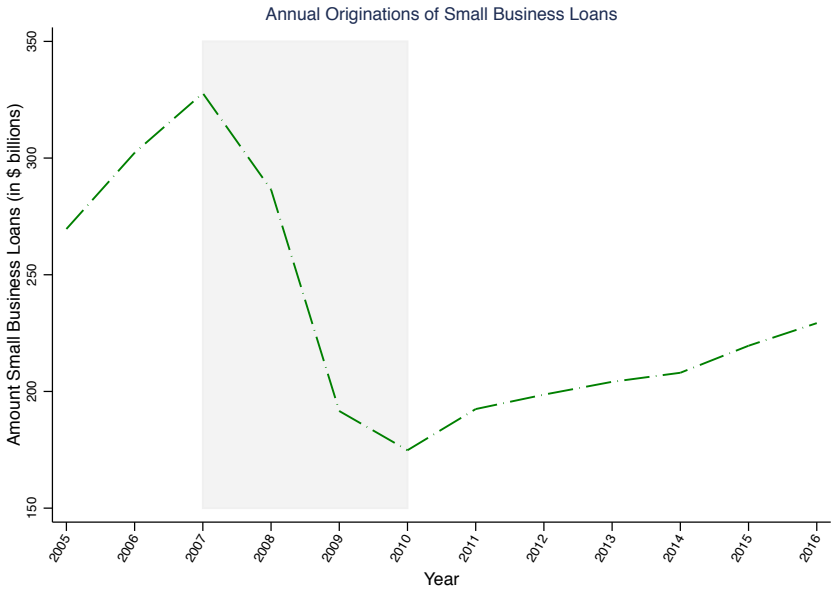
Novelty Index: 0.66

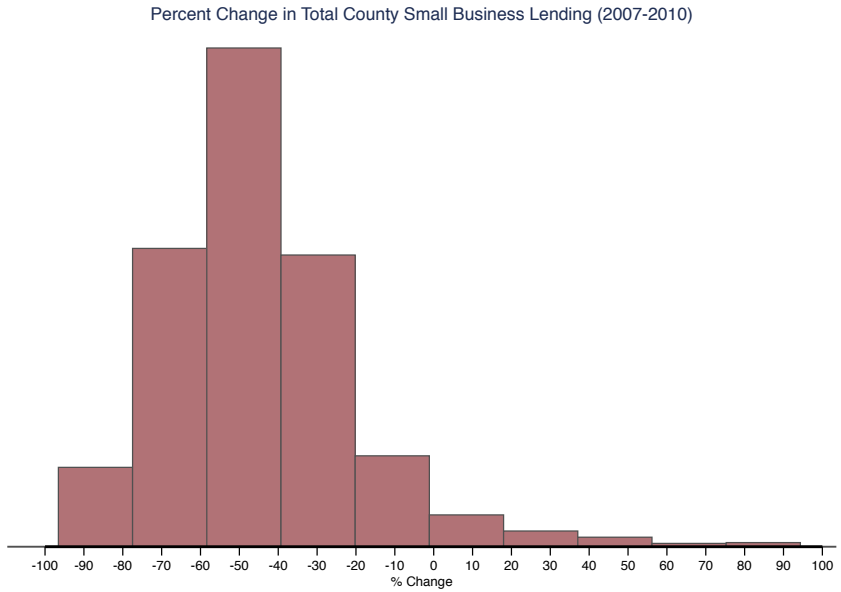
Swiffer Wetjet Hardwood Floor Mopping Sweet Citrus

Novelty Index: 0.14

Measures of Credit Market Disruption

Geography-based Measure of Credit Market Disruption - (I)





- Small Business lending market saw significant contraction in the 2007–2010 period
- Heterogeneity across counties in the severity of the decline in the small business lending market
- BUT... total change in county lending conflates supply and demand in the market for bank lending

Measures of Credit Market Disruption

Geography-based Measure of Credit Market Disruption - (II)

- Modified-Bartik approach of Greenstone, Mas, and Nguyen (2020):

Step 1: Compute bank-specific lending shocks from OLS estimation of:

$$\Delta SBL_{b,c}^{07-10} = \gamma_b + \delta_c + \epsilon_{b,c}$$

Step 2: Compute pre-determined county exposure to bank lending shocks as:

$$SBL\ Shock_c = -\sum_b (\hat{\gamma}_b \times s_{b,c}^{07})$$

Step 3: Merge county lending shock with product-level data from RMS using firms' HQ address information from GS1 dataset

Assumption: Bank Lending is described by an additively separable decomposition between bank supply and firm demand for credit.

Measures of Credit Market Disruption

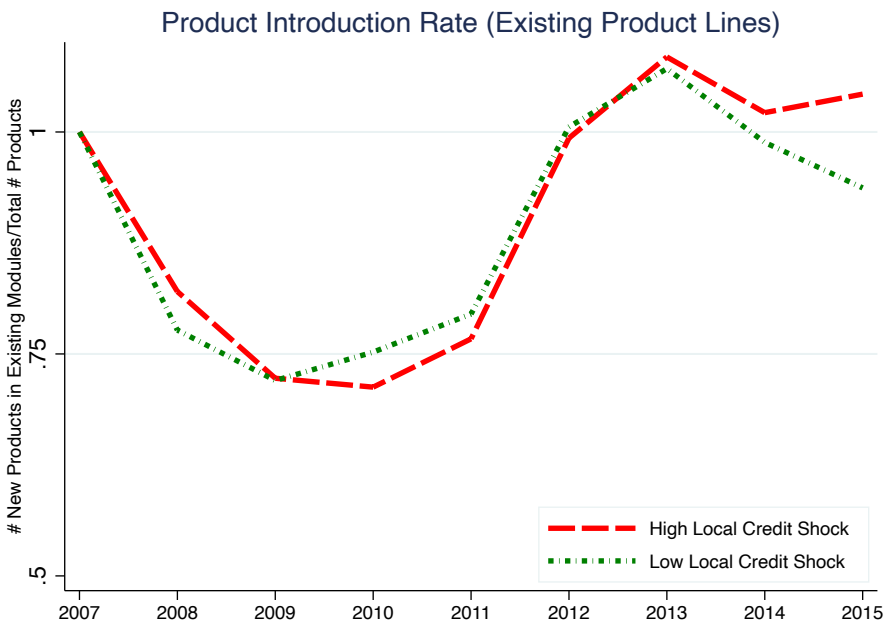
Firm-based Measure of Credit Market Disruptions - (I)

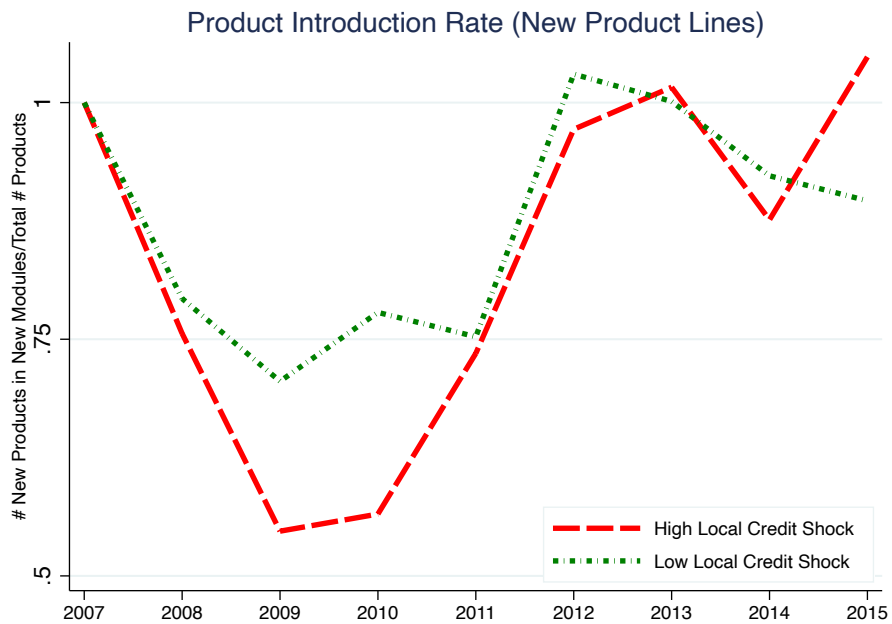
- Compute preexisting firm-level variation in the need to access external financing during a time of significant contraction in the syndicated lending markets
  - Hand-match the RMS product-level and firm-level dataset with LPC syndicated loan dataset.
  - Share of long-term syndicated debt coming due between July 2007 and August 2008 (e.g. Almeida et al., 2012; Benmelech, Frydman, and Papanikolaou, 2019; Costello, 2018)

- Smaller sample of larger firms but better able to capture whether such firms require access to external financing

Descriptive Statistics

Product Introduction Rates (by Innovation Type)





- Credit market disruptions negatively affect firm expansion to new product lines

Main Results

Geography-based Measure of Credit Market Disruption

$$Y_{i,t} = \alpha_i + \theta_t + \beta Shock_i \times Crisis_t + \Gamma X_{i,t} + \epsilon_{i,t}$$

	(1) Prod. Intro.	(2) Rate (All)	(3) Prod. Intro.	(4) Rate (Old Lines)	(5) Prod. Intro.	(6) Rate (New Lines)
Local Credit Shock × I(Crisis)	-0.042	-0.045*	-0.011	-0.013	-0.020***	-0.021***
	(0.027)	(0.024)	(0.022)	(0.020)	(0.007)	(0.007)
Ln(Firm Revenue)		-0.176***		-0.114***		-0.044***
		(0.012)		(0.006)		(0.003)
Rev. Concentration Index		-0.194***		-0.125***		-0.041***
		(0.006)		(0.004)		(0.002)
Ln(Rev. per Product)		0.198***		0.128***		0.050***
		(0.011)		(0.006)		(0.004)
Observations	173447	173447	173447	173447	173447	173447
Adjusted R^2	0.248	0.269	0.218	0.234	0.156	0.163
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes

- No statistically significant decline in the rate of product innovation in existing modules and statistically and economically significant decline in product expansion to new modules

Main Results

Firm-based Measure of Credit Market Disruption

$$Y_{i,t} = \alpha_i + \theta_t + \beta Shock_i \times Crisis_t + \Gamma X_{i,t} + \epsilon_{i,t}$$

	(1) Prod. Intro.	(2) Rate (All)	(3) Prod. Intro.	(4) Rate (Old Lines)	(5) Prod. Intro.	(6) Rate (New Lines)
Firm Credit Shock × I(Crisis)	-0.029	-0.026	0.014	0.014	-0.035***	-0.035***
	(0.044)	(0.039)	(0.028)	(0.025)	(0.012)	(0.012)
Ln(Firm Revenue)		-0.148***		-0.056		-0.047**
		(0.041)		(0.038)		(0.020)
Rev. Concentration Index		-0.199***		-0.108***		-0.048*
		(0.063)		(0.037)		(0.024)
Ln(Rev. per Product)		0.176***		0.082**		0.046**
		(0.048)		(0.037)		(0.022)
Observations	1744	1744	1744	1744	1744	1744
Adjusted R^2	0.309	0.330	0.293	0.309	0.229	0.233
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes

- Similar results despite smaller sample and very different source of variation in credit market disruptions

Main Results

Cross-Sectional Heterogeneity

	Old	New	Large	Small	Low Fin.Dep.	Hi Fin.Dep
			Prod. Intro. Rate (New Lines)			
Local Credit Shock × I(Crisis)	-0.012*	-0.095***	-0.007	-0.018*	-0.014**	-0.024**
	(0.006)	(0.031)	(0.009)	(0.010)	(0.006)	(0.010)
Ln(Firm Revenue)	-0.031***	-0.123***	-0.037***	-0.037***	-0.049***	-0.037***
	(0.003)	(0.015)	(0.004)	(0.004)	(0.005)	(0.004)
Rev. Concentration Index	-0.032***	-0.060***	-0.053***	-0.033***	-0.042***	-0.033***
	(0.002)	(0.004)	(0.004)	(0.002)	(0.005)	(0.005)
Ln(Rev. per Product)	0.035***	0.127***	0.037***	0.041***	0.054***	0.042***
	(0.003)	(0.014)	(0.004)	(0.005)	(0.005)	(0.005)
Observations	135372	38075	39766	111355	90145	89358
Adjusted R^2	0.101	0.195	0.125	0.095	0.184	0.179
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes

- Effects concentrated in newer and smaller firms and in sectors with greater dependence from external financing sources

Main Results

Robustness: Industry Specialization

Panel A: Geography-Based Measure of Credit Market Disruption

	(1)	(2)	(3)	(4)	(5)	(6)
	Prod. Intro. Rate (New Lines)					
Local Credit Shock × I(Crisis)	-0.018**	-0.019***	-0.021***	-0.021***	-0.019**	-0.019**
	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)
Ln(Firm Revenue)		-0.045***		-0.046***		-0.047***
		(0.003)		(0.004)		(0.003)
Rev. Concentration Index		-0.040***		-0.040***		-0.039***
		(0.002)		(0.002)		(0.002)
Ln(Rev. per Product)		0.050***		0.051***		0.052***
		(0.004)		(0.004)		(0.003)
Observations	173445	173445	173445	173445	172285	172285
Adjusted R^2	0.157	0.164	0.160	0.166	0.180	0.186
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Department × Year Fixed-Effects	Yes	Yes	No	No	No	No
Prod. Group × Year Fixed-Effects	No	No	Yes	Yes	No	No
Prod. Module × Year Fixed-Effects	No	No	No	No	Yes	Yes

- Not consistent with credit market disruptions capturing demand shocks (e.g. Paravisini, Rapopport, Schnabl, and Wolfenzon, 2015)

Main Results

Product Novelty Index: Geography-based measure of credit market disruption

$$Y_{i,t} = \alpha_i + \theta_t + \beta Shock_i \times Crisis_t + \Gamma X_{i,t} + \epsilon_{i,t}$$

Panel A: Geography-Based Measure of Credit Market Disruption

	(1)	(2)	(3)	(4)	(5)	(6)
	Ln(Novelty Index)		Ln(Novelty Index (Combination))		Ln(Novelty Index (Hedonic))	
Local Credit Shock × I(Crisis)	-0.015*	-0.015*	-0.024**	-0.025**	-0.025*	-0.026*
	(0.008)	(0.008)	(0.008)	(0.008)	(0.011)	(0.012)
Ln(Firm Revenue)		-0.009***		-0.011***		-0.015***
		(0.002)		(0.002)		(0.004)
Rev. Concentration Index		0.015***		0.017***		0.023***
		(0.004)		(0.004)		(0.006)
Ln(Rev. per Product)		0.008***		0.011***		0.014**
		(0.002)		(0.002)		(0.004)
Observations	52728	52728	52728	52728	50295	50295
Adjusted R^2	0.329	0.330	0.394	0.395	0.333	0.333
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes

- Credit market disruptions partly accounts for some of the decline in "never-before-seen" characteristics during the crisis

Heterogeneity and Robustness

1. Specification, sample, or weighting:
   - Alternative Fixed Effects (Firm-Level Measure) ▸ Alternative FE
   - Firms with Majority Sales Outside State HQ ▸ Outside State
   - Eliminating each state at a time ▸ Eliminating States
   - Placebo measures of Credit Market Disruption? ▸ Placebo
2. Alternative Definitions and Measures:
   - Dummy New Products? ▸ Dummy New Products
   - Number of New Products? ▸ Nbr. New Products
   - Alternative geography-based measures? ▸ Alt. Geo. Measure
   - Alternative definition of product? ▸ Brand
3. Alternative Explanations:
   - Controlling for Local Economic Conditions ▸ Local Econ
   - Controlling for Household Demand Shocks ▸ Household Shocks
4. Cross-Sectional Heterogeneity:
   - Durable and Non-Durable Products ▸ Durable Products
   - Banks' Exposure to Lehman ▸ Lehman Shock

Credit Market Disruptions and Ex-Post Performance of New Product Lines

- Association between initial exposure to credit market disruptions and ex-post performance of new product lines introduced during the crisis period is unclear from theoretical standpoint
  1. Initial exposure to credit market disruptions could affect overall investment in quality of the innovation, marketing, product diffusion and promotion, etc
  2. Selection margin suggests that constrained firms will only introduce their "very best" products during the crisis period

Main Results

Credit Market Disruptions and Ex-Post Performance of New Product Lines

$$Ln(Rev_{i,g,c}) = \alpha_i + \theta_{gc} + \beta Shock_i \times Crisis\ Cohort_c + \epsilon_{i,g,c}$$

	(1)	(2)	(3)	(4)
	Ln(Total Revenues)		Share Firm Rev.	
Local Credit Shock × I(Crisis Cohort)	-0.200**	-0.219**	-0.026***	-0.015***
	(0.093)	(0.093)	(0.007)	(0.005)
Observations	13110	8464	13110	8464
Adjusted R^2	0.448	0.431	0.412	0.423
Product Group×Cohort Fixed-Effects	Yes	Yes	Yes	Yes
Firm Fixed-Effects	Yes	Yes	Yes	Yes
Sample	All Firms	Incumbent Firms	All Firms	Incumbent Firms

- New product lines introduced by firms exposed to credit market disruptions during crisis periods generate less revenue than otherwise comparable new product lines introduced by the same firm outside the crisis period

Main Results

Credit Market Disruptions and Ex-Post Performance of New Product Lines: Channels

	(1) Ln($\frac{Rev}{Prod.}$)	(2) Ln(Prod)	(3) Ln($\frac{Rev}{DMA}$)	(4) Ln(DMA)	(5) Ln($\frac{Rev}{Chain}$)	(6) Ln(Chains)
Local Credit Shock × I(Crisis Cohort)	-0.161**	-0.039**	-0.146**	-0.054	-0.151*	-0.049**
	(0.079)	(0.019)	(0.061)	(0.045)	(0.078)	(0.024)
Observations	13110	13110	13110	13110	13110	13110
Adjusted R^2	0.464	0.199	0.440	0.600	0.453	0.504
Product Group×Cohort Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes

Conclusion

- Credit market disruptions disrupt radical product innovation
  - Lower rates of introduction of products in new product lines
  - New products are less novel
  - New product lines are less successful
- Results have important implications for our understanding of the process of product innovation in the economy.

Main Results

Robustness: Alternative Dependent Variable

$$Y_{i,t} = \alpha_i + \theta_t + \beta Shock_i \times Crisis_t + \Gamma X_{i,t} + \epsilon_{i,t}$$

Panel A: Geography-Based Measure of Credit Market Disruption

	(1)	(2)	(3)	(4)	(5)	(6)
	Ln(1+New Prod.) (All)		Ln(1+New Prod.) (Old)		Ln(1+New Prod.) (New)	
Local Credit Shock × I(Crisis)	-0.064	-0.057	-0.028	-0.020	-0.047***	-0.048***
	(0.050)	(0.046)	(0.049)	(0.046)	(0.014)	(0.013)
Ln(Firm Revenue)		0.289***		0.345***		-0.069***
		(0.019)		(0.017)		(0.010)
Rev. Concentration Index		-0.308***		-0.246***		-0.113***
		(0.008)		(0.007)		(0.005)
Ln(Rev. per Product)		-0.213***		-0.275***		0.080***
		(0.017)		(0.014)		(0.009)
Observations	173447	173447	173447	173447	173447	173447
Adjusted R^2	0.714	0.723	0.730	0.738	0.282	0.286
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes

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Main Results

Robustness: Alternative Geographic Measure of Credit Market Disruption

$$Y_{i,t} = \alpha_i + \theta_t + \beta Shock_i \times Crisis_t + \Gamma X_{i,t} + \epsilon_{i,t}$$

Panel A: Entry Rates of New Products

	(1)	(2)	(3)	(4)	(5)	(6)
	Entry Rate (All Modules)		Entry Rate (Old Modules)		Entry Rate (New Modules)	
Local Credit Shock	0.037***	0.032	0.004	0.000	0.020*	0.019
	(0.000)	(0.072)	(0.060)	(0.056)	(0.012)	(0.012)
Local Credit Shock × I(Crisis)	-0.084	-0.086	-0.018	-0.019	-0.043***	-0.044***
	(0.098)	(0.055)	(0.053)	(0.049)	(0.012)	(0.012)
Ln(Firm Revenue)		-0.175***		-0.114***		-0.044***
		(0.020)		(0.014)		(0.003)
Rev. Concentration Index		-0.194***		-0.125***		-0.041***
		(0.016)		(0.010)		(0.002)
Ln(Rev. per Product)		0.198***		0.128***		0.050***
		(0.019)		(0.013)		(0.004)
Observations	173447	173447	173447	173447	173447	173447
Adjusted R^2	0.248	0.269	0.218	0.234	0.156	0.163
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes

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Main Results

Robustness: Alternative Definition of Product

$$Y_{i,t} = \alpha_i + \theta_t + \beta Shock_i \times Crisis_t + \Gamma X_{i,t} + \epsilon_{i,t}$$

Panel A: Entry Rates of New Products

	(1)	(2)	(3)	(4)	(5)	(6)
	Entry Rate (All Modules)		Entry Rate (Old Modules)		Entry Rate (New Modules)	
Local Credit Shock × I(Crisis)	-0.044***	-0.046***	-0.011	-0.012	-0.027***	-0.028***
	(0.012)	(0.010)	(0.008)	(0.007)	(0.008)	(0.007)
Ln(Firm Revenue)		-0.132***		-0.054***		-0.074***
		(0.005)		(0.003)		(0.004)
Rev. Concentration Index		-0.097***		-0.043***		-0.049***
		(0.003)		(0.002)		(0.002)
Ln(Rev. per Product)		0.142***		0.058***		0.079***
		(0.005)		(0.003)		(0.004)
Observations	170216	170216	170216	170216	170216	170216
Adjusted R^2	0.207	0.220	0.141	0.148	0.160	0.167
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes

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Main Results

Robustness: Placebo Measures of Credit Market Disruptions

Panel A: Entry Rates of New Products

	(1)	(2)	(3)	(4)	(5)	(6)
	Entry Rate (New Modules)					
Local Credit Shock (2005–2008) × I(Crisis)	-0.000	-0.001				
	(0.012)	(0.012)				
Local Credit Shock (2011–2014) × I(Crisis)			-0.012	-0.013		
			(0.009)	(0.009)		
Local Credit Shock (2012–2015) × I(Crisis)					-0.010	-0.010
					(0.010)	(0.010)
Ln(Firm Revenue)		-0.044***		-0.044***		-0.044***
		(0.003)		(0.003)		(0.003)
Rev. Concentration Index		-0.041***		-0.041***		-0.041***
		(0.002)		(0.002)		(0.002)
Ln(Rev. per Product)		0.050***		0.050***		0.050***
		(0.004)		(0.004)		(0.004)
Observations	173447	173447	173447	173447	173447	173447
Adjusted R^2	0.156	0.163	0.156	0.163	0.156	0.163
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes

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Main Results

Robustness: Alternative Fixed Effect Structures

Panel A: Geography-Based Measure of Credit Market Disruption

	(1)	(2)	(3)	(4)	(5)	(6)
	Entry Rate (New Modules)					
Local Credit Shock × I(Crisis)	-0.018**	-0.019***	-0.021***	-0.021***	-0.019**	-0.019**
	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)
Ln(Firm Revenue)		-0.045***		-0.046***		-0.047***
		(0.003)		(0.004)		(0.003)
Rev. Concentration Index		-0.040***		-0.040***		-0.039***
		(0.002)		(0.002)		(0.002)
Ln(Rev. per Product)		0.050***		0.051***		0.052***
		(0.004)		(0.004)		(0.003)
Observations	173445	173445	173445	173445	172285	172285
Adjusted R^2	0.157	0.164	0.160	0.166	0.180	0.186
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Department × Year Fixed-Effects	Yes	Yes	No	No	No	No
Prod. Category × Year Fixed-Effects	No	No	Yes	Yes	No	No
Prod. Module × Year Fixed-Effects	No	No	No	No	Yes	Yes

▸ Go Back

Main Results

Geography-based Measure of Credit Market Disruption (II)

$$Y_{i,t} = \alpha_i + \theta_t + \beta Shock_i \times Crisis_t + \Gamma X_{i,t} + \epsilon_{i,t}$$

Panel B: Indicator Variables for Product Introduction

	(1) I(New Prod=1)	(2) (All)	(3) I(New Prod=1)	(4) (Old Modules)	(5) I(New Prod=1)	(6) (New Modules)
Local Credit Shock × I(Crisis)	-0.049*	-0.049*	-0.028	-0.027	-0.032**	-0.032**
	(0.028)	(0.026)	(0.029)	(0.026)	(0.014)	(0.013)
Ln(Firm Revenue)		0.066***		0.076***		-0.004
		(0.006)		(0.006)		(0.007)
Rev. Concentration Index		-0.143***		-0.135***		-0.068***
		(0.004)		(0.004)		(0.003)
Ln(Rev. per Product)		-0.035***		-0.048***		0.015**
		(0.006)		(0.005)		(0.006)
Observations	173447	173447	173447	173447	173447	173447
Adjusted R^2	0.453	0.460	0.464	0.470	0.210	0.213
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes

- Results from regression framework indicate that credit market disruptions affect radical product innovation but not incremental product innovation

Robustness

Alternative Fixed Effects (Firm-level Measure)

	(1)	(2)	(3)	(4)	(5)	(6)
	Entry Rate (New Modules)					
Firm Credit Shock × I(Crisis)	-0.036***	-0.037***	-0.065***	-0.059***	-0.065*	-0.070*
	(0.011)	(0.006)	(0.017)	(0.017)	(0.031)	(0.035)
Ln(Firm Revenue)		-0.059**		-0.076***		-0.067
		(0.018)		(0.020)		(0.040)
Rev. Concentration Index		-0.048**		-0.089**		0.018
		(0.019)		(0.035)		(0.045)
Ln(Rev. per Product)		0.056***		0.070***		0.043
		(0.014)		(0.015)		(0.050)
Observations	1740	1740	1445	1445	825	825
Adjusted R^2	0.236	0.240	0.290	0.300	0.210	0.208
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Department × Year Fixed-Effects	Yes	Yes	No	No	No	No
Prod. Group × Year Fixed-Effects	No	No	Yes	Yes	No	No
Prod. Module × Year Fixed-Effects	No	No	No	No	Yes	Yes

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Robustness

Alternative Fixed Effects and Product Novelty

	(1)	(2)	(3)	(4)	(5)	(6)
	Ln(Novelty Index)			Ln(Novelty Index (Combination))		
Local Credit Shock × I(Crisis)	-0.012	-0.017*	-0.016*	-0.022**	-0.028***	-0.028**
	(0.007)	(0.007)	(0.008)	(0.007)	(0.008)	(0.010)
Ln(Firm Revenue)	-0.008***	-0.008***	-0.008***	-0.011***	-0.011***	-0.011***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
Rev. Concentration Index	0.016***	0.015***	0.012**	0.017***	0.017***	0.014**
	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)	(0.005)
Ln(Rev. per Product)	0.009***	0.009***	0.009***	0.011***	0.011***	0.011***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
Observations	52726	52706	50969	52726	52706	50969
Adjusted R^2	0.331	0.334	0.348	0.397	0.399	0.409
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Department × Year Fixed-Effects	Yes	No	No	Yes	No	No
Prod. Group × Year Fixed-Effects	No	Yes	No	No	Yes	No
Prod. Module × Year Fixed-Effects	No	No	Yes	No	No	Yes

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Robustness

Sales Outside HQ's State and Product Novelty

	(1)	(2)	(3)	(4)	(5)	(6)
	Novelty Index			Novelty Index (Combination)		
Local Credit Shock × I(Crisis)	-0.012*	-0.011	-0.010	-0.019***	-0.017***	-0.018**
	(0.006)	(0.006)	(0.009)	(0.002)	(0.003)	(0.006)
Ln(Firm Revenue)	-0.008***	-0.008***	-0.007***	-0.011***	-0.011***	-0.009***
	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)
Rev. Concentration Index	0.016***	0.015***	0.018***	0.018***	0.017***	0.021***
	(0.005)	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)
Ln(Rev. per Product)	0.009***	0.008***	0.007**	0.011***	0.011***	0.009***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	35774	34049	27021	35774	34049	27021
Adjusted R^2	0.331	0.331	0.331	0.410	0.411	0.408
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	No	No	No
Subsample (% Sales Outside HQ State)	≥66%	≥75%	≥90%	≥66%	≥75%	≥90%

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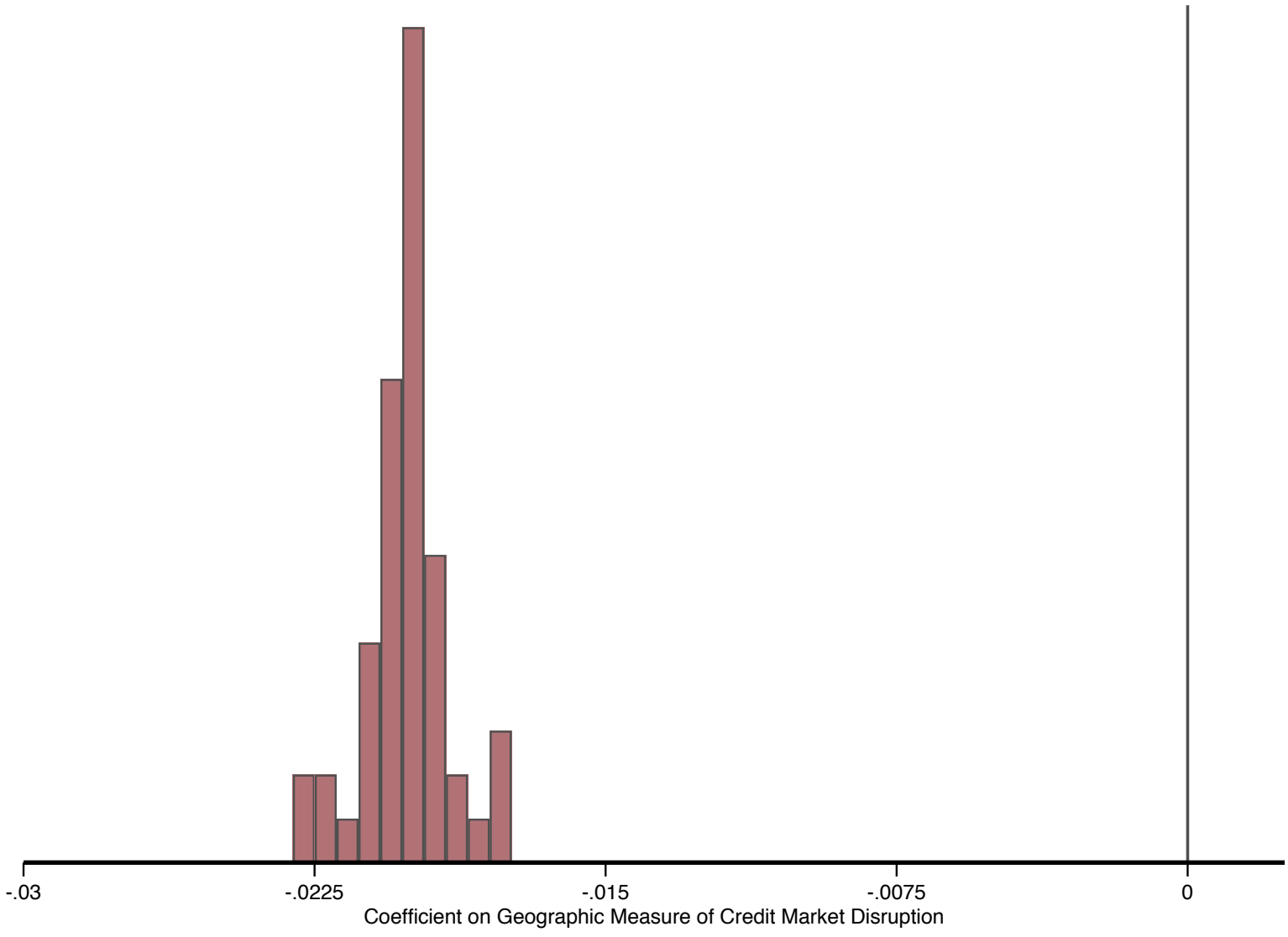
Robustness

Eliminating one state at a time



Robustness

Alternative Dependent Variable: Dummy for Product Introduction

	(1)	(2)	(3)	(4)	(5)	(6)
	I(New Prod=1)	(All)	I(New Prod=1)	(Old Modules)	I(New Prod=1)	(New Modules)
Local Credit Shock × I(Crisis)	-0.049*	-0.049*	-0.028	-0.027	-0.032**	-0.032**
	(0.028)	(0.026)	(0.029)	(0.026)	(0.014)	(0.013)
Ln(Firm Revenue)		0.066***		0.076***		-0.004
		(0.006)		(0.006)		(0.007)
Rev. Concentration Index		-0.143***		-0.135***		-0.068***
		(0.004)		(0.004)		(0.003)
Ln(Rev. per Product)		-0.035***		-0.048***		0.015**
		(0.006)		(0.005)		(0.006)
Observations	173447	173447	173447	173447	173447	173447
Adjusted R^2	0.453	0.460	0.464	0.470	0.210	0.213
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes

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Robustness

Controlling for Local Indicators of Economic Conditions

	(1)	(2)	(3)	(4)	(5)	(6)
	Entry Rate (All Modules)		Entry Rate (Old Modules)		Entry Rate (New Modules)	
Local Credit Shock × I(Crisis)	-0.046*	-0.050**	-0.018	-0.020	-0.019***	-0.020***
	(0.026)	(0.024)	(0.021)	(0.019)	(0.007)	(0.006)
Ln(Unemployment Rate) × I(Crisis)	0.014*	0.014*	0.014**	0.013**	0.001	0.001
	(0.008)	(0.008)	(0.006)	(0.006)	(0.003)	(0.002)
Ln(Cnty Inc. pc) × I(Crisis)	0.026***	0.022***	0.018***	0.016***	0.004**	0.003**
	(0.005)	(0.005)	(0.004)	(0.004)	(0.002)	(0.002)
Ln(Unemployment Rate)	-0.032***	-0.031***	-0.009	-0.009	-0.016***	-0.015***
	(0.011)	(0.010)	(0.009)	(0.009)	(0.004)	(0.004)
Ln(Cnty Inc. pc)	-0.007	-0.013	0.010	0.006	-0.015	-0.017
	(0.029)	(0.028)	(0.018)	(0.017)	(0.014)	(0.014)
Ln(Firm Revenue)		-0.175***		-0.113***		-0.044***
		(0.012)		(0.006)		(0.003)
Rev. Concentration Index		-0.195***		-0.126***		-0.041***
		(0.006)		(0.004)		(0.002)
Ln(Rev. per Product)		0.198***		0.128***		0.050***
		(0.011)		(0.006)		(0.004)
Observations	172189	172189	172189	172189	172189	172189
Adjusted R^2	0.248	0.269	0.218	0.234	0.156	0.163
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes

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Robustness

Alternative Fixed Effects (Firm-level Measure)

	(1)	(2)	(5)	(6)	(7)	(8)
			Entry Rate (New Modules)			
Local Credit Shock × I(Crisis)	-0.020**	-0.020**	-0.026***	-0.027***	-0.019**	-0.019**
	(0.009)	(0.009)	(0.009)	(0.009)	(0.008)	(0.007)
Δ Cnty. HPI × I(Crisis)	-0.000	0.001				
	(0.005)	(0.005)				
Ln(Debt to Income Ratio, 2006) × I(Crisis)						
Ln(Housing Supply Elasticity, Saiz) × I(Crisis)			-0.003	-0.002		
			(0.002)	(0.002)		
Housing Net Worth Shock, 2006–2009 × I(Crisis)					0.007	0.008
					(0.006)	(0.006)
Ln(Firm Revenue)		-0.044***		-0.042***		-0.043***
		(0.003)		(0.003)		(0.004)
Rev. Concentration Index		-0.041***		-0.041***		-0.041***
		(0.002)		(0.003)		(0.003)
Ln(Rev. per Product)		0.050***		0.047***		0.047***
		(0.004)		(0.004)		(0.004)
Observations	171466	171466	136546	136546	132925	132925
Adjusted R^2	0.156	0.163	0.162	0.168	0.162	0.168
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes

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Main Results

Robustness: Firms that do not sell locally

	(1)	(2)	(3)	(4)	(5)	(6)
	Prod. Intro. Rate (New Lines)					
Local Credit Shock × I(Crisis)	-0.033***	-0.033***	-0.038***	-0.039***	-0.037***	-0.037***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Ln(Firm Revenue)		-0.036***		-0.036***		-0.037***
		(0.003)		(0.004)		(0.004)
Rev. Concentration Index		-0.035***		-0.034***		-0.032***
		(0.002)		(0.002)		(0.002)
Ln(Rev. per Product)		0.041***		0.041***		0.041***
		(0.003)		(0.003)		(0.004)
Observations	101817	101817	96853	96853	80471	80471
Adjusted R^2	0.113	0.119	0.113	0.119	0.110	0.116
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Subsample (% Sales Outside HQ State)	≥66%	≥66%	≥75%	≥75%	≥90%	≥90%

- Results are not driven by firms with significant exposure to local demand shocks

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Main Results

Robustness: Firms that sell Durable Products

	Hi. Dur	Low Dur.	Hi. Dur	Low Dur.	Hi. Dur	Low Dur.
	Prod. Int. Rate (All)		Prod. Int. Rate (Old Lines)		Prod. Int. Rate (New Lines)	
Local Credit Shock × I(Crisis)	-0.073**	-0.020	-0.031	-0.000	-0.026***	-0.015*
	(0.030)	(0.028)	(0.026)	(0.023)	(0.009)	(0.008)
Ln(Firm Revenue)	-0.173***	-0.195***	-0.112***	-0.131***	-0.043***	-0.046***
	(0.014)	(0.014)	(0.008)	(0.009)	(0.005)	(0.005)
Rev. Concentration Index	-0.181***	-0.180***	-0.120***	-0.121***	-0.036***	-0.035***
	(0.009)	(0.009)	(0.005)	(0.006)	(0.003)	(0.003)
Ln(Rev. per Product)	0.187***	0.222***	0.121***	0.149***	0.046***	0.052***
	(0.012)	(0.014)	(0.008)	(0.009)	(0.004)	(0.005)
Observations	78802	93370	78802	93370	78802	93370
Adjusted R^2	0.279	0.287	0.243	0.241	0.176	0.191
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes

- Results are more pronounced in the subset of durable products

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Robust

Cross-Sectional Heterogeneity

	Large	Small	Low Δ^- Loans	Hi Δ^- Loans	Hi. Lehman	Low Lehman
	Prod. Intro. Rate (New Lines)					
Firm Credit Shock × I(Crisis)	0.010	-0.067***	-0.030*	-0.047**	-0.061***	-0.026
	(0.006)	(0.018)	(0.017)	(0.021)	(0.019)	(0.017)
Ln(Firm Revenue)	-0.017	-0.062*	-0.028	-0.062*	-0.038	-0.068***
	(0.014)	(0.032)	(0.019)	(0.035)	(0.044)	(0.025)
Rev. Concentration Index	-0.087***	-0.040	-0.080	-0.017	0.008	-0.091*
	(0.020)	(0.028)	(0.050)	(0.035)	(0.028)	(0.050)
Ln(Rev. per Product)	0.041*	0.057*	0.025	0.062	0.036	0.061**
	(0.018)	(0.027)	(0.027)	(0.041)	(0.053)	(0.024)
Observations	844	821	809	935	674	1070
Adjusted R^2	0.294	0.201	0.218	0.239	0.168	0.276
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes

- Effects also concentrated in smaller firms and in firms whose lenders cut back lending to a greater extent or were more exposed to Lehman

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