Demonetization and Firm Exports

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Motivation

- Study the economic impact of a major episode of "Demonetization" in India (Nov 2016)
  - Demonetization: Large Currency Notes (Rs 500 and 1000) – accounting for over 85 percent of currency in circulation – suddenly invalidated as legal tender (with immediate effect)
  - Unanticipated policy shock
- Important questions regarding the short- and long-run impacts of this policy
  - Effects on economic activity?
  - Supply chain resilience: Concern that demonetization may have caused long run disruptions.
- Related to broad questions in economics literature
  - Could a monetary policy shock impact international trade (Gali and Monacelli 05)?
  - Temporary or Persistent Effects - Neutrality of money?

Our Paper

- Study these questions through the lens of international trade: Firm Exports
  - Use granular, high-frequency, data: Customs Transactions-Level information on Firm Exports
  - Firm characteristics: Merge trade data set with CMIE Prowess (Firm Balance Sheet Information)
- Event Study/Difference-in-differences Approach
  - Heterogeneity in Firm-level exposure to the policy shock
- Preview of Results
  - Significant negative effects in the short term, but no long-run effects
  - Neutrality proposition holds in the long run

Outline

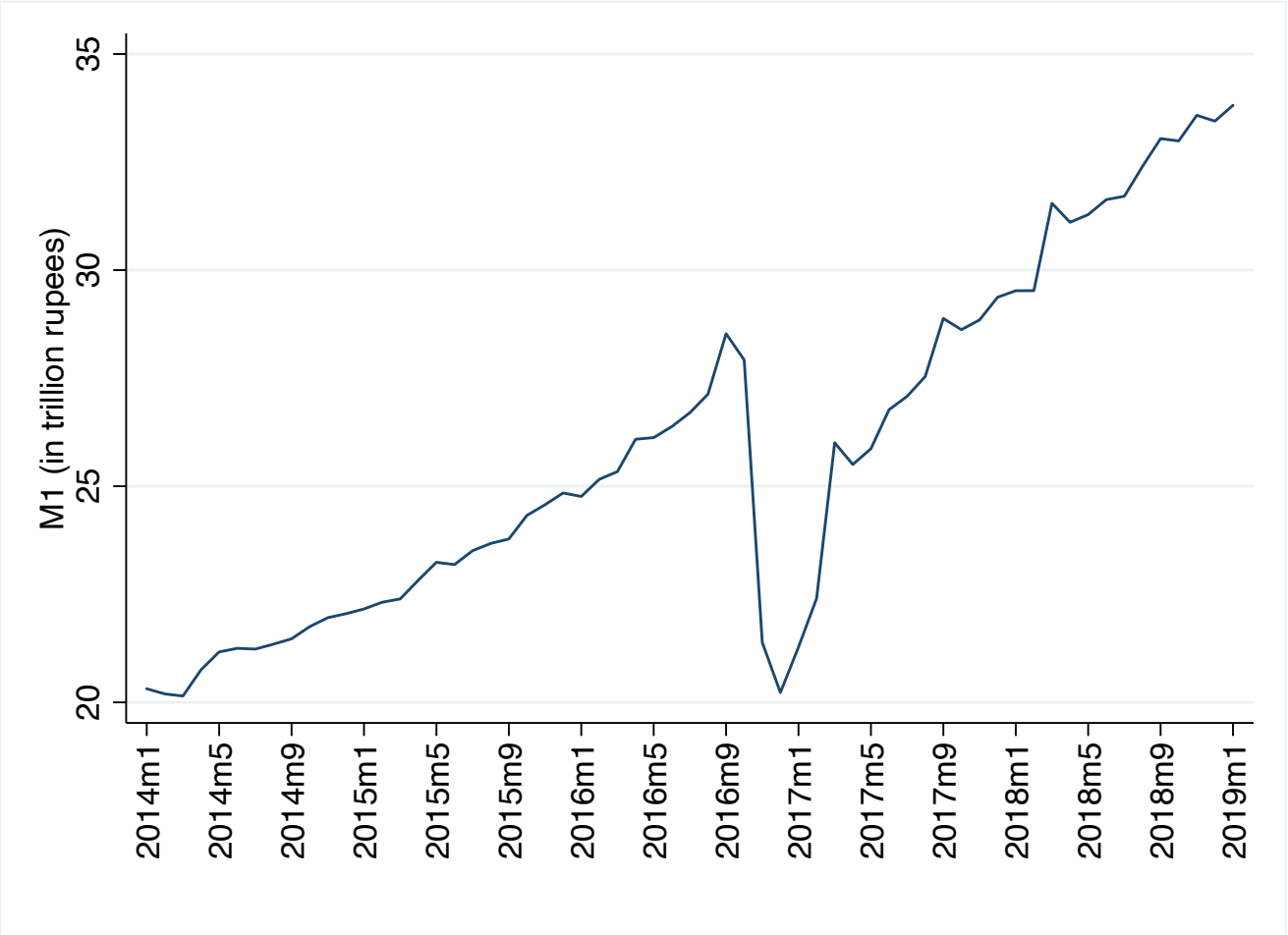
- Demonetization: Description of Policy Shock
- Literature
- Data
  - Customs Data - Detail and Coverage
  - CMIE -Balance Sheet Data
- Empirical Strategy
- Results

India Demonetization: November 8, 2016 at 8:15 pm

- ₹ 500 and ₹ 1,000 (85% of the currency in circulation) become immediately invalid as legal tender from midnight.
  - Stated goal: To invalidate undeclared income held in cash and counterfeit currency (Lahiri (2020))
  - To exchange with the new notes (in ₹ 500, ₹ 2,000), cash holders had to deposit the old notes by December 31, 2016.
  - Delays due to logistical challenges
    - ATMs and banks ran out of new currency notes
    - New currency notes of ₹ 2,000, less useful for daily transactions
    - Severe rationing of cash
    - Continuous revision of the criteria for deposits of old currency & the daily limits on withdrawals of the new currency
  - Gradual Re-monetization (Took about 2-3 quarters for the economy to be fully remonetized).

India Demonetization: Money Supply

- Money supply fell dramatically at the time of the demonetization.



source: OECD, "Main Economic Indicators - complete database"

Related Literature

- International Monetary Policy
  - Gali and Monacelli 05, Cetorelli and Goldberg 12, Bruno and Shin 15, Kalemli-Ozcan 19, Brauning and Ivashina 20, Miranda-Agrippino and Rey 20, Schmitt-Grohé and Uribe 22, Buch et al. 19, Buch and Goldberg 20, Kalemli-Ozcan and Kwak 20
- Firm Behavior w.r.t a Monetary Policy Shock
  - Gertler and Gilchrist 94, Cloyne et al. 18, Jeenas 19, Ottonello and Winberry 20
- Trade and Financial Frictions
  - Manova 12, Foley and Manova 15, Amiti and Weinstein 11, Schmidt-Eisenlohr 13, Feenstra et al. 14, Paravisini et al 14, Antras and Foley 15, Niepmann and Schmidt-Eisenlohr 17, Ahn 20, Bruno and Shin 20
- India Demonetization
  - Chodorow-Reich, Gopinath, Mishra, and Narayanan 19, Chanda and Cook 22, Bhavnani and Copelovitch 18, Crouzet et al. 19, Aggarwal et al. 20, Karmakar and Narayanan 20, Khanna and Mukherjee 20, Subramaniam 20, Kisat and Phan 21, Aggarwal and Narayanan 22.
- Trade Credit in Production Network
  - Petersen and Rajan 97, Levchenko, Lewis, and Tesar 10, Kim and Shin 12, Kalemli-Özcan et al. 14, Jacobson and von Schedvin 15, Bigio and La'O 20, Costello 20, Luo 20, Reisher 20, Altinoglu 21

Data

- Product-Firm-Destination-Month-level Export and Import: India Custom
  - covers $\approx$ 3.8 million observations per year

    e.g: price and quantity of locks used for motor vehicles (of base metal) made by Hero Motocorp LTD sold to Bangladesh in November 2016.

  - The sample covers $\approx$ 80% of total exports in Trademap data

- Firm Characteristics: Prowess
  - Covers both publicly traded and private firms
  - Includes balance-sheet information on real and financial activities

◂ top 15 sectors ◂ summary stat.

Exposure to Demonetization: Account receivables/Sales (AR/S)

- Accounts receivable are created when a company lets a buyer purchase their goods or services on credit.
- Failure on the part of the buyer to make a timely payment affects the working capital of the firm and, in turn, its ability to make payments (wages and materials).
- **We define firm-level exposure to demonetization as the average pre-demonetization (2013-15) AR/S for the firm**

Empirical Method: Event Study Design

$$\text{ln Exports}_{it} = \beta_0 + \sum_{\tau \leq -2} \beta_\tau \mathbb{1}(t = \tau) \left[\frac{AR}{S}\right]_i + \sum_{\tau \geq 0} \beta_\tau \mathbb{1}(t = \tau) \left[\frac{AR}{S}\right]_i + \lambda_i + \delta_t + \epsilon_{it}$$

i: firm, t: month, $t = 0$: November 2016

- $\left[\frac{AR}{S}\right]_i$: firm-specific exposure to the demonetization
  - pre-demonetization (2013-2015 mean) account receivables to sales
  - firms with high initial AR expect to receive more payments, but demonetization limits their domestic customer's ability to pay.
- $\mathbb{1}(\tau = t)$: short-run vs. long-run effect
- baseline: $\tau = -1$ (October 2016)

Empirical Method: Difference-in-Differences

$$\text{ln Exports}_{it} = \beta_0 + \beta_1 \text{post}_t \left[\frac{AR}{S}\right]_i + \lambda_i + \delta_t + \epsilon_{it}$$

i: firm, t: month, $t = 0$: November 2016

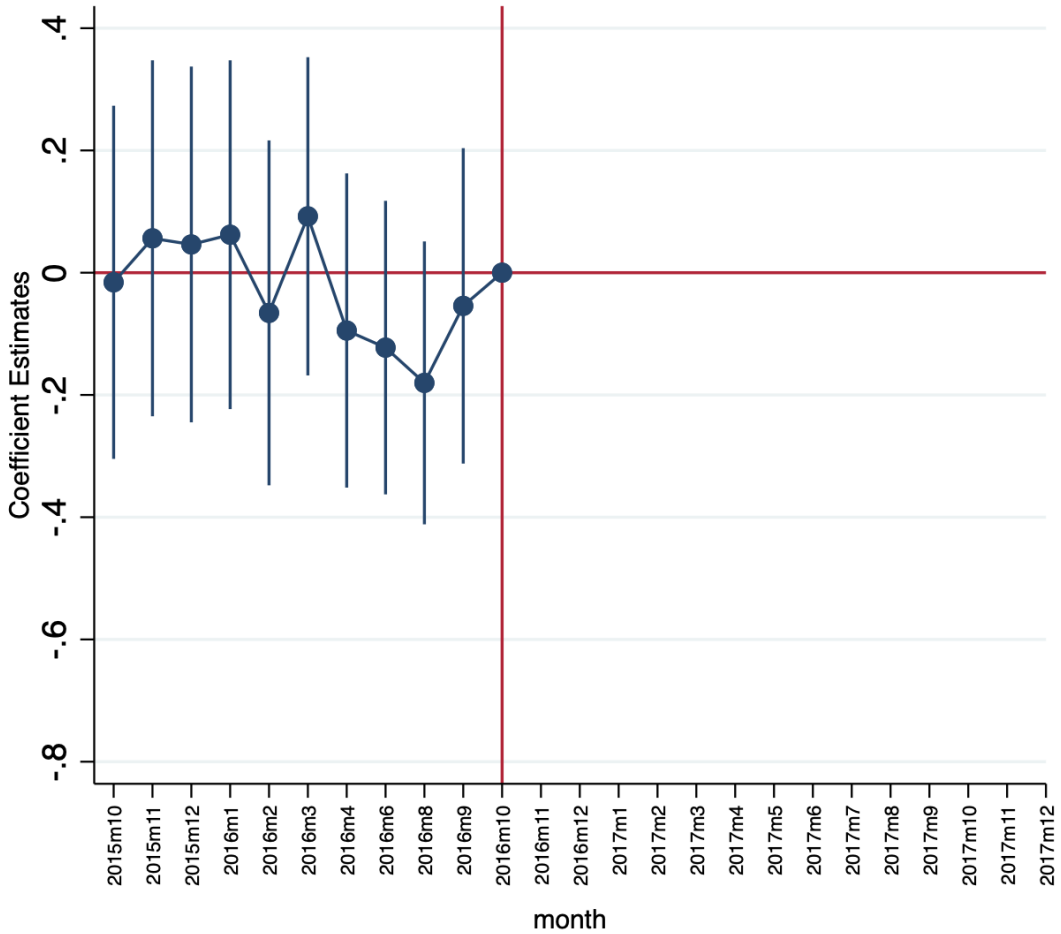
- ln Exports_{it}: log firm-month-level export value in 2015-2017
- $\left[\frac{AR}{S}\right]_i$: firm-specific exposure to the demonetization
  - pre-demonetization (2013-2015 mean) account receivables to sales
  - firms with high initial AR expect to receive more payments, but demonetization limits their domestic customer's ability to pay.
- post_t: after Indian Demonetization announcement (November 2016)

$$\text{post}_t = \begin{cases} 1 & \text{if t} \geq \text{November 2016} \\ 0 & \text{if t} < \text{November 2016} \end{cases}$$

Results: Exports

- Firms that are more exposed to a decrease in domestic money supply had similarly trending exports relative to less exposed firms

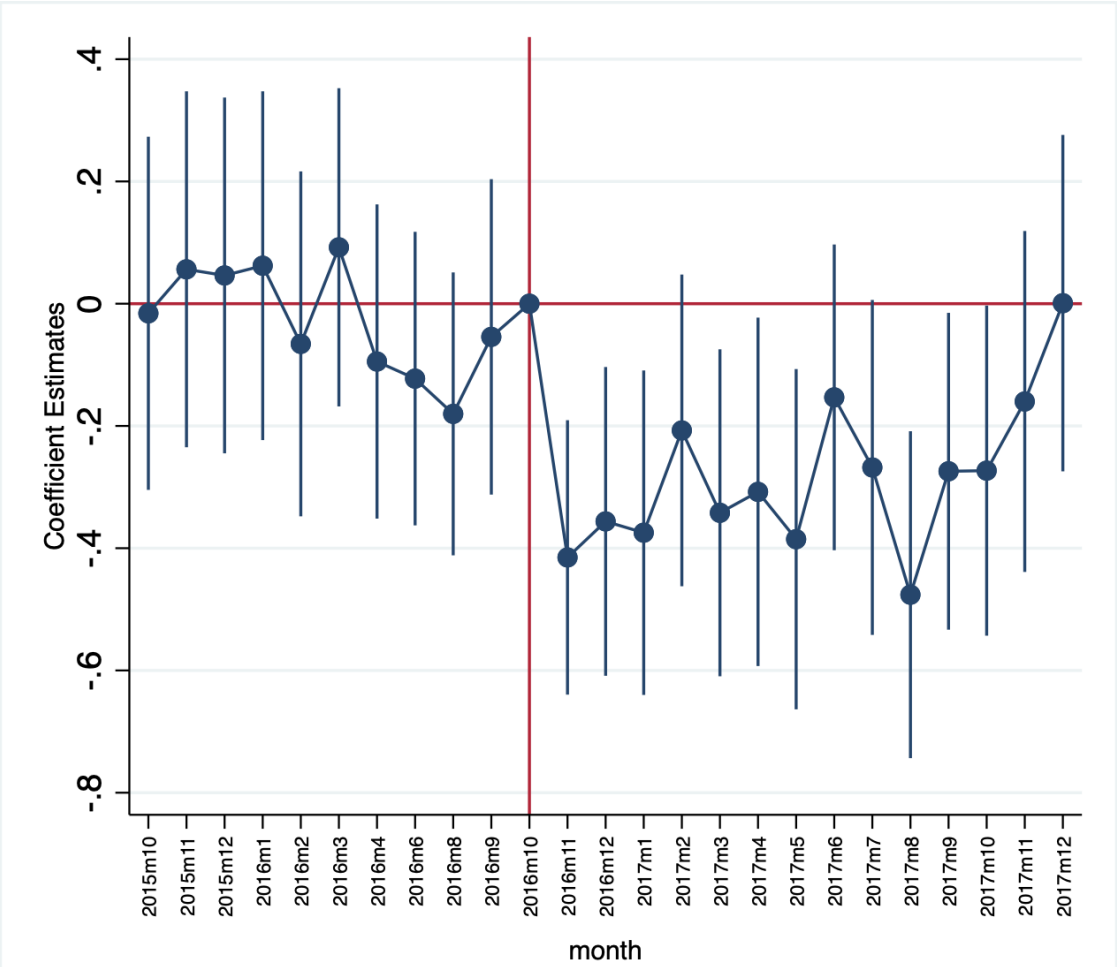
$$\ln \text{Exports}_{it} = \beta_0 + \sum_{\tau \leq -2} \beta_\tau \mathbb{1}(t = \tau) \left[\frac{AR}{S}\right]_i + \sum_{\tau \geq 0} \beta_\tau \mathbb{1}(t = \tau) \left[\frac{AR}{S}\right]_i + \lambda_i + \delta_t + \epsilon_{it}$$



Results: Exports

- Firms that are more exposed to a decrease in domestic money supply temporarily decrease their exports relative to less exposed firms

$$\ln \text{Exports}_{it} = \beta_0 + \sum_{\tau \leq -2} \beta_\tau \mathbb{1}(t = \tau) \left[\frac{AR}{S}\right]_i + \sum_{\tau \geq 0} \beta_\tau \mathbb{1}(t = \tau) \left[\frac{AR}{S}\right]_i + \lambda_i + \delta_t + \epsilon_{it}$$



Results: Exports

- Firms that are more exposed to a decrease in domestic money supply temporarily decrease their exports (relative to less exposed firms).

$$\ln \text{Exports}_{it} = \beta_0 + \sum_{\tau \geq 0} \beta_\tau \mathbb{1}(t = \tau) \left[\frac{AR}{S} \right]_i + \lambda_i + \delta_t + \epsilon_{it}$$

	(1)	(2)	(3)	(4)	(5)	(6)
				Exports		
					τ: Quarter	τ: Bi-month
Post × AR/S_i	-0.312***	-0.313***	-0.317***	-0.321***		
	(0.105)	(0.112)	(0.112)	(0.112)		
$\mathbb{1}(t = 2016m11\text{-}12)$ AR/S_i					-0.399***	-0.399***
					(0.141)	(0.141)
$\mathbb{1}(t = \tau_2)$ AR/S_i					-0.341**	-0.341**
					(0.138)	(0.145)
$\mathbb{1}(t = \tau_3)$ AR/S_i					-0.385***	-0.368**
					(0.143)	(0.156)
$\mathbb{1}(t = \tau_4)$ AR/S_i					-0.383***	-0.380***
					(0.140)	(0.143)
$\mathbb{1}(t = \tau_5)$ AR/S_i					-0.103	-0.468***
					(0.144)	(0.148)
$\mathbb{1}(t = \tau_6)$ AR/S_i						-0.234
						(0.159)
$\mathbb{1}(t = \tau_7)$ AR/S_i						-0.020
						(0.155)
Firm FE	✓	✓	✓	✓	✓	✓
Time FE	✓	✓	✓	✓	✓	✓
NIC4 x Post FE		✓	✓	✓	✓	✓
Firm Controls x Post FE				✓	✓	✓
R^2	0.762	0.765	0.765	0.765	0.765	0.765

Number of Obs.=103783, Number of Firms = 4029. Other firm controls are 2013-2015 log mean bank borrowing, cash holdings, interest expenses, and total assets. Standard errors are clustered at the firm level.

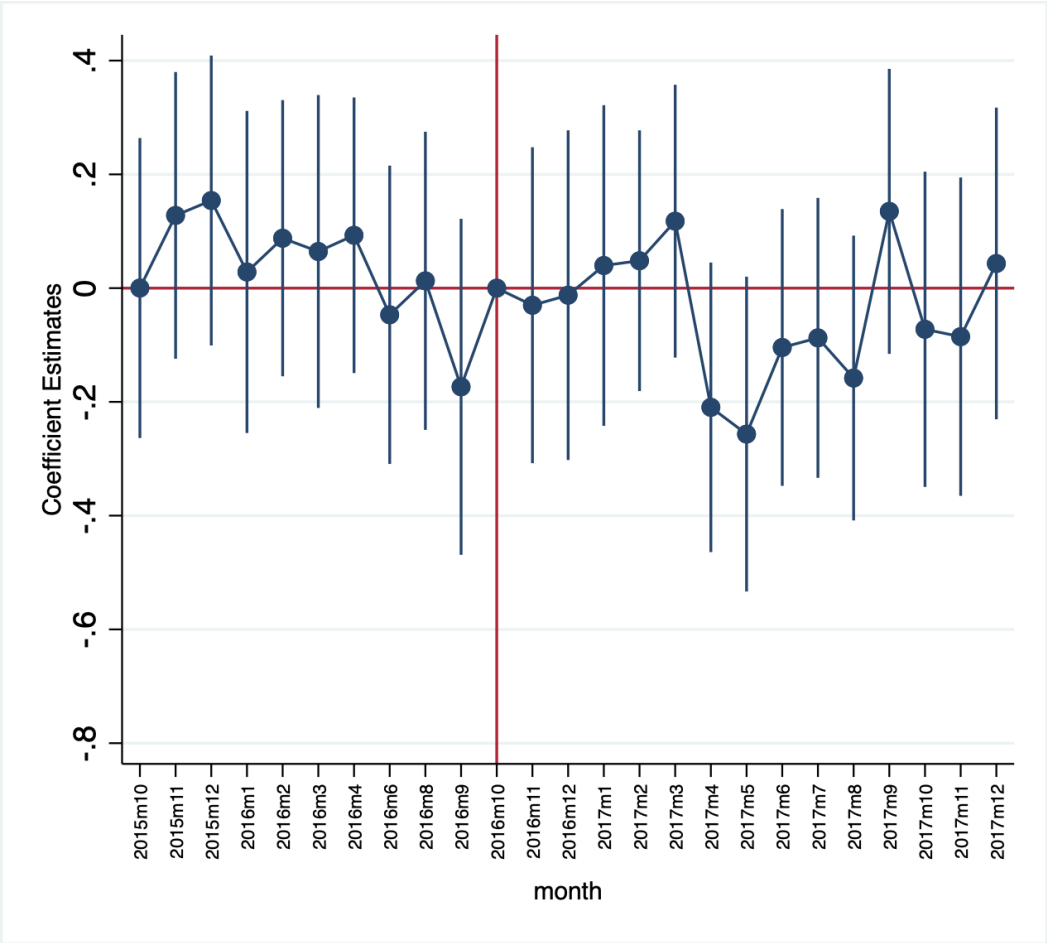
Robustness

- Controlling for **pre-demonetization** firm-level characteristics gives us the same results controls
  - Age, total assets, cash holding, bank borrowing, interest payment, interest coverage ratio, debt/assets, cash/assets, profitability, account payables
- Spatial heterogeneity spatial heterogeneity
  - Negative effects on exports stronger in districts with higher demonetization shock (Chodorow-Reich, Gopinath, Mishra, and Narayanan 19)
  - Negative effects on exports stronger in underbanked districts (RBI 2006)
- Full sample (aggregating to HS8 level) gives similar results full sample
  - Exposure to demonetization defined at the industry or HS8 level gives similar results

Results: Imports

- Firms that are more exposed to a decrease in domestic money supply do not change their imports (relative to less exposed firms)

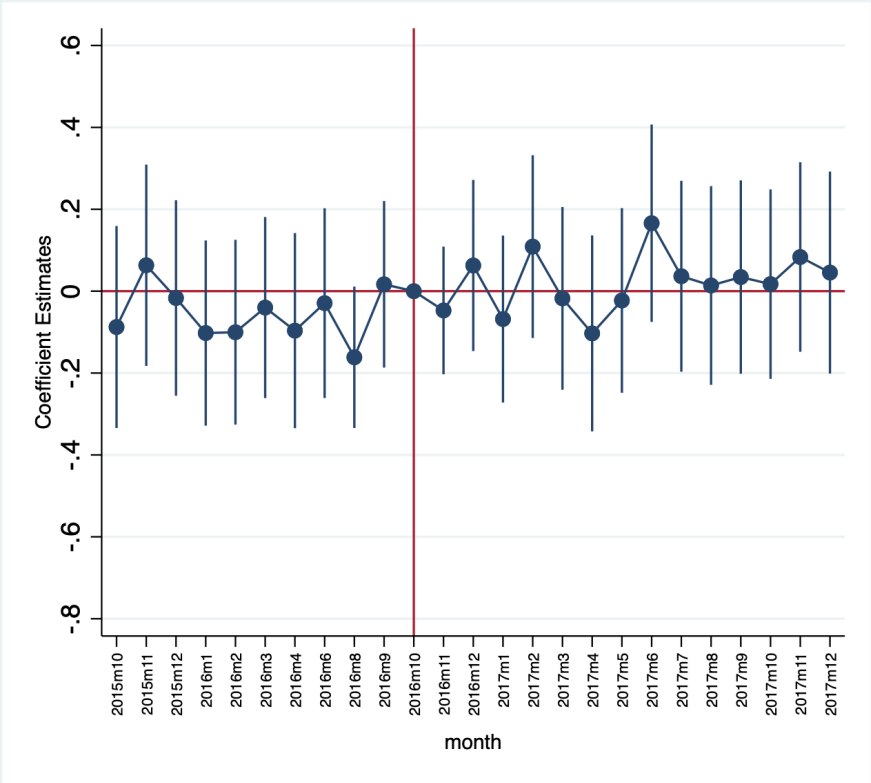
$$\ln \text{Imports}_{it} = \beta_0 + \sum_{\tau \neq -1} \beta_\tau \mathbb{1}(t = \tau) \left[\frac{AR}{S} \right]_i + \lambda_i + \delta_t + \epsilon_{it}$$



Export Price vs. Quantity

- Firms that are more exposed to a decrease in domestic money supply do not change their export price (relative to less exposed firms)
  - No "pass-through" of the financial cost on price

$$\ln \text{Export Price}_{it} = \beta_0 + \sum_{\tau \neq -1} \beta_\tau \mathbb{1}(t = \tau) \left[\frac{AR}{S}\right]_i + \lambda_i + \delta_t + \epsilon_{it}$$

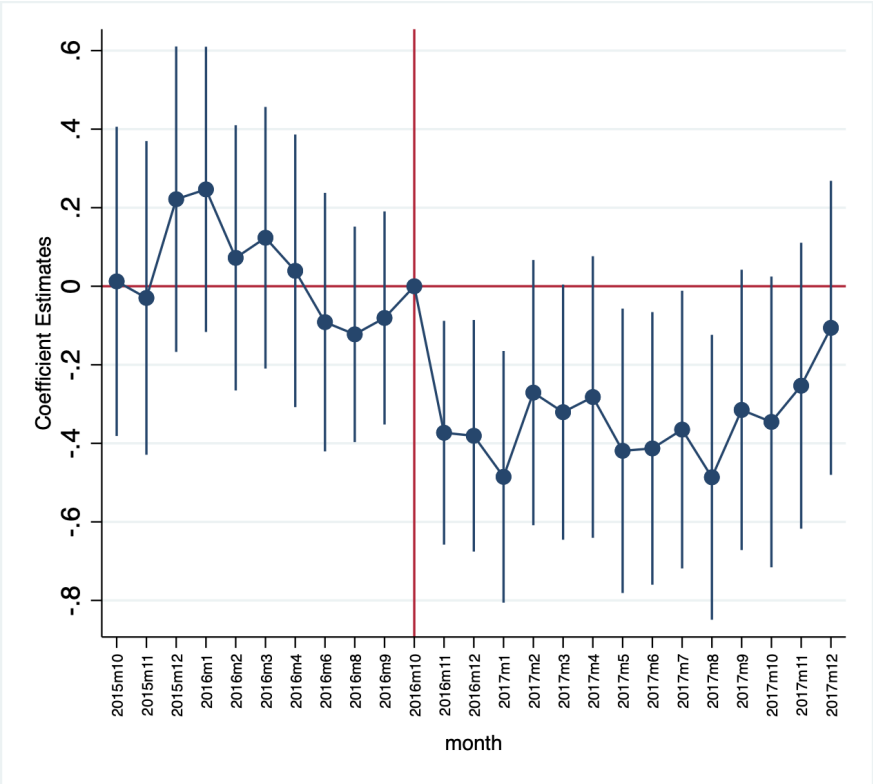


◂ Tornqvist price Index ◂ RW price Index

Export Price vs. Quantity

- Firms that are more exposed to a decrease in domestic money supply temporarily decrease their export quantity (relative to less exposed firms)
  - The real effect of the decrease in money supply

$$\ln \text{Export Quantity}_{it} = \beta_0 + \sum_{\tau \neq -1} \beta_\tau \mathbb{1}(t = \tau) \left[\frac{AR}{S}\right]_i + \lambda_i + \delta_t + \epsilon_{it}$$

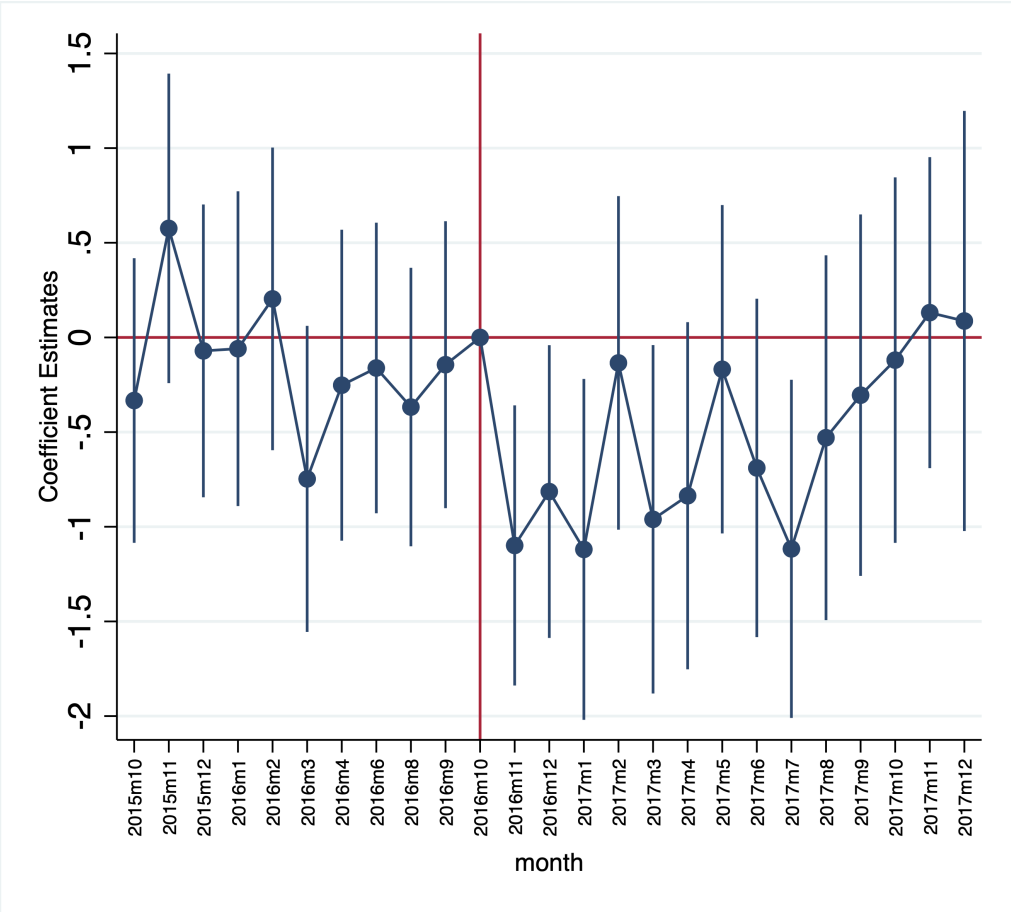


◂ Tornqvist price Index ◂ RW price Index

Extensive Margin: Export Varieties

- Firms that are more exposed to a decrease in domestic money supply temporarily decrease their export variety (relative to less exposed firms)

$$\text{Number of Export Varieties}_{it} = \beta_0 + \sum_{\tau \neq -1} \beta_\tau \mathbb{1}(t = \tau) \left[\frac{AR}{S}\right]_i + \lambda_i + \delta_t + \epsilon_{it}$$



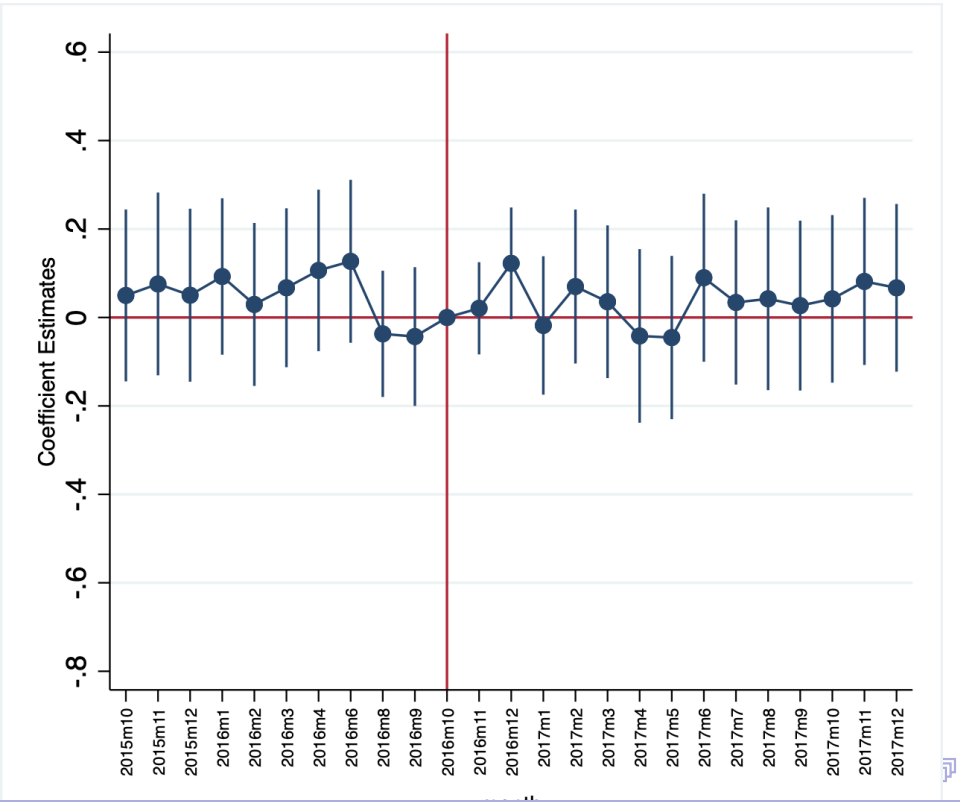
◀ Decomposition

Extensive Margin: Export Varieties

- Firms that are more exposed to a decrease in domestic money supply keep the important products (relative to less exposed firms)

$$\underbrace{\ln\left[\prod_{\tau=B_f+1}^{t}\left(\frac{\sum_{p\in\Omega_{it,t-1}} s_{ipt}}{\sum_{p\in\Omega_{it,t-1}} s_{ip,t-1}}\right)^{\frac{1}{\sigma-1}}\right]}_{\text{Feenstra 94 Variety Adjustment}} = \beta_0 + \sum_{\tau\neq -1}\beta_\tau \mathbb{1}(t=\tau)\left[\frac{AR}{S}\right]_i + \lambda_i + \delta_t + \epsilon_{it}$$

p: product, $\Omega_{it,t\text{-}1}$: the set of products p firm f provides in both period t and t-1, $\sigma = 6$ (match ESCAP estimates)



Mechanism: Input Financing for Production

- Firms that are more exposed to a decrease in domestic money supply decrease production, inventory, borrowings (relative to less exposed firms)

$$\ln \text{Expenses}_{it} = \beta_0 + \beta_1 \text{post}_t \left[\frac{AR}{S}\right]_i + \lambda_i + \delta_t + \epsilon_{it}$$

	(1) Material	(2) Employee	(3) Inventories	(4) Exports	(5) Bank Borr.	(6) Write-off
Post x $AR/S_{i,t-1}$	-0.194***	-0.104***	-0.186***	-0.259***	-0.146***	0.390**
	(0.070)	(0.033)	(0.046)	(0.099)	(0.044)	(0.188)
Firm FE	✓	✓	✓	✓	✓	✓
Time FE	✓	✓	✓	✓	✓	✓
Number of Firms	4,512	5,981	5,579	1,760	5,191	650
Firm Control x Post FE	✓	✓	✓	✓	✓	✓
R^2	0.958	0.978	0.959	0.936	0.927	0.760
Observations	9024	11962	11158	3520	10382	1300

Firm controls are 2013-2015 log mean bank borrowing, cash holdings, interest expenses, and total assets. Standard errors are clustered by firm.

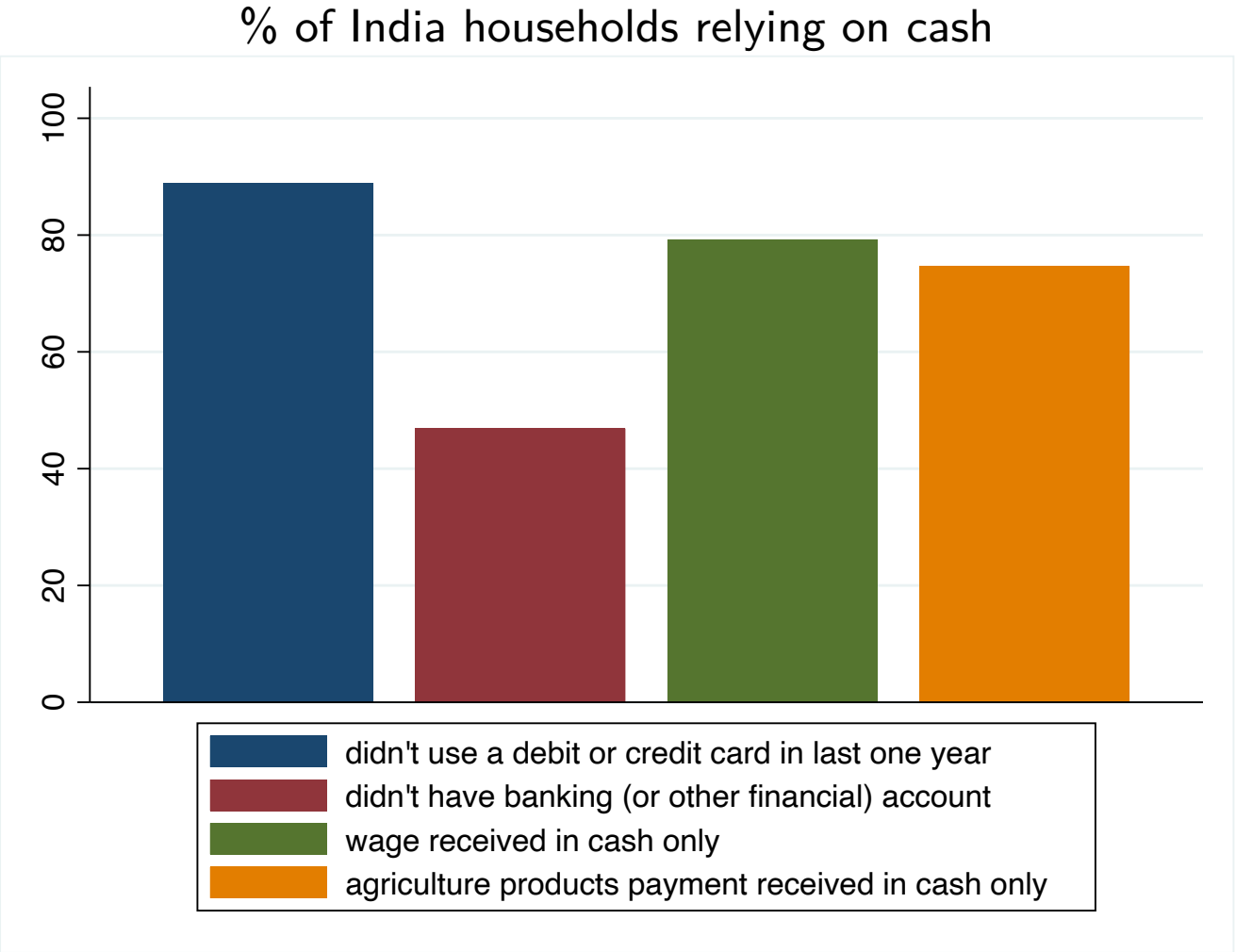
Conclusion

- Effects of demonetization on firm exports
  - Use high-frequency granular customs transactions data matched with balance-sheet information on firms
  - Event-study and difference-in-differences approach
  - Exposure to demonetization: Account receivables/sales
- Sharp reduction in exports in the short run; effects dissipate over time
- Short-run effects were real rather than nominal
  - $\downarrow$ in exports, export quantities, export varieties, and export destinations
    ◂ destination
  - No change in imports, export prices, or important product varieties
- Suggestive mechanism: Inability to finance inputs for production
- Cash is important to understand links between monetary policy and international trade.

Appendix

India Demonetization

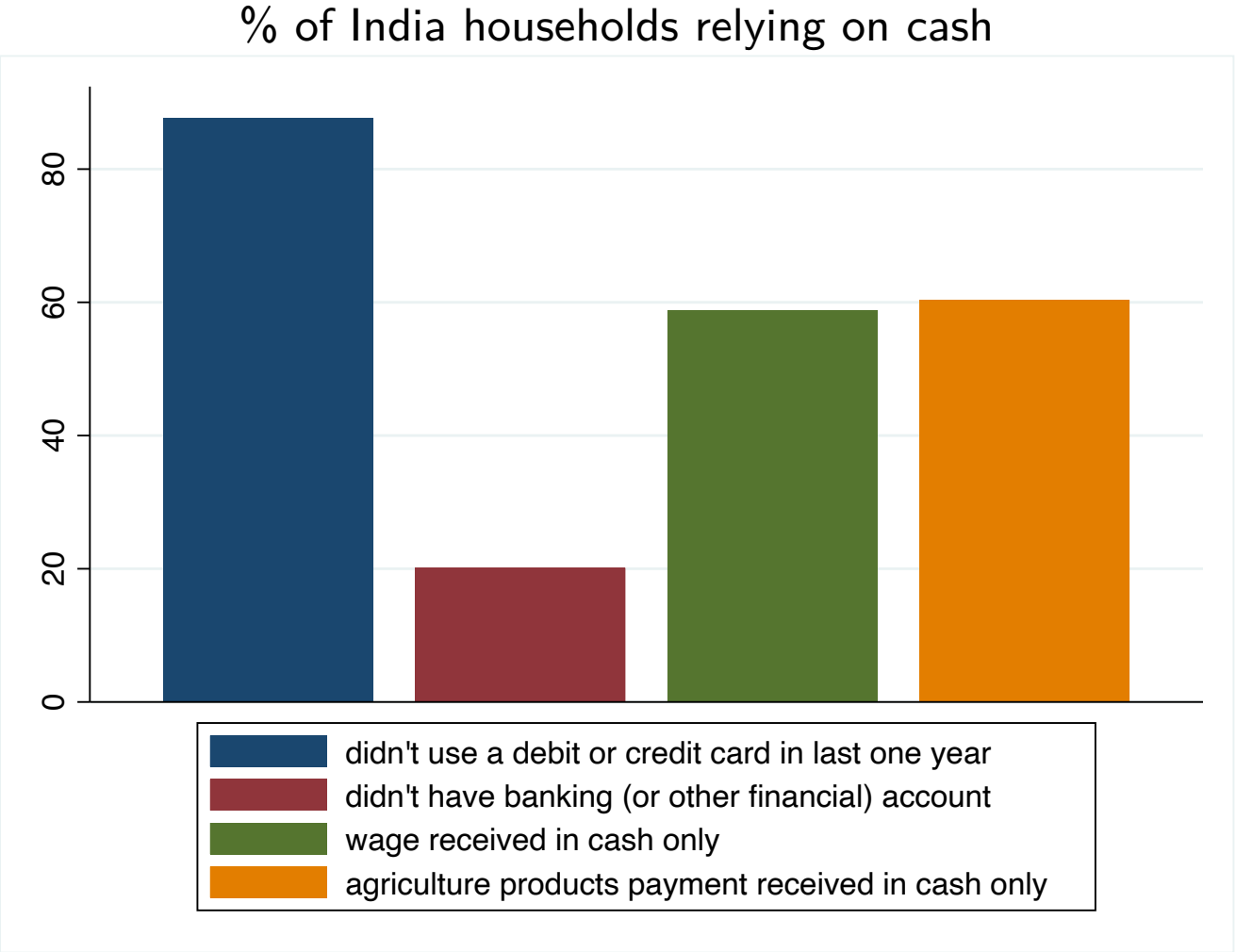
- India before demonetization: cash-reliant country



World Bank payment survey, surveyed in 2014

India Demonetization

- India in 2017: still cash-reliant



World Bank payment survey, surveyed in 2017

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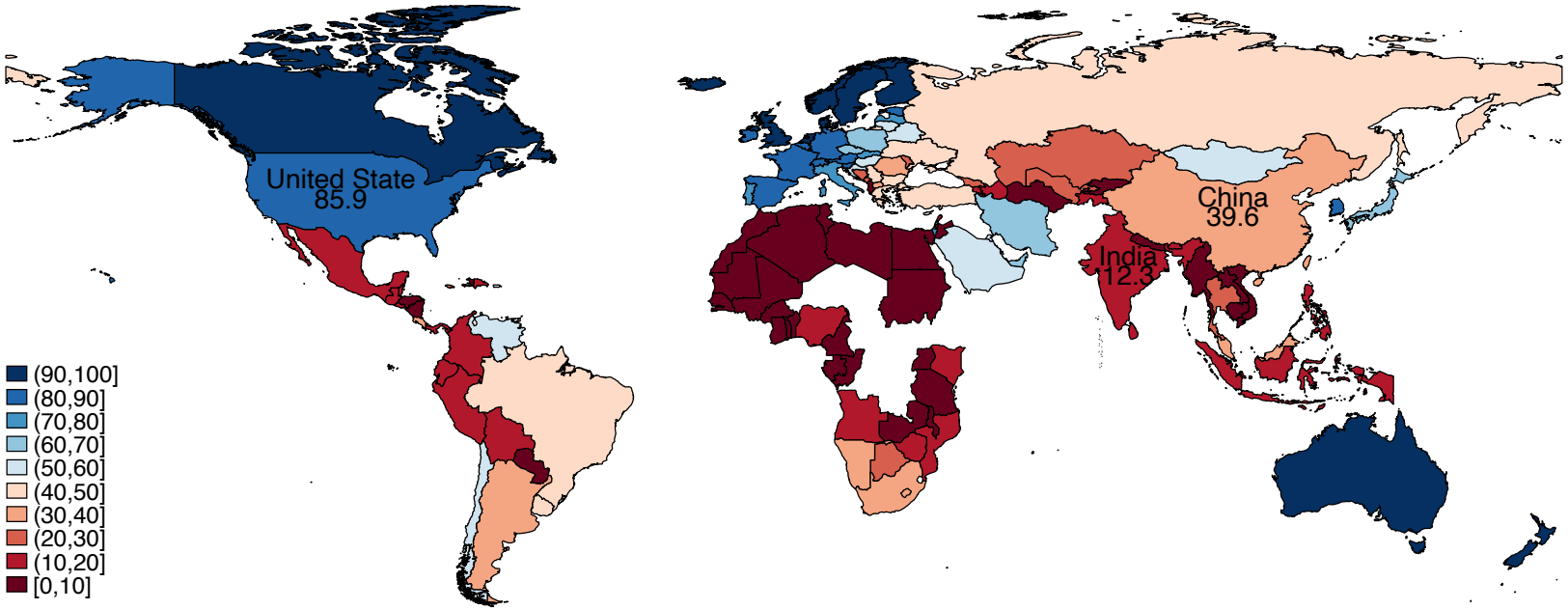
Importance of Cash

- Less than 36% world population uses a debit or credit card in a given year.



% of +15 aged people that use a debit or credit card in the last year (by country, 2011-2021 mean)

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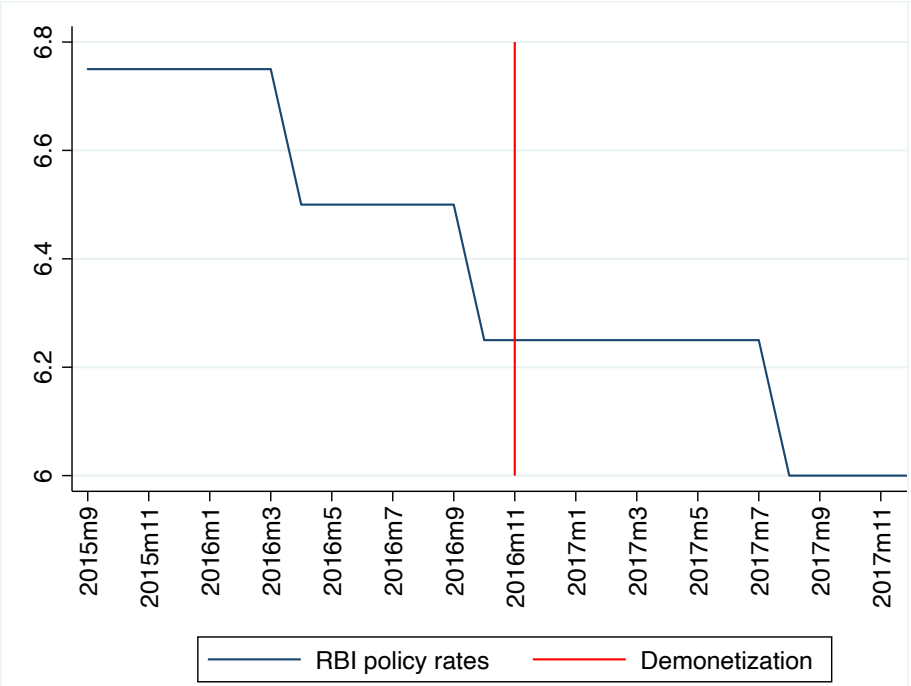
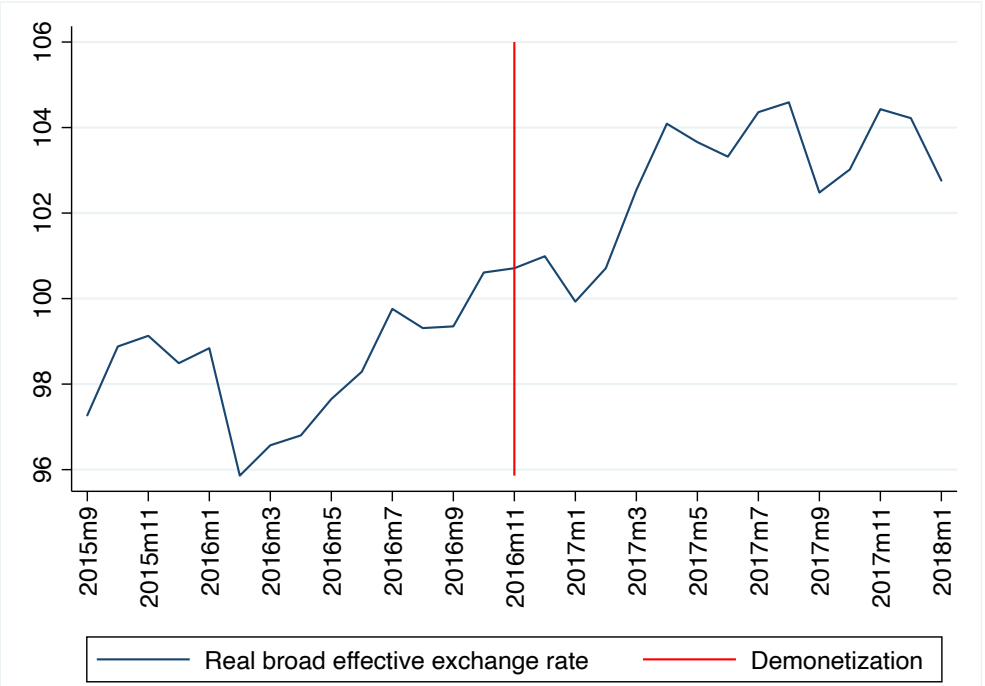
India Demonetization: Policy Rate, Real Exchange Rate

- Interest rate and exchange rate were unaffected by the demonetization.

(a) Policy Rate



(b) Real Exchange Rate



source: Bank for International Settlements

Data

- 15 largest exporting 8-digit HS code in 2016

8-digit HS	Label	Exports (INR)	Exports (USD)
30049099	Medicaments consisting of mixed or unmixed products for ther	369.36	5.55
71131990	Articles of jewellery and parts thereof, of precious metal o	285.19	4.29
87032291	Motor cars and other motor vehicles principally designed for	219.81	3.30
10063020	Semi-milled or wholly milled rice, whether or not polished o	213.28	3.21
3061790	Frozen shrimps and prawns, even smoked, whether in shell or	202.67	3.05
2023000	Frozen, boneless meat of bovine animals	198.59	2.99
88033000	Parts of aeroplanes or helicopters, n.e.s. (excl. those for	165.10	2.49
87089900	Parts and accessories, for tractors, motor vehicles for the	137.43	2.07
61091000	T-shirts, singlets and other vests of cotton, knitted or cro	113.72	1.71
52010015	Cotton, neither carded nor combed: Indian cotton of staple l	106.60	1.60
49070020	Unused postage, revenue or similar stamps of current or new	94.82	1.42
87032391	Motor cars and other motor vehicles principally designed for	90.42	1.36
76011010	Aluminium, not alloyed, unwrought: Ingots	89.89	1.35
74031100	Copper, refined, in the form of cathodes and sections of cat	88.99	1.34
10063010	Semi-milled or wholly milled rice, whether or not polished o	88.80	1.34

Exports are in billions rupees or billions USD.

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Data

Variable	Obs	Mean	Std. Dev.	P10	P50	P90
		Panel A: Exports by Firm and Month				
ln Export	160348	16.325	2.215	13.38	16.563	18.976
ln Quantity (Tornqvist)	160299	16.209	2.633	12.589	16.536	19.304
ln Price (Tornqvist)	160105	.12	1.282	-1.299	.059	1.628
Number of 8-digit HS code	161431	5.817	7.669	1	3	14
Number of 6-digit HS code	161532	5.089	6.494	1	3	12
Number of 4-digit HS code	161548	3.788	4.478	1	2	9
Number of Destinations	161513	6.407	6.915	1	4	16
		Panel B: Firm-Specific Variables				
Accounts Receivable to Sales	5960	.216	.167	.063	.181	.392
ln Age	6396	3.194	.536	2.485	3.219	3.85
ln Bank Borrowings	5093	5.195	1.92	2.676	5.279	7.583
ln Cash	5428	-.23	1.665	-2.439	-.432	2.047
ln Interest Payment	5700	3.02	2.001	.337	3.122	5.546
ln Total Assets	6110	7.016	1.704	4.889	6.995	9.242

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Data

Variable	Obs	Mean	Std. Dev.	P10	P50	P90
	Panel C: Other Variables by Firm and Year					
ln Material Expenses	14079	6.099	1.951	3.477	6.264	8.469
ln Compensation to Employees	20364	4.067	1.93	1.476	4.152	6.514
ln Inventories	18576	4.732	2.19	1.831	4.886	7.392
ln Exports	8321	4.788	2.362	1.407	5.053	7.672
ln Sales	20477	6.678	1.943	4.074	6.833	9.052
ln Receivables	20105	4.911	1.95	2.289	5.075	7.317
ln Bank Borrowings	15586	5.012	2.185	2.042	5.138	7.742
ln Interest Payment	18570	2.776	2.265	-.366	2.926	5.603

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Data

- 15 sectors that are well-covered

8-digit HS	Label	Ratio (Custom to Trademap)
88026000	Spacecraft, incl. satellites, and suborbital and spacecraft	27927.739
49070020	Unused postage, revenue or similar stamps of current or new	2533.92
7133990	Dried, shelled beans "Vigna and Phaseolus", whether or not s	1130.897
15211019	Vegetable waxes, whether or not refined or coloured (excl. t	242.42119
15121110	Crude sunflower-seed or safflower oil: Sunflower seed oil	216.74974
48021020	Handmade paper and paperboard of any size or shape: Paperboa	206.28222
27012090	Briquettes, ovoids and similar solid fuels manufactured from	179.44417
85284100	Cathode-ray tube monitors of a kind solely or principally us	118.06441
41022910	Raw skins of sheep or lambss, without wool on, fresh or salt	105.02331
1013090	Live asses + detailed label not available +	77.167599
47069200	Chemical pulp of fibrous cellulosic material (excl. that of	64.494194
85431010	Electrical particle accelerators for electrons, protons, etc	61.044794
79020010	Zinc waste and scrap (excl. ash and residues from zinc produ	60.798485
74121000	Refined copper tube or pipe fittings "e.g., couplings, elbow	55.235508
44039916	Wood in the rough, whether or not stripped of bark or sapwoo	52.815447

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Data

- 15 sectors that are not well-covered

8-digit HS	Label	Ratio (Custom to Trademap)
44081020	Sheets for veneering, incl. those obtained by slicing lamina	0
28500020	Hydrides, nitrides, azides, silicides and borides, whether o	0
27129020	Paraffin wax, microcrystalline petroleum wax, slack wax, ozo	0
20095000	Tomato juice, unfermented, whether or not containing added s	0
37040020	Photographic plates, film, paper, paperboard and textiles, e	0
51121940	Woven fabrics containing >= 85% combed wool or combed fine a	0
72269940	Flat-rolled products of alloy steel other than stainless, of	0
1031000	Pure-bred breeding swine	0
81082000	Unwrought titanium; titanium powders	0
71101110	Platinum, unwrought or in powder form: Unwrought form	0
39207129	Plates, sheets, film, foil and strip, of non-cellular regene	0
40012910	Natural rubber in primary forms or in plates, sheets or stri	4.591e-08
27101220	Light oils and preparations, of petroleum or bituminous mine	2.451e-07
27102000	Petroleum oils and oils obtained from bituminous minerals (o	3.097e-07
31039000	Mineral or chemical phosphatic fertilizers (excl. superphosp	2.448e-06

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Main Results: Diff-in-Diff, Showing Controls

- Firms that are more exposed to a decrease in domestic money supply decrease their exports

$$\ln \text{Exports}_{it} = \beta_0 + \beta_1 \text{post}_t \left[\frac{AR}{S}\right]_i + \lambda_i + \delta_t + \epsilon_{it}$$

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				Exports			
Post x AR/S$_{i,t-1}$	-0.312***	-0.320***	-0.328***	-0.321***	-0.330***	-0.276**	-0.297**
	(0.105)	(0.112)	(0.112)	(0.112)	(0.113)	(0.116)	(0.132)
Post x Age$_i$		-0.067**	-0.057*	-0.059**	-0.064**	-0.064**	-0.019
		(0.030)	(0.029)	(0.029)	(0.030)	(0.030)	(0.030)
Post x Total Assets$_{i,t-1}$		0.028***	0.044***	0.061***	0.019*	0.019*	0.037
		(0.010)	(0.015)	(0.017)	(0.010)	(0.010)	(0.030)
Post x Cash Holding$_{i,t-1}$			-0.030***	-0.028***			-0.022**
			(0.011)	(0.011)			(0.011)
Post x Bank Borrowing$_{i,t-1}$			-0.003	0.030			0.030*
			(0.013)	(0.019)			(0.017)
Post x Interest Payment$_{i,t-1}$				-0.052**			-0.033*
				(0.020)			(0.019)
Post x Interest Coverage Ratio$_{i,t-1}$						-0.000	
						(0.000)	
Post x Borrowings/Assets$_{i,t-1}$						-0.076	
						(0.106)	
Post x Cash/Assets$_{i,t-1}$					-6.320*	-6.304*	
					(3.430)	(3.422)	
Post x PBIT$_{i,\ t-1}$							0.003
							(0.021)
Post x AP/S$_{i,t-1}$							-0.165
							(0.180)
Firm FE	✓	✓	✓	✓	✓	✓	✓
Time FE	✓	✓	✓	✓	✓	✓	✓
NIC4 x Post FE		✓	✓	✓	✓	✓	✓
Number of Firms	4,030	4,030	4,030	4,030	3,994	3,921	3,499
R^2	0.762	0.765	0.765	0.765	0.764	0.765	0.769
Observations	103797	103797	103797	103797	102924	101193	91957

◂ Go Back

Main Results: Diff-in-Diff, Full Sample

- Firms that are more exposed to a decrease in domestic money supply decrease their exports

$$\ln \text{Exports}_{kt} = \beta_0 + \beta_1 \text{post}_t \left[\frac{AR}{S}\right]_k + \lambda_k + \delta_t + \epsilon_{kt} \quad \text{k: 8-digit HS code}$$

	(1) lnvalueinr_wout	(2) lnvalueinr_wout	(3) lnvalueinr_wout	(4) lnvalueinr_wout	(5) lnvalueinr_wout
Post x $AR/S_{j,t-1}$	-0.273**	-0.399**	-0.432**		
	(0.106)	(0.156)	(0.186)		
2016 M11-12 x $AR/S_{j,t-1}$				-0.416**	-0.417**
				(0.212)	(0.212)
2017 Q1 x $AR/S_{j,t-1}$				-0.472**	
				(0.204)	
2017 Q2 x $AR/S_{j,t-1}$				-0.661***	
				(0.206)	
2017 Q3 x $AR/S_{j,t-1}$				-0.475**	
				(0.212)	
2017 Q4 x $AR/S_{j,t-1}$				-0.151	
				(0.218)	
2017 M1-2 x $AR/S_{j,t-1}$					-0.544***
					(0.210)
2017 M3-4 x $AR/S_{j,t-1}$					-0.483**
					(0.216)
2017 M5-6 x $AR/S_{j,t-1}$					-0.671***
					(0.215)
2017 M7-8 x $AR/S_{j,t-1}$					-0.490**
					(0.222)
2017 M9-10 x $AR/S_{j,t-1}$					-0.321
					(0.224)
2017 M11-12 x $AR/S_{j,t-1}$					-0.130
					(0.225)
8-digit HS FE	✓	✓	✓	✓	✓
Time FE	✓	✓	✓	✓	✓
2-digit HS x Post FE	✓				
6-digit HS x Post FE		✓	✓	✓	✓
Firm Controls x Post FE			✓	✓	✓
Number of 8-digit HS	9,364.000	9,351.000	8,933.000	8,933.000	8,933.000
R^2	0.801	0.814	0.815	0.815	0.815
Observations	269141	269042	263273	263273	263273

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Main Results: Heterogeneity across space

- Differential effect on exports is larger in places with larger demonetization shocks, and in underbanked areas Go Back

$$\ln \text{Exports}_{it} = \beta_0 + \beta_1 \text{post}_t \left[\frac{AR}{S}\right]_i + \lambda_i + \delta_t + \epsilon_{it}$$

	Demone. Shock=1		Demone. Shock=0		Underbanked=1		Underbanked=0	
	(1) log value (INR)	(2) log value (INR)	(3) log value (INR)	(4) log value (INR)	(5) log value (INR)	(6) log value (INR)	(7) log value (INR)	(8) log value (INR)
Post x $AR/S_{i,t-1}$	-0.363**		-0.268		-0.858**		-0.335***	
	(0.141)		(0.212)		(0.392)		(0.130)	
$\mathbb{1}(t = 2016m11\text{-}12)$ AR/S_i		-0.287**		-0.649***		-0.470		-0.395***
		(0.144)		(0.215)		(0.307)		(0.133)
$\mathbb{1}(t = \tau_2)$ AR/S_i		-0.218		-0.435**		-0.887**		-0.287**
		(0.156)		(0.207)		(0.358)		(0.138)
$\mathbb{1}(t = \tau_3)$ AR/S_i		-0.413**		-0.205		-0.723*		-0.280*
		(0.169)		(0.216)		(0.420)		(0.147)
$\mathbb{1}(t = \tau_4)$ AR/S_i		-0.453***		-0.092		-0.279		-0.353**
		(0.159)		(0.199)		(0.369)		(0.138)
$\mathbb{1}(t = \tau_5)$ AR/S_i		-0.635***		-0.148		-0.220		-0.490***
		(0.166)		(0.207)		(0.366)		(0.143)
$\mathbb{1}(t = \tau_6)$ AR/S_i		-0.309*		-0.411		-0.758		-0.288*
		(0.163)		(0.253)		(0.508)		(0.152)
$\mathbb{1}(t = \tau_7)$ AR/S_i		-0.150		0.114		-0.610		-0.070
		(0.163)		(0.235)		(0.384)		(0.151)
Firm FE	✓	✓	✓	✓	✓	✓	✓	✓
Time FE	✓	✓	✓	✓	✓	✓	✓	✓
NIC4 x Post FE	✓	✓	✓	✓	✓	✓	✓	✓
Firm Control x Post FE	✓	✓	✓	✓	✓	✓	✓	✓
Number of Firms	2,499	3,387	1,529	1,988	557	706	3,112	4,216
R^2	0.766	0.763	0.767	0.764	0.796	0.793	0.759	0.757
Observations	64206	85569	39539	50762	14152	17770	80821	107736

Price Index Construction: Tornqvist

- Price Index (Eslava and Haltiwanger 20, Lenzu et al. 22)

$$P_{ft} = P_{f,B_f} \prod_{\tau=B_f+1}^{t} \Phi_{f\tau}$$

- Tornqvist

$$\Phi_{ft} = \Phi_{ft}^{T} = \frac{\prod_{p\in\Omega_{ft,t-1}} (P_{fpt})^{s_{ft,t-1}}}{\prod_{p\in\Omega_{ft,t-1}} (P_{fp,t-1})^{s_{ft,t-1}}}$$

where $s_{ft,t\text{-}1} \equiv \frac{s_{f,t\text{-}1}+s_{ft}}{2}$, and $\Omega_{ft,t\text{-}1}$ is the set of products p firm f provide in both period t and t-1.

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Price Index Construction: Baseline Index

- Price Index

$$P_{ft} = P_{f,B_f} \prod_{\tau=B_f+1}^{t} \Phi_{f\tau}$$

- Firm-specific baseline price index

$$P_{f,B_f} = P_{B_f} \prod_{p \in \Omega_{f,B_f}} \left(\frac{P_{fp,B_f}}{\bar{P}_{p,B_f}} \right)^{s_{fpB}}, \quad \bar{P}_{p,B_f} = \prod_{f} P_{fp,B_f}$$

where

$$P_{B_f} = \begin{cases} 1, & \text{if B is the first month of the sample} \\ \prod_{f'} P_{f',B-1}, & \text{if B is after the first month of the sample} \end{cases}$$

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Price Index Construction: Redding & Weinstein (19)

- Price Index (Eslava and Haltiwanger 20, Lenzu et al. 22)

$$P_{ft} = P_{f,B_f} \prod_{\tau=B_f+1}^{t} \Phi_{f\tau}$$

- where

$$\Phi_{f\tau} = \Phi_{ft}^{J} \Phi_{ft}^{F} \Phi_{ft}^{RW}$$

- Jevons

$$\Phi_{ft}^{J} = \frac{\prod_{p \in \Omega_{ft,t-1}} (P_{fpt})^{\frac{1}{|\Omega_{ft,t-1}|}}}{\prod_{p \in \Omega_{ft,t-1}} (P_{fp,t-1})^{\frac{1}{|\Omega_{ft,t-1}|}}}$$

where $\Omega_{ft,t\text{-}1}$ is the set of products p firm f provides in both period t and t-1, and $|\Omega_{ft,t\text{-}1}|$ is the number of these continuing products provided by firm f.

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Price Index Construction: Redding & Weinstein (19)

- Price Index (Eslava and Haltiwanger 20, Lenzu et al. 22)

$$P_{ft} = P_{f,B_f} \prod_{\tau=B_f+1}^{t} \Phi_{f\tau}$$

- where

$$\Phi_{f\tau} = \Phi_{ft}^{J} \Phi_{ft}^{F} \Phi_{ft}^{RW}$$

- Feenstra 94 Variety Adjustment

$$\Phi_{ft}^{F} = \Phi_{ft}^{F} = \left(\frac{\sum_{p \in \Omega_{ft,t-1}} s_{fpt}}{\sum_{p \in \Omega_{ft,t-1}} s_{fp,t-1}} \right)^{\frac{1}{\sigma-1}}$$

where $s_{ft,t\text{-}1} \equiv \frac{s_{f,t\text{-}1} + s_{ft}}{2}$, and $\Omega_{ft,t\text{-}1}$ is the set of products p firm f provide in both period t and t-1.

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Price Index Construction: Redding & Weinstein (19)

- Price Index (Eslava and Haltiwanger 20, Lenzu et al. 22)

$$P_{ft} = P_{f,B_f} \prod_{\tau=B_f+1}^{t} \Phi_{f\tau}$$

- where

$$\Phi_{f\tau} = \Phi_{ft}^{J} \Phi_{ft}^{F} \Phi_{ft}^{RW}$$

- Redding and Weinstein 19 Quality Adjustment

$$\Phi_{ft}^{RW} = \left(\frac{\prod_{p \in \Omega_{ft,t-1}} \left(s_{fpt}^{*} \right)^{\frac{1}{|\Omega_{ft,t-1}|}}}{\prod_{p \in \Omega_{ft,t-1}} \left(s_{fp,t-1}^{*} \right)^{\frac{1}{|\Omega_{ft,t-1}|}}} \right)^{\frac{1}{\sigma-1}}$$

where s_{fpt}^{*} is the share of product p in firm f's revenues at time t *among all products continuing from period* t-1 *to* t, $\Omega_{ft,t\text{-}1}$ is the set of products p firm f provide in both period t and t-1, and $|\Omega_{ft,t\text{-}1}|$ is the number of these continuing products provided by firm f.

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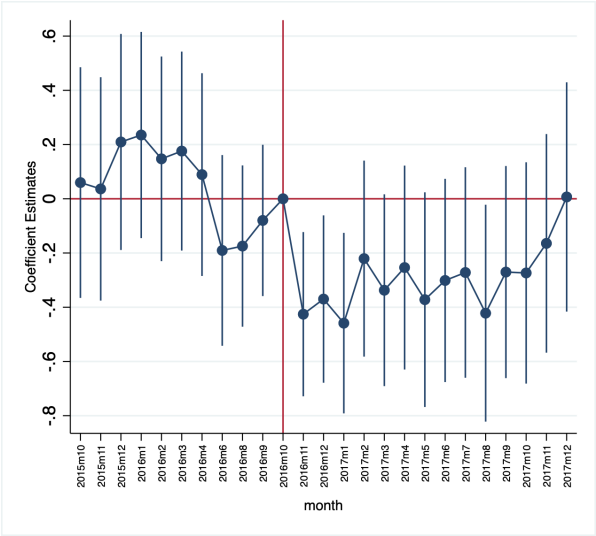
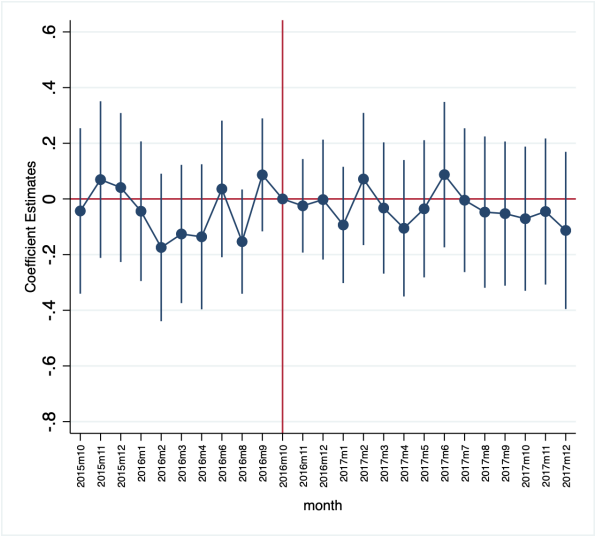
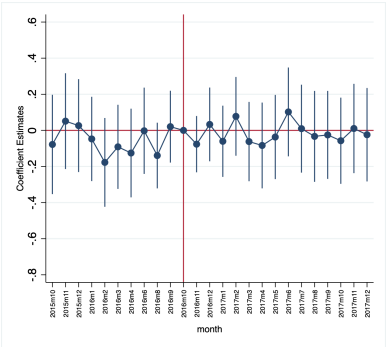
Price vs. Quantity using Redding & Weinstein (19)



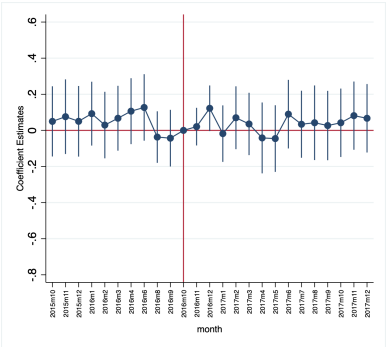
(a) RW Quantity Index



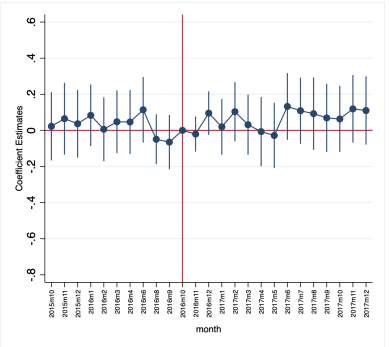
(b) RW Price Index



(c) Price: Jevons Index



(d) Price: Variety Correction



(e) Price: Taste Correction

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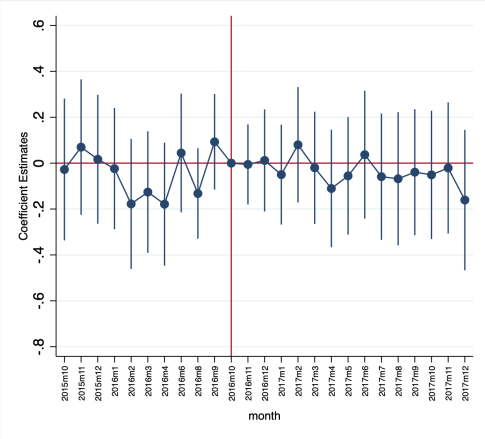
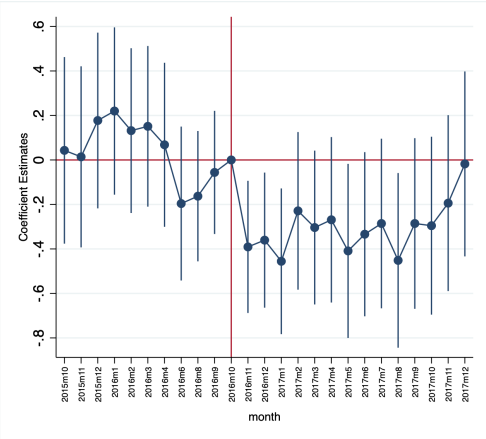
Price vs. Quantity using Redding & Weinstein (19)

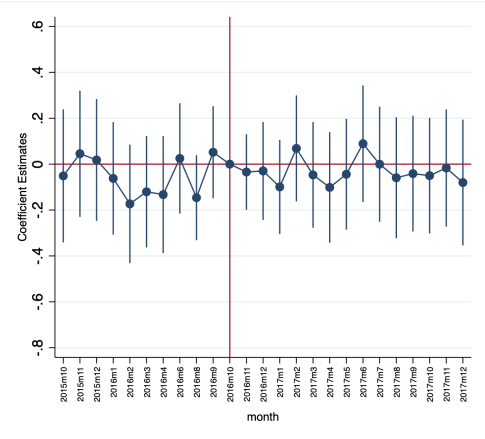
(a) RW: Quantity Index with $\sigma = 4$



(b) RW: Price Index with $\sigma = 4$



(c) RW: Quantity Index with $\sigma = 8$



(d) RW: Price Index with $\sigma = 8$

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Extensive vs. Intensive Margins

$$\ln \text{Exports} = \underbrace{\ln\left(\text{Number of X}\right)}_{\text{Extensive Margin}} + \underbrace{\ln\left(\frac{\text{Exports}}{\text{Number of X}}\right)}_{\text{Intensive Margin}}$$

Margins		Product		Destination		Product x Dest.	
	(1) Exports	(2) Ext.	(3) Int.	(4) Ext.	(5) Int.	(6) Ext.	(7) Int.
Post x $AR/S_{i,t-1}$	-0.323***	-0.143***	-0.181*	-0.115***	-0.208**	-0.197***	-0.126
	(0.111)	(0.046)	(0.098)	(0.043)	(0.088)	(0.055)	(0.084)
Firm FE	✓	✓	✓	✓	✓	✓	✓
Time FE	✓	✓	✓	✓	✓	✓	✓
nic4 x post FE	✓	✓	✓	✓	✓	✓	✓
Number of Firms	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Firm Control x Post FE	✓	✓	✓	✓	✓	✓	✓
R^2	0.757	0.784	0.714	0.833	0.667	0.824	0.675
Observations	100021	100021	100021	100021	100021	100021	100021

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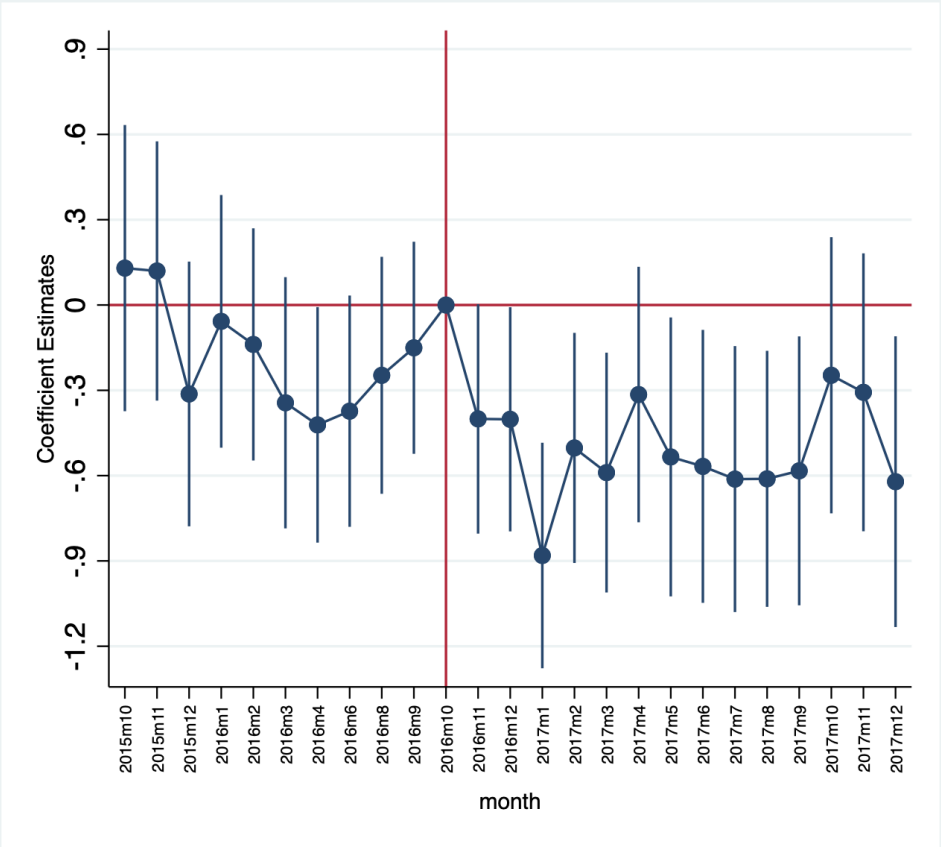
Extensive Margin: Number of Destinations

- Firms that are more exposed to a decrease in domestic money supply temporarily decrease their export destinations

$$\text{Number of Export Destinations}_{it} = \beta_0 + \sum_{\tau \neq -1} \beta_\tau \mathbb{1}(t = \tau) \left[\frac{AR}{S}\right]_i + \lambda_i + \delta_t + \epsilon_{it}$$



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Back of the envelope calculation of overall effects

- AR/S of median exporter: .175
- Estimated coefficient $\approx$ .3
- The overall effect going from AR/S = 0 to median AR/S: .175*.3 = .0525 (5.25
- Aggregate 2015 exports in Billions USD (based on the Trademap data): 264.66
- Total loss in exports = (264.66 * 0.0525) ($\approx$ 14 billion USD) Go Back