Consumer Demand Shocks & Firm Linkages: Evidence from Demonetization in India

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Abstract

Exploiting a unique natural experiment, the 2016 demonetization episode in India, this paper analyzes the extent to which a consumer demand shock propagates through firms' input-output networks. In November 2016, India demonetized 86% of its currency, creating a nationwide demand shock. We construct measures of upstreamness to evaluate the impact of the demonetization shock on firms based on their position in the supply chain. Contrary to the predictions of many network models, we find that the shock does not meaningfully propagate across the supply chain. Revenues, wages, and investment decline substantially after demonetization, but these negative effects are largely limited to consumer facing firms. We identify several mechanisms, such as pricing power, inventory frictions, and export intensity, which independently explain this result. Our findings suggest that final goods producers are particularly susceptible to, and therefore must be protected against, unexpected declines in consumer demand. JEL Codes: O11, E23, G30, E51

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The smooth functioning of a modern economy, across both developed and emerging markets, relies heavily on increasingly complex linkages in its supply chain. Recent empirical evidence shows that firm-level micro shocks propagate to firms' suppliers as well as to their customers (Barrot and Sauvagnat (2016), Carvalho et al. (2020)). Isolated disruptions to a particular sector can in this setting agglomerate to create aggregate fluctuations, an important concern expressed by both economists and policymakers. It stands to reason then that intermediate goods producers.

specification includes State × Period fixed effects to flexibly control for spatial heterogeneity in the impact of demonetization, as shown in Chodorow-Reich et al. (2019).

We first document that firms with higher upstreamness values (upstream firms) perform consistently better than firms with lower upstreamness values (downstream firms) in the periods after demonetization. A unit increase in upstreamness is associated with 3.3% to 8.3% higher quarterly revenues post-shock. This difference in revenue primarily comes from revenue reductions experienced by downstream firms. This result is in line with raw revenue trends in the periods around demonetization, and is consistent across both the ASI and MOSPI measures of upstreamness. We also evaluate wage outcomes and find that post-demonetization, upstream firms' wages are 3.2% to 4.2% higher relative to downstream firms. Both our revenue and wage results are robust to non-parametric definitions of upstreamness and of time periods. Taken together, these results suggest that the negative impact of demonetization did not substantially "pass-through" across the supply chain.

Independent of pass-through considerations, both demand and supply side mechanisms can theoretically generate the above results. First, upstream firms could experience higher productivity than downstream firms in the periods after demonetization, raising both their revenues and wages. However, this hypothesis is only valid if there was a positive productivity shock that disproportionately affected upstream firms in the exact same quarter as demonetization. To the extent that demonetization itself may have created a supply side shock, through a reduction in credit supply for instance, it is unclear why such a shock would particularly impact downstream firms' performance, as our results seems to suggest. A second, more plausible, explanation is that demonetization produced a liquidity shock that primarily affected retail customers and therefore, at first order, negatively impacted downstream firms' performance.

While the effects of demonetization on firm performance documented thus far can be viewed as short-term, demonetization can also impact decisions that may affect firms' longer term prospects. Capital investment projects are critical to the long-term performance of a firm and require the commitment of a significant amount of a firm's economic resources. These projects, which range from purchasing additional equipment to building a new factory, allow companies to maintain or increase the scope of their operations. A large literature in economics and finance has documented that managers reduce capital expenditures during periods of macroeconomic uncertainty (Baker et al. (2016), Gulen and Ion (2016), McLean and Zhao (2014)). We find that a unit increase in upstreamness leads to a higher capital expenditure relative to fixed assets at economically significant levels. Using granular project level data, we investigate the impact of demonetization on the managerial decisions to start or complete capital expenditure projects and find that both margins are affected. We document that a unit increase in upstreamness leads to a 3 to 9 percentage points (p.p.) increase in the likelihood that an ongoing capital project will be completed in a given quarter. On the other side of the project life-cycle, we find that after demonetization, upstream firms initiate 1% to 2% more new capital projects relative to downstream firms.

We evaluated several ... nd)-4ects)-er0-28osd)-4e

Our baseline results remain robust to variations on sample selection, regression specifications, and variable measurement.

Our project contributes to three strands of literature in macroeconomics and finance. First, we are linked to the empirical literature on the role of input-output linkages in transforming microeconomic shocks into aggregate fluctuations (Carvalho and Tahbaz-Salehi (2019), Boehm et al. (2019)). Carvalho et al. (2020) analyze supply chain disruptions created by the Great East Japan Earthquake of 2011, and find that both the suppliers and customers of firms located near the disaster area experience a decline in performance. Similarly, Barrot and Sauvagnat (2016) study natural disasters in the US and find that firms report 2 to 3 percentage points lower revenue growth when their suppliers are affected by a major disaster.

Our paper contributes to this literature by considering features of the supply chain that may prevent rather than facilitate the transmission of sector specific shocks. The literature on input-output networks has so far centered on features of a production network, such shock propagation, as the plants are less reliant on intermediate goods to begin with.

Finally, our work also speaks to both the theoretical and empirical research on money non-neutrality, particularly in emerging market economies (Lucas and Stokey (1987), Velde (2009), Karmakar and Narayanan (2020)). We are most closely linked to Chodorow-Reich et al. (2019), who also study the Indian demonetization episode and find that economic activity declines substantially in relatively more cash constrained districts. Our paper augments this literature by considering the heterogeneous effects of a money supply shock by industry. In particular, we are able to show that even if a shock to money holdings is large scale and widespread, intermediate goods sectors may be able to emerge from it relatively unscathed.

The rest of the paper is structured as follows. Section 1 provides background on the 2016 Indian demonetization episode. Section 2

try code according to the National Industrial Classi cation (NIC), India's standard coding scheme covering all industries.

2.3 Firm & Investment Data

2.4 Upstreamness Calculation

Following Antras et al. (2012a), we compute upstreamness at the industry level for India.[11] Upstreamness is a standard statistic that is widely used in the firm networks literature. It is computed by assigning discrete weights based on the distance from final use of an industry's output. To build intuition, we show how to compute upstreamness for a closed economy with N industries.[12] Each industry j's output, Y_j can be written as follows:

$$Y_j = F_j + Z_j = F_j + \sum_{k=1}^{N} d_{kj} Y_k \tag{1}$$

where F_j and Z_j are the sum of industry j's output used as a final good and an intersumer, and that it is always greater than or equal to one. A value of one implies that an industry is completely consumer facing i.e., it has no intermediate uses. A difference in upstreamness of one unit, a key basis for our reduced form results in section 4, can therefore by interpreted as comparing an industry that sells all of its output to a final consumer to an industry that sells the equivalent of all of its output to another, entirely final goods producing, industry.

We calculate upstreamness for our constructed input-output tables from the ASI and MOSPI, hereafter referred to as ASI upstreamness and MOSPI upstreamness, respectively. For any 5-digit industries in the sample for which we cannot compute ASI upstreamness, we determine upstreamness for the associated 4-digit industries and assign the variable at this higher consolidation level.[14] In addition, to increase coverage to non-manufacturing industries, we manually input an ASI upstreamness value of one for those industries that report a MOSPI upstreamness of one or very close to one.[15] We show in Section 6 that our results are robust to these adjustments. In order to assign MOSPI upstreamness to a firm, we map each MOSPI industrial sector to its associated NIC industry at a 3 digit industry level based on the industry names reported in the MOSPI SUT documentation.

The distribution of ASI and MOSPI upstreamness for our sample firms, plotted in Figure 2, shows significant variation in upstreamness, with a large proportion of firms reporting an upstreamness of close to one. Relative to ASI upstreamness, MOSPI upstreamness has a less smooth distribution, which is to be expected as it is based on a coarser input-output matrix. Additionally, a greater proportion of firms report higher values of MOSPI upstreamness. This result is intuitive, since our MOSPI input-output table includes all agriculture and service sector industries, and so contains longer input-output linkages on average.

[14] We repeat the procedure up to a 3-digit level.

[15] The exact threshold used is a MOSPI upstreamness of less than or equal to 1.10.

2.5 Sample Selection and Statistics

while the median wage expense is INR 36 million. Turning to control variables, the mean firm age is 34 years with INR 1,828 million in assets. On average firms spend 6% of net fixed assets on capital expenditures every semester. The average firm leverage — defined as total debt over total assets — is 27% and the average annualized return-on-assets — defined as net income over total assets — is 2.52%.

cash, this could translate to lower revenue for firms that are more consumer facing. These firms are precisely the downstream firms — firms with low upstreamness — in our sample. While the impact of this demand shock can be passed on by downstream firms to more decline after demonetization was implemented, whereas upstream firms' performance was largely unaffected.

4.1.2 Continuous Difference-in-Difference

find revenue and wage results consistent with our parametric specification. Figure 4 plots the point estimates and the associated confidence intervals for both revenue and wages from estimating (5). Panels (a) and (b) show results for ASI upstreamness, and panels (c) and (d) display results for MOSPI upstreamness. Two features of each graph stand out. First, in line with the parallel trends assumption, the estimated treatment effects are largely close to zero and statistically insignificant for each quarter before up to the quarter before demonetization. Second, the estimated treatment effect jumps discontinuously in 2016Q4, the quarter of demonetization. This discontinuity further reinforces the argument

Indian accounting standards only require ling this statement on an annual basis. Additionally, certain balance sheet items are only available on a half year basis. Thus, we back out analysis. Because we observe limited information on project level characteristics (e.g. costs, labor intensity, etc...), we include project fixed effects, $_{p}$, to rule out the impact of these time invariant omitted variables on project completion.

In Table 6, we examine the extent to which upstreamness and therefore the intensity of exposure to demonetization affects project completion. In Column (1) of Panel A, we find that a unit increase in ASI upstreamness leads to a higher probability of a project being completed in a given quarter. Moving across columns, we find that the effect remains relatively stable as we add more stringent fixed effects, including those that control for the state where the project is located and for seasonality in completion rate. We are careful in interpreting the effect as coefficients in a linear model does not necessarily translate to a marginal effect in terms of probability. Nevertheless, given that the average quarterly completion rate is 0.18 for our sample, we interpret the magnitudes of 0.075 to 0.089 to represent substantial increases in likelihood of completion in a given quarter. In Panel B, we find similar results for MOSPI upstreamness, though the coefficients are smaller in magnitude — approximately 0.03 across all specifications.

In addition to delaying completion of projects, firms also choose not to initiate new projects due to demonetization. We sum all project starts in a given quarter to the firm level for the set of firms identified above — firms with projects outstanding between 2015Q1 and 2017Q4. If a firm has multiple projects during this period, we average upstreamness across all projects tied to a given firm. All firm-quarters during this time period in which the firm did not start a new project are coded as zero. The fixed effect structure are the same as in Equation 4. We find in Table A.2 that the effect of upstreamness is weaker for project starts. A unit increase in upstreamness leads to 1.6-1.7% more project starts in a given quarter though the effect is not strongly significant.

5 Mechanisms

This section considers several potential mechanisms underlying our baseline result of a relative lack of pass-through of the demonetization induced demand shock to upstream industries. Section 5.1 considers the relevance of price responses, section 5.2 tests for inventory stickiness, and 5.3 tackles the importance of exports.

5.1 Profit Margins and Pass-Through

We test whether demonetization induced a disproportionate decline in profitability for downstream firms. The demand shock may have reduced both the prices and the quantity of final goods and services. However, if the shock acts primarily through price rather than quantity reductions, then it is possible that downstream firms' intermediate goods purchases are less affected as these firms are still selling a similar quantity of goods. Under this hypothesis, hereafter referred to as the pricing channel, the corresponding intermediate goods suppliers would not see a large reduction in their own revenues, thereby mitigating shock pass-through.

We use profit margins as the key outcome variable to obtain reduced form evidence for the pricing channel. Under standard models of monopolistic competition with CES, profit margins are unaffected by a demand shock as prices are a fixed function of marginal costs. Given variable markups however, demand declines may induce price reductions which, assuming no concurrent change in marginal costs, would translate to decreases in profit margins.[26]

Our baseline profit margin measure is the ratio of operating profits before interest, taxes, and other extraordinary items to sales. We choose this variable as it is a relatively clean indicator of a firm's ongoing profitability, since it excludes the impact of one-time extraordinary events, funding costs, and changes in tax regimes. Our results are robust to considering

Results from estimating (4) for the baseline profit margin variable are displayed in Table 7, and show that margins are significantly lower for downstream firms post-shock, consistent with the predictions of the pricing channel. As shown in the table, profit margins are 2–3 percentage points higher for upstream firms post-shock. The coefficients are statistically significant and stable in magnitude across fixed effects specifications and after the inclusion of controls. These results represent a numerically meaningful divergence in profit margins after demonetization, as the median profit margin for the sample is 5 percent. These findings suggest that price reductions for consumer facing farms may have played an important role in preventing shock propagation.

5.2 Inventory Stickiness

Frictions in inventory contracts can also diminish the propagation of a demand shock. Firms may hold inventories for a variety of reasons, including ordering related transaction costs, lags in shipping, and demand uncertainty (Alessandria et al. (2010)). Crucially, some of these same factors may contribute to the lack of shock pass-through from downstream to upstream firms. For instance, with non-convex inventory adjustment costs (Khan and Thomas (2007)), retailers facing a temporary demand decline may be disincentived from adjusting their material goods purchases. Similarly, shipping lags may result in retailers having to purchase

However, relatively less is known about the role of this channel in preventing shock propagation through the supply chain. To demonstrate how this mechanism may work, suppose a small open economy features an entirely non-tradable final goods sector and a completely tradable intermediate goods sector. A demand shock in this case lowers production in the non-tradable sector and marginal costs across both sectors (assuming perfectly mobile local labor markets). In response to this, intermediate goods production may increase, as firms in the sector take advantage of lower marginal costs and export away output that cannot clear the domestic market. In sum, the demand shock will not spread to upstream firms.

The above channel relies on final goods industries being less tradable relative to intermediate goods industries, and indeed we find that this is the case for India. We follow Mian et al. (2020) and classify Agriculture, Forestry and Fishing, Manufacturing, and Mining and Quarrying as tradable industries.[27] Average MOSPI upstreamness for tradable industries is 1.99 whereas that for non-tradable industries is much lower, at 1.34. Since India is a major exporter of services, we define tradability in a more granular way by computing export to value-added ratios across industries (De Gregorio et al. (1994)). As shown in Figure A.3, this ratio increases with higher upstreamness terciles.

To test the relevance of the export channel, we explore heterogeneity in our results by whether a firm is an exporter. We classify a firm as an exporter if its average annual export to sales ratio from 2014-15 is in the top quartile.[28] We then perform a triple difference analysis where we interact $Upstreamness \times Post$ with exporter status. We hypothesize that conditional on upstreamness, exporting firms should see a less steep decline in revenues post-demonetization.[29]

As shown in Table 9, firms defined as exporters have higher revenues post-shock relative to less export intensive firms, even after conditioning on their position in the supply chain. The

[27] The remaining industrial sectors are classified as non-tradable.

[28] Periods refers to fiscal years 2014 and 2015.

[29] A natural alternative specification is to run our standard difference-in-difference with export revenues as the outcome variable. However, we are unable to perform this analysis as few firms in the sample report quarterly export revenues.

coefficient on the Upstreamness Post Exporter variable is positive across both definitions of upstreamness, though it is only highly statistically significant for MOSPI Upstreamness (as displayed in Panel B). The weaker result for ASI upstreamness is intuitive since we are unable to assign ASI upstreamness for most export intensive industries in agriculture and mining. Even though we lose observations as many firms do not consistently report export revenues, these findings indicate that the relatively higher tradability of intermediate goods may have prevented the complete pass-through of the demonetization shock.

6 Robustness Tests

We vary our research design choices to confirm the robustness of the effects of upstreamness on firm performance. In this section, we describe in detail our additional analyses, which include changes in sample selection, regression specifications, and variable measurement.

Our revenue and wage results are robust to a variety of alternative specifications and variable definitions, as shown in Table 10 and 11, respectively. In both tables, column (1) replicates the baseline coefficients for revenues and wages as reported in column (6) of Table 3 and Table 4, respectively. We first consider whether our results are robust to sample selection. In our main sample, we followed steps to match all firms in the CMIE database that have an identifiable NIC industry code. Thus, for cases where either upstreamness is not available at the five digit level, or where the firm's industry is only reported at levels less granular than five digit industries (i.e. four digit sectors or higher), we impute an industry's upstreamness with the average upstreamness for all five digit industries within the less granular industry sector. We also condition on firms that report outcomes for the twelve quarters between 2015Q1 and 2017Q4. We examine alternatives to these sample wages, respectively. We find that matching on exact industries (sectors), the impact of upstreamness in the periods after demonetization is 3.2-5.6% for revenue and 1.1-3.8% for wages. Expanding the sample to an unbalanced panel gives effects of 2.8-7.5% for revenue and 3.4-3.6% for wages.

The second set of robustness tests varies the structure of our regression specification. Our main results for performance outcomes always include firm fixed effects to control for many company specific time invariant attributes that may affect revenue or wages (e.g. company culture, management). Nevertheless, the regression may be overspecified as the variation we are exploiting comes from differences in upstreamness across industry. In Column (4) of Tables 10 and 11, we repeat the analysis with only industry fixed effects and find that the magnitudes and statistical significance of the difference-in-difference coefficients are similar to the those in our baseline specification. Additionally, we test whether our results are sensitive to the manner in which we include control variables. In our main tests, we fix control variables in the year before demonetization and interact them with the post demonetization indicator. Instead of this approach, in Column (5), we use firm characteristics lagged by a year as time varying control variables and find similar results as before.

supply chain. In contrast to previous results in the firm networks literature, we find that the demonetization shock disproportionately negatively affects consumer facing industries and does not meaningfully propagate upstream. We explore pricing power, inventory stickiness, and export capacity as potential \frictions" that may mitigate pass-through of the demonetization induced demand shock and find evidence that all three mechanisms may play a role.

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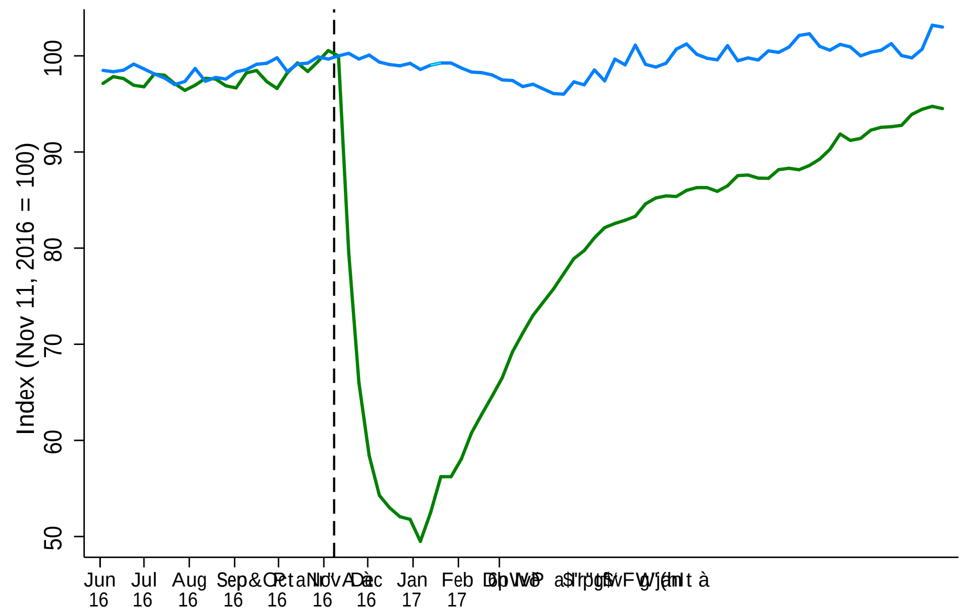
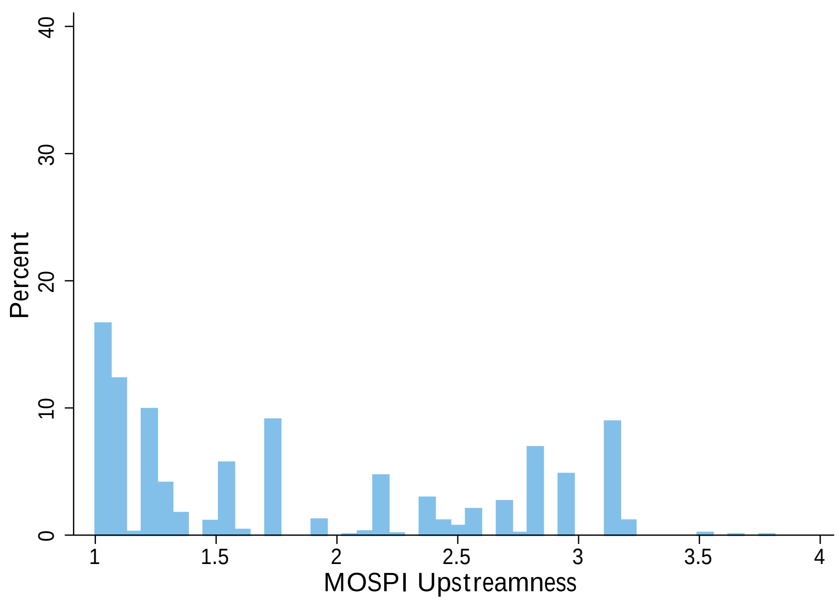
Figure 1: RBI Currency in Circulation & Liabilities



This gure plots the time series for currency in circulation and total RBI liabilities from June 2016 to

Figure 2: Upstreamness Distribution for Sample Firms

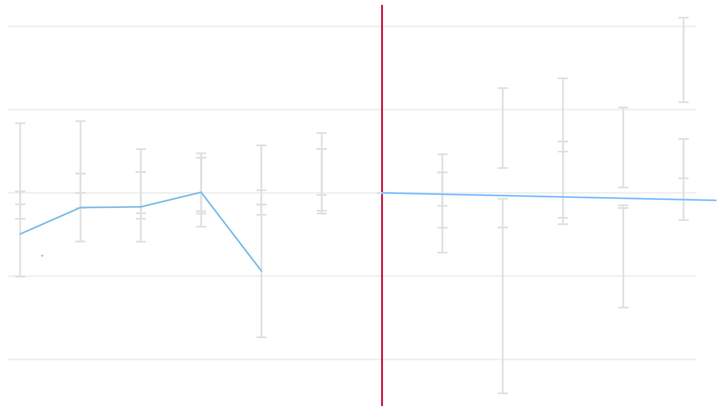
(a) ASI Upstreamness



(b) MOSPI Upstreamness

The gure plots the distribution of ASI Upstreamness and MOSPI Upstreamness for sample rms. The sample consists of a balanced panel of rms from Q1, 2015 { Q4, 2017.

Figure 3: Trends by Upstreamness Tercile { Log Revenues



(a) ASI Upstreamness

(b) MOSPI Upstreamness

The gure plots average revenues by tercile of upstreamness. Higher terciles indicate higher levels of upstreamness. Sample consists of a balanced panel of rms from 2015-2017. Each point (and the associated 95% con dence intervals) represents the coe cient from regressing revenues on period dummies, after residualizing on rm xed e ects. Standard errors are clustered at the industry level.

Figure 4: Dynamic Effects of Demonetization

(a) ASI Upstreamness - Revenue

(b) ASI Upstreamness - Wages

(c) MOSPI Upstreamness - Revenue

(d) MOSPI Upstreamness - Wages

The figure plots the $_t$ coefficients, and associated 95% confidence intervals, from estimating 5 for log revenues and log wages. The period before demonetization, 2016Q3, is the excluded period. Panels (a) and (b) report results for ASI upstreamness, whereas panels (c) and (d) report results for MOSPI Upstreamness. The specification in all panels includes controls, as well as firm and period fixed effects. Controls include leverage, log assets, ROA, and firm age as at 2016 Q3 interacted with period.

Table 1: Summary Statistics

	Upstream Terc. = 1		Upstream Terc. > 1		Total	
	Mean	Median	Mean	Median	Mean	Median
Panel A: Firm Data						
Revenues	1,558.63	247.47	1,896.79	521.83	1,779.98	416.38
Wages	135.51	22.07	149.72	40.63	145.05	35.59
Pro t Margin	-0.03	0.04	0.00	0.06	-0.01	0.05
Inventory Turnover Ratio	8.54	3.53	5.27	3.06	6.31	3.13
Capex to Fixed Assets Ratio	0.06	0.02	0.06	0.03	0.06	0.03
Exporter	0.15	0.00	0.27	0.00	0.25	0.00
Leverage	0.22	0.17	0.30	0.28	0.27	0.24
Log Assets	7.22	7.19	7.77	7.66	7.57	7.51
ROA	0.56	0.39	0.67	0.64	0.63	0.53
Age	30.65	27.00	36.16	31.00	34.20	29.00
Firms	912		1,657		2,569	

Table 2: Non-Parametric Upstreamness and Log Revenues

	Dependent Variable: Log Revenues					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: ASI Upstreamness						
Post	0.006	0.004	{	-0.071	-0.036	{
	(0.012)	(0.013)		(0.046)	(0.047)	
(Upstreamness Terc. = 1) x Post	-0.055	-0.066	-0.060	-0.066	-0.076	-0.069
	(0.023)	(0.025)	(0.024)	(0.021)	(0.022)	(0.023)
Observations	24,183	24,140	24,116	22,706	22,669	22,645
Clusters	368	368		358	358	
Panel B: MOSPI Upstreamness						
Post	0.009	0.010	{	-0.064	-0.031	{
	(0.011)	(0.012)		(0.046)	(0.043)	
(Upstreamness Terc. = 1) x Post	-0.058	-0.070	-0.064	-0.055	-0.067	-0.060
	(0.023)	(0.024)	(0.024)	(0.019)	(0.020)	(0.021)
Observations	28,995	28,935	28,923	27,222	27,169	27,157
Clusters	442	442		428	428	
Firm FE	Yes	Yes		Yes	Yes	
Firm x Quarter FE		Yes	Yes		Yes	Yes
State x Period FE			Yes			Yes
Controls				Yes	Yes	Yes

The table presents results from estimating the following equation:
$y_{fjt} = {}_1 1\{Post_t\} + {}_2(1\{UpstreamnessTerc. = 1\} \; 1\{Post_t\}) + {}^T X_{fjt} + {}_f + "_{fjt}$, where the common variables and indices are exactly as de ned in (4

Table 3: Upstreamness and Log Revenues

	Dependent Variable: Log Revenues					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: ASI Upstreamness						
Upstreamness x Post	0.074	0.080	0.074	0.079	0.083	0.080
	(0.025)	(0.026)	(0.026)	(0.022)	(0.024)	(0.024)
Observations	24,183	24,140	24,116	22,706	22,669	22,645
Clusters	368	368	368	358	358	358
Panel B: MOSPI Upstreamness						
Upstreamness x Post	0.038	0.040	0.040	0.033	0.033	0.032
	(0.012)	(0.013)	(0.013)	(0.011)	(0.011)	(0.011)
Observations	28,995	28,935	28,923	27,222	27,169	27,157
Clusters	442	442	442	428	428	428
Firm FE	Yes			Yes		
Period FE	Yes	Yes		Yes	Yes	
Firm x Quarter FE		Yes	Yes		Yes	Yes
State x Period FE			Yes			Yes
Controls				Yes	Yes	Yes

The table presents results from estimating equation (4). The dependent variable is log revenues (seasonally adjusted). Sample consists of a balanced panel of rms from 2015-2017. Controls include leverage, log assets, ROA, and rm age as at 2016 Q3 interacted with period. Robust standard errors (reported in parentheses) are clustered at the industry level. ***, **, and * indicate statistical signi cance at the 1%, 5% and 10% levels, respectively.

Table 4: Upstreamness and Log Wages

	Dependent Variable: Log Wages					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: ASI Upstreamness						
Upstreamness x Post	0.032	0.034	0.032	0.039	0.042	0.040
	(0.022)	(0.023)	(0.024)	(0.023)	(0.024)	(0.025)
Observations	23,106	23,100	23,076	21,920	21,914	21,890
Clusters	362	362	362	353	353	353
Panel B: MOSPI Upstreamness						
Upstreamness x Post	0.036	0.037	0.038	0.036	0.037	0.038
	(0.008)	(0.009)	(0.009)	(0.010)	(0.010)	(0.010)
Observations	27,740	27,732	27,720	26,290	26,282	26,270
Clusters	435	435	435	422	422	422
Firm FE	Yes			Yes		
Period FE	Yes	Yes		Yes	Yes	
Firm x Quarter FE		Yes	Yes		Yes	Yes
State x Period FE			Yes			Yes
Controls				Yes	Yes	Yes

The table presents results from estimating equation (4). The dependent variable is log wages (seasonally adjusted). Sample consists of a balanced panel of firms from 2015-2017. Controls include leverage, log assets, ROA, and firm age as at 2016 Q3 interacted with period. Robust standard errors (reported in parentheses) are clustered at the industry level. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 5: Upstreamness and Capital Expenditures

Dependent Variable: Capex to Fixed Assets Ratio	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: ASI Upstreamness						
Upstreamness x Post	0.012	0.010	0.010	0.011	0.008	0.008
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Observations	11,265	10,980	10,980	10,738	10,492	10,492
Clusters	374	366	366	364	357	357
Panel B: MOSPI Upstreamness						
Upstreamness x Post	0.008	0.006	0.006	0.008	0.006	0.006
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Observations	13,592	13,252	13,252	12,937	12,650	12,650
Clusters	448	439	439	436	428	428
Firm FE	Yes			Yes		
Period FE	Yes	Yes		Yes	Yes	
Firm x Quarter FE		Yes	Yes		Yes	Yes
State x Period FE			Yes			Yes
Controls				Yes	Yes	Yes

The table presents results from estimating equation (4). The dependent variable is capital expenditure over average net xed assets. The capital expenditure ratio is calculated at a half yearly frequency, where year refers to scal year. Sample consists of a balanced panel of rms from 2015-2017. Controls include leverage, log assets, ROA, and rm age as at 2016 Q3 interacted with period. Robust standard errors (reported in parentheses) are clustered at the industry level. ***, **, and * indicate statistical signi cance at the 1%, 5% and 10% levels, respectively.

Table 6: Upstreamness and Project Completion

	Dependent Variable: Project Completion					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: ASI Upstreamness						
Upstreamness x Post	0.081	0.089	0.084	0.079	0.080	0.075
	(0.035)	(0.033)	(0.035)	(0.044)	(0.042)	(0.045)
Observations	20,452	13,580	13,537	13,587	9,715	9,673
Clusters	2,154	1,381	1,378	1,392	940	936
Panel B: MOSPI Upstreamness						
Upstreamness x Post	0.034	0.030	0.030	0.007	0.006	0.001
	(0.014)	(0.012)	(0.012)	(0.016)	(0.014)	(0.014)
Observations	26,885	18,740	18,705	15,321	11,510	11,473
Clusters	2,505	1,717	1,714	1,382	1,018	1,014
Project FE	Yes			Yes		
Period FE	Yes	Yes		Yes	Yes	
Project x Quarter FE		Yes	Yes		Yes	Yes
State x Period FE			Yes			Yes
Controls				Yes	Yes	Yes
Mean Dep Var	0.178	0.178	0.178	0.178	0.178	0.178

The table presents results from estimating equation (6). The dependent variable is a binary variable indicating whether a project was completed in a particular quarter, conditional on completion by YE 2017. The sample includes only those investment projects that were ongoing as at Jan 1, 2015. Controls include original project cost interacted with period. Robust standard errors (reported in parentheses) are clustered at the industry level. ***, **, and * indicate statistical signi cance at the 1%, 5% and 10% levels, respectively.

Table 7: Upstreamness and Pro t Margins

Table 8: Upstreamness and Inventory Turnover

	Dependent Variable: Log Inventory Turnover Ratio					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: ASI Upstreamness						
Upstreamness x Post	0.063	0.074	0.074	0.065	0.068	0.068
	(0.034)	(0.035)	(0.036)	(0.033)	(0.035)	(0.035)
Observations	11,227	11,023	11,023	10,707	10,545	10,545
Clusters	367	367	367	359	359	359
Panel B: MOSPI Upstreamness						
Upstreamness x Post	0.029	0.046	0.046	0.033	0.045	0.045
	(0.017)	(0.016)	(0.016)	(0.016)	(0.017)	(0.017)
Observations	13,317	13,075	13,075	12,709	12,517	12,517
Clusters	435	435	435	425	425	425
Firm FE	Yes			Yes		
Period FE	Yes	Yes		Yes	Yes	
Firm x Quarter FE		Yes	Yes		Yes	Yes
State x Period FE			Yes			Yes
Controls				Yes	Yes	Yes

The table presents results from estimating equation (4). The dependent variable is inventory turnover ratio, de ned as the ratio of sales to average inventory holdings. Inventory turnover ratio is calculated at a half yearly frequency, where year refers to scal year. Sample consists of a balanced panel of rms from 2015-2017. Controls include leverage, log assets, ROA, and rm age as at 2016 Q3 interacted with period. Robust standard errors (reported in parentheses) are clustered at the industry level. ***, **, and * indicate statistical signi cance at the 1%, 5% and 10% levels, respectively.

Table 9: Upstreamness and Log Revenues: Results by Export Intensity

	Dependent Variable: Log Revenues					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: ASI Upstreamness						
Upstreamness x Post x Exporter	0.083	0.096	0.090	0.059	0.077	0.066
	(0.050)	(0.054)	(0.058)	(0.047)	(0.052)	(0.053)
Upstreamness x Post	0.052	0.050	0.048	0.053	0.050	0.052
	(0.030)	(0.032)	(0.030)	(0.027)	(0.029)	(0.029)
Observations	18,255	18,224	18,164	17,528	17,498	17,438
Clusters	316	316	316	310	310	310
Panel B: MOSPI Upstreamness						
Upstreamness x Post x Exporter	0.079	0.086	0.104	0.057	0.067	0.084
	(0.026)	(0.028)	(0.030)	(0.023)	(0.024)	(0.026)
Upstreamness x Post	0.012	0.007	0.011	0.010	0.004	0.005
	(0.017)	(0.018)	(0.019)	(0.015)	(0.016)	(0.017)
Observations	19,700	19,664	19,616	18,914	18,879	18,831
Clusters	364	364	364	356	356	356
Firm FE	Yes			Yes		
Period FE	Yes	Yes		Yes	Yes	
Firm x Quarter FE		Yes	Yes		Yes	Yes
State x Period FE			Yes			Yes
Controls				Yes	Yes	Yes

The table presents results from estimating the following equation: $y_{fjt} = {}_1(U_j \; 1\{Post_t\} \; 1\{Exporter_f\}) + {}_2(U_j \; 1\{Post_t\}) + {}^T X_{fjt} + {}_f + {}_t + \varepsilon_{fjt}$, where the common variables and indices are exactly as defined in (4). $1\{Exporter_f\}$

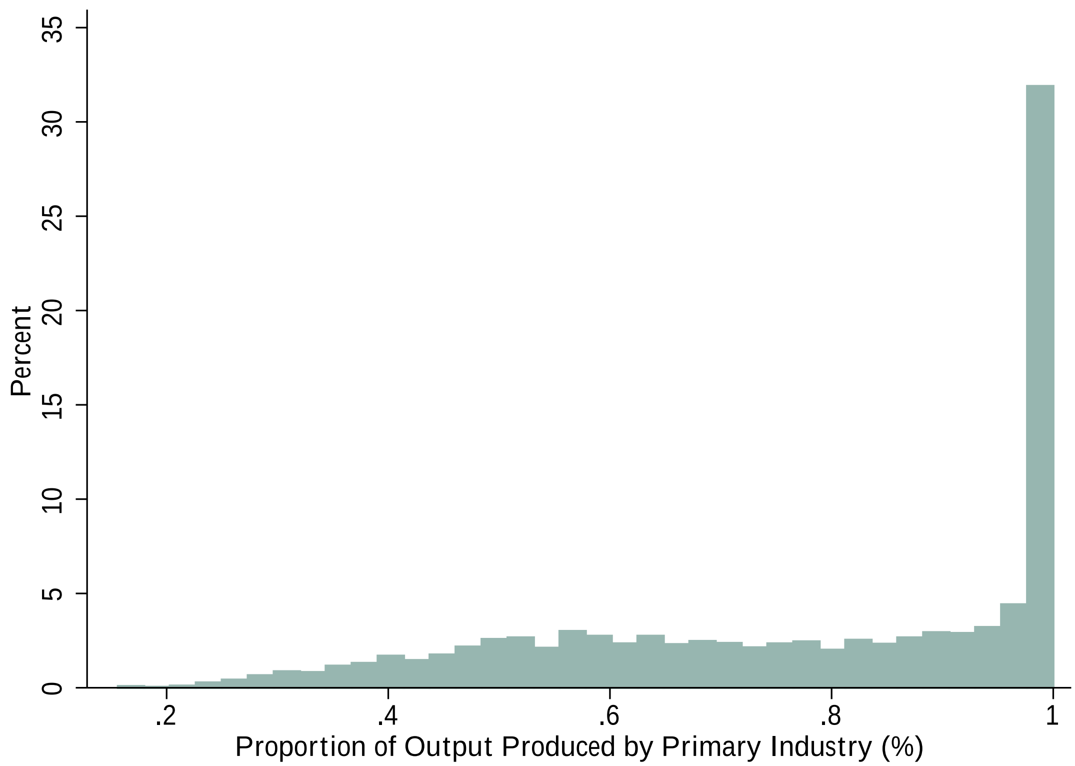
Table 10: Robustness to Alternative Specifications: Revenues

	Dependent Variable: Log Revenues					
	Baseline	Exact Upstreamness Matches	Unbal. Panel	Industry FEs	Parametric Controls	No Season. Adj.
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: ASI Upstreamness						
Upstreamness x Post	0.080	0.056	0.075	0.064	0.119	0.076
	(0.024)	(0.026)	(0.023)	(0.025)	(0.026)	(0.023)
Observations	22,645	14,446	22,678	22,209	23,904	24,192
Clusters	358	227	358	358	365	367
Panel B: MOSPI Upstreamness						
Upstreamness x Post	0.032	0.032	0.028	0.034	0.047	0.025
	(0.011)	(0.012)	(0.011)	(0.012)	(0.016)	(0.012)
Observations	27,157	26,209	27,206	26,629	28,716	28,998
Clusters	428	418	428	427	437	439
Period FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm x Quarter FE	Yes	Yes		Yes	Yes	Yes
State x Period FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes

The table presents results from estimating equation (4). Column (1) replicates the baseline regression results displays in column (6) of Table 3. Column (2) contains only firm-quarters in which the industry match exactly with those available in the ASI or MOSPI. Column (3) expands the sample to an unbalanced panel, allowing firms to enter or exit between 2015Q1-2017Q4. Column (4) employs industry instead of firm fixed effects. Column (5) allows for time varying controls (lagged by a year) instead of non-parametric controls described in Section 3. Finally, in Column (6), the raw series was used as the outcome variable instead of the seasonally adjusted series. The dependent variable is log revenues. Sample consists of a balanced panel of firms from 2015-2017. Unless specified otherwise, controls include leverage, log assets, ROA, and firm age as at 2016 Q3 interacted with period. Robust standard errors (reported in parentheses) are clustered at the industry level. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

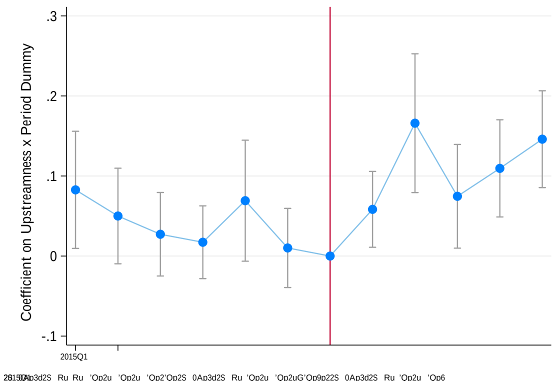
A Additional Figures & Tables

Figure A.1: Output Produced by Primary Industry

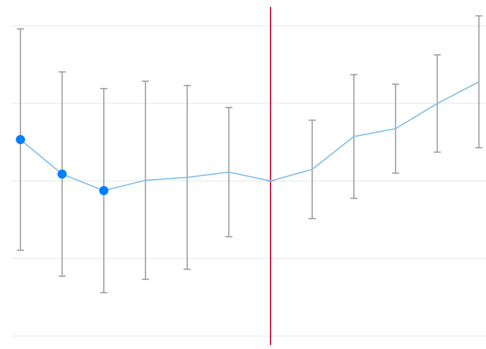


This gure plots t g 0 G1 0 0 1 -014gure(t7s637()3if0 G1 7Filts)-33 0 1.0632Pro

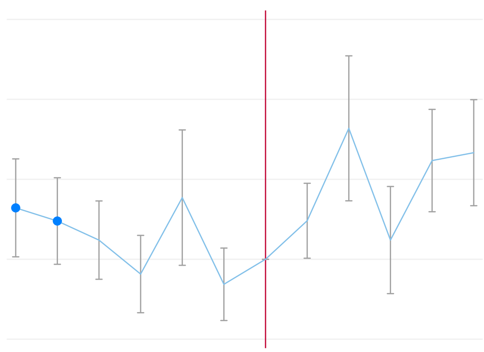
Figure A.2: Dynamic Effects of Demonetization



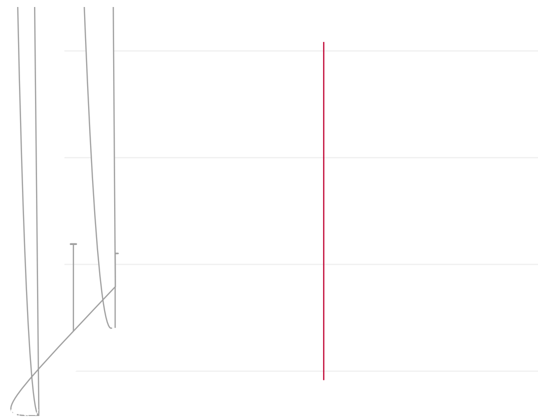
(a) ASI Upstreamness - Revenue



(b) ASI Upstreamness - Wages



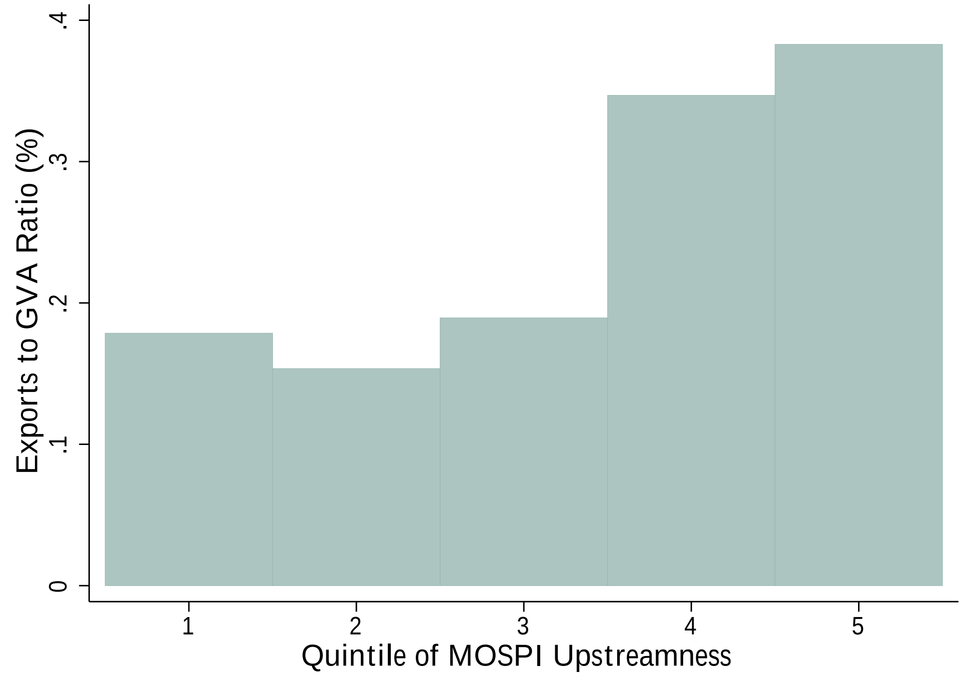
(c) MOSPI Upstreamness - Revenue



(d) MOSPI Upstreamness - Wages

The figure plots the β_t coefficients, and associated 95% confidence intervals, from estimating 5 for log revenues and log wages. The period before demonetization, 2016Q3, is the excluded period. Panels (a) and (b) report results for ASI upstreamness, whereas panels (c) and (d) report results for MOSPI Upstreamness. The specification in all panels includes firm and period fixed effects.

Figure A.3: Export to GVA Ratios by Quintile of Upstreamness



The gure plots the average exports to gross value-added (GVA) ratio by quintile of MOSPI upstreamness, weighted by industry GVA. Data is sourced from the 2015-16 MOSPI Supply Use Tables.

Table A.1: Non-Parametric Upstreamness and Log Wages

Dependent Variable: Log Wages

Table A.2: Upstreamness and Project Initiation

Dependent Variable: Log New Projects			
	(1)	(2)	(3)
Upstreamness x Post	0.013	0.016	0.017
	(0.009)	(0.010)	(0.010)
Observations	51,660	51,660	51,660
Clusters	119	119	119
Firm FE	Yes		
Period FE	Yes	Yes	
Firm x Quarter FE		Yes	Yes
State x Period FE			Yes
Mean Dep Var	0.051	0.051	0.051

The table presents results from estimating equation (4). The dependent variable is log of the sum of new investment projects undertaken by a particular firm in a period. The sample includes only those investment projects that were ongoing as at Jan 1, 2015. Robust standard errors (reported in parentheses) are clustered at the industry level. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table A.3: Upstreamness and Reported Pro t Margins

	Dependent Variable: Reported Pro t Margin					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: ASI Upstreamness						
Upstreamness x Post	0.128	0.126	0.127	0.146	0.140	0.143
	(0.051)	(0.052)	(0.052)	(0.055)	(0.056)	(0.055)
Observations	24,492	24,492	24,468	22,980	22,980	22,956
Clusters	368	368	368	358	358	358
Panel B: MOSPI Upstreamness						
Upstreamness x Post	0.076	0.072	0.073	0.096	0.090	0.090
	(0.032)	(0.032)	(0.032)	(0.034)	(0.035)	(0.035)
Observations	29,376	29,376	29,364	27,564	27,564	27,552
Clusters	442	442	442	428	428	428
Firm FE	Yes			Yes		
Period FE	Yes	Yes		Yes	Yes	
Firm x Quarter FE		Yes	Yes		Yes	Yes
State x Period FE			Yes			Yes
Controls				Yes	Yes	Yes

The table presents results from estimating equation (4). The dependent variable is reported pro t margin (seasonally adjusted). Reported pro t margin is the ratio of reported pro t after tax to sales. Sample consists of a balanced panel of rms from 2015-2017. Controls include leverage, log assets, ROA, and rm age as at 2016 Q3 interacted with period. Robust standard errors (reported in parentheses) are clustered at the industry level. ***, **, and * indicate statistical signi cance at the 1%, 5% and 10% levels, respectively.

B Variable De nitions

Variable	De nition
A. Firm Data	
Revenues	Quarterly revenues (siq_ntrm_net_sales).
Wages	Quarterly wages (siq_ntrm_wages_salaries).
Pro t Margin	Ratio of operating pro ts before interest, taxes, and other extraordinary items (siq_ntrm_pbit_net_of_peoi) to revenues (siq_ntrm_net_sales).
Capital Expenditure Ratio	Ratio of scal half yearly capital expenditure to average net xed assets. Capital expenditure is calculated as $FA_t \quad FA_{t \ 1} + Dep_t$ where t and t 1 represent current and previous scal half year, respectively. FA indicates net xed assets (e.g. property, plant, and equipment) and Dep indicates depreciation expense (siq_depreciation). Average net xed assets is calculated as average of net xed assets (siq_ntrm_net_ xed_assets) in the current and previous scal half year.
Inventory Turnover Ratio	Ratio of scal half yearly sales to average inventory holdings. Fiscal half yearly sales calculated as the sum of revenues for a scal half. Average inventories is calculated as average of inventories (siq_ntrm_inventories) as at scal half start and inventories as at scal year end.
Exporter	Binary variable indicating if a rm's average annual export to sales ratio from 2014-15 is in the top quartile of the variable's distribution.
Leverage	Ratio of total debt (siq_ntrm_borrowings) to total assets. Total assets is calculated as the sum of net xed assets (ntrm_net_ xed_assets), investments (siq_ntrm_investments), other non current assets (siq_ntrm_other_non_current_assets), current assets (siq_ntrm_curr_assets_loans_n_advns), capital work in progress (siq_ntrm_cap_work_in_progress), net pre-operative expenses (siq_ntrm_net_pre_operative_exp), other assets (siq_ntrm_other_assets), deferred tax assets (siq_ntrm_deferred_tax_asst), and miscellaneous expenses

Variable	Definition
Age	Calendar year of reporting minus firm incorporation year (incorporation_year).
Reported Profit Margin	Ratio of reported profit after tax (siq_ntrm_reported_pat) to revenues (siq_ntrm_net_sales).
B. Investment Data	
Project Completion	Binary variable indicating whether a project was completed in a particular quarter, conditional on completion by YE 2017. A project is identified as being completed in a quarter if its project status (Project Status) is categorized as "Completed".
New Projects	Sum of new investment projects undertaken by a particular firm in a period.
C. Industry Upstreamness	
ASI Upstreamness	Upstreamness calculated from constructed input-output table from the 2015-16 survey round of the Indian Annual Survey of Industries. See Section 2.4 for more details.
MOSPI Upstreamness	Upstreamness calculated from 2015-16 official supply use tables (SUT 2015-16) published by the Indian Ministry of Statistics and Programme Implementation (MOSPI). Available at http://mospi.nic.in/publication/supply-use-tables.