

Grant Proposal: Entry and Competition in India's Brick Industry

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Industry entry and exit dynamics have long been recognized as a central mechanism in the evolution of aggregate productivity (Hopenhayn 1992; Olley and Pakes 1996). These forces have been studied in the United States (Dunne, Roberts, and Samuelson 1988), but we know little about these dynamics in developing countries. Yet since productivity in many industries in developing countries lags far behind the global frontier, understanding the determinants of entry by more efficient firms (and exit by less efficient ones) is particularly important for welfare since the scope for gains is so high (Tybout 2000).

I propose to examine these dynamics in the context of the market for ceramic bricks in 12 districts across India, by carrying out a detailed census and short survey of all brick firms operating in the area. This census would be part of a larger ongoing project on the brick industry in this area, including a 2013 census round that mapped 6,793 firms and collected limited details about their sales, prices and production, as well as two subsequent rounds of highly detailed sample surveys that covered 600 firms and collected data on all aspects of their production processes and financial flows. One more round of this detailed survey is planned, in conjunction with a randomized evaluation discussed further below.

Why collect another round of census data? There are 3 main reasons:

1. Better measurement of entry and exit. While the baseline census does allow for some insights into firm entry in the past year (since it recorded the age of the firm), and the survey data does record firm exits (59 cases, or 9.9% between rounds 1 and 2) the existing survey methodology is not particularly well suited to study the impact of entry and exit on productivity and competition. The existing data cannot be used to estimate exit hazard rates with respect to the age of the firm¹, and the set of new entrants interviewed in the first survey round (46 establishments) is not sufficient to draw clear statistical conclusions. A new census would allow analysis of propensity to exit with respect to all baseline characteristics (including age) and will be used to select a new "Entrant Sample" that will be included in the next round of the detailed survey. This will for both maintain an unbiased sample (as exiting firms will be replaced in the sample with entrants) as well as allow specific tests of the relative productivity of entrants, incumbents, and exiting firms.
2. Panel data on competition with market fixed effects. The intensity of competition is likely to play a key role in firm's entry, exit and dynamic investment decisions. The firm census is the primary source of information on this, since it will capture the full set of prices and quantities of firms operating in each market as well as supply shifters such as input prices and the number of bricks destroyed by unexpected rains. Collecting a second round of data

¹The detailed firm survey can estimate exit rates by firm age, but with only 59 exiters, sample sizes are too low to generate meaningful estimates. Further survey rounds may contain more exiters, but can provide no further information on firms exiting after only 1 year of operation.

is both useful to increase precision of estimates of market-level outcomes, and also because it permits fixed-effects estimates of competitive effects measuring the impact of entry and exit on incumbent firms.

3. Collection of an improved sample frame for future surveying. While the impact of competition on entry/exit and investment can be measured in the cross section or with panel data (Syverson 2004; Bresnahan and Reiss 1991), the concern remains that whatever factors may be affecting the density of competitors might also affect firms' decisions through other channels as well. To generate additional, purely random, variation in the intensity of competition we are pursuing two simultaneous randomized trials. In the first, we plan to introduce a more efficient firing technology to randomly selected kilns, and observe the impact on their own and competitor's prices and revenues. Second, we are in talks to partner with two MFIs to provide credit to randomly selected brick kilns. The second census round will provide a sampling frame on which to carry out the randomization of these interventions, as well as an opportunity to enquire about entrepreneurs' interest in participating in these interventions.

The census of brick firms would be accompanied by a short questionnaire (see Appendix B for a draft) that would ascertain basic information about the establishment. This survey is *not* designed to measure productivity or financial position of the entrepreneur—these are left to the 87 page manager and 12 page owner surveys. Instead, the goal is to gather data on the market-level outcomes that characterize the competitive environment in which these firms operate. Nevertheless, this data will contain important information rarely collected in large-scale firm censuses. First, it will contain the exact geographical location of each establishment which will enable a much more granular analysis of competition since the major differentiating characteristic of brick firms is their geographical location. Second, this census would cover *all* firms, regardless of size or formal status. The existing major firm censuses cover only larger firms, and therefore cannot capture the substantial amount of entry and exit that surely exists among smaller firms.

The one area in which this census round will differ from the previous round is that it will also cover the nascent cement block industry. Cement blocks are in many ways superior to bricks, but have little market penetration in India outside the 10 largest cities. Recently, however, it seems they may be beginning to spread, and in the long-term it seems possible that government enforcement of environmental regulations may drive their expansion even more. Including them in the census would be an excellent opportunity to capture a new industry at the very beginning of its growth.

Survey Implementation Since the proposed census is part of ongoing work in this field, much of the logistical framework is already in place. The fieldwork will be carried out by the Centre for Micro-Finance at IFMR-LEAD, a research organization that has been a partner in the brick work for the past 3 years. The field supervisors and many surveyors are veterans of up to 3 rounds of previous surveying, and the existing map of all brick enterprises can be used to confirm exit of existing firms. Thus the logistical task of locating and interviewing every brick firm in a vast geographical area, while substantial, will be accomplished efficiently and thoroughly.

Funding We request funding of \$16,325 to complete this census – a relatively low price to generate a geocoded database of ~7,000 firms with basic production data (~\$2.50 per firm). Much of the census will be funded by project funds already allocated to other aspects of the project but were un-needed due to more efficient project implementation than originally anticipated. As shown in the attached budget (Appendix A), these funds will cover \$21,500 out of \$37,825 of the total costs. As the budget makes clear, these funds are entirely dedicated to project costs, with no included salary or budget for PI expenses.

References

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Appendix A: Brick Industry Census Budget Estimates

| Particular | Unit | Unit Rate (pm) | No. of months | Total(INR) | Total (\$) | Further Assumptions |
|------------------------------------|------|----------------|---------------|------------------|------------------|--|
| HR Costs | | | | 1,969,575 | 33,394.67 | |
| PA Salary | 3 | 15000 | 1.5 | 67,500 | 1,106.56 | |
| Monitor Salary | 4 | 10000 | 1.5 | 60,000 | 983.61 | |
| Supervisor Salary | 12 | 9000 | 1.5 | 162,000 | 2,655.74 | |
| Surveyors salary | 36 | 8000 | 1.5 | 432,000 | 7,081.97 | |
| Field Editor Salary | 1 | 8500 | 1.5 | 12,750 | 209.02 | |
| Field Scrutinizer Salary | 1 | 6500 | 1.5 | 9,750 | 159.84 | |
| PA TA | 3 | 5200 | 1.5 | 23,400 | 383.61 | |
| Monitor TA | 4 | 5200 | 1.5 | 31,200 | 511.48 | |
| Supervisor TA | 12 | 5200 | 1.5 | 93,600 | 1,534.43 | |
| Surveyor TA | 36 | 5200 | 1.5 | 280,800 | 4,603.28 | |
| Field Editor TA | 1 | 5200 | 1.5 | 7,800 | 127.87 | |
| Field Scrutinizer TA | 1 | 5200 | 1.5 | 7,800 | 127.87 | |
| Long TA | 57 | 500 | 1.5 | 42,750 | 700.82 | |
| PA DA | 3 | 9100 | 1.5 | 40,950 | 671.31 | |
| Monitor DA | 4 | 9100 | 1.5 | 54,600 | 895.08 | |
| Supervisor DA | 12 | 9100 | 1.5 | 163,800 | 2,685.25 | |
| Surveyor DA | 36 | 9100 | 1.5 | 491,400 | 8,055.74 | |
| Field Editor DA | 1 | 9100 | 1.5 | 13,650 | 223.77 | |
| Field Scrutinizer DA | 1 | 9100 | 1.5 | 13,650 | 223.77 | |
| PA Mobile Allowance | 3 | 750 | 1.5 | 3,375 | 55.33 | |
| Monitor Mobile Allowance | 4 | 350 | 1.5 | 2,100 | 34.43 | |
| Supervisor Mobile Allowance | 12 | 300 | 1.5 | 5,400 | 88.52 | |
| Surveyor Mobile Allowance | 36 | 200 | 1.5 | 10,800 | 177.05 | |
| CMF HR Travel cost | 1 | 3000 | 2 | 6,000 | 98.36 | Includes cost of RA, PH, Software Developer to the field |
| Training Costs | | | | 161,400 | 2,645.90 | |
| Venue Cost | 1 | 4000 | 15 | 60,000 | 983.61 | 5 days training in each state |
| Staff DA | 52 | 350 | 5 | 91,000 | 1,491.80 | |
| Stationary and printing | 52 | 200 | 1 | 10,400 | 170.49 | |
| Material and Equipment Cost | | | | 64,825 | 1,062.70 | |
| GPS rental | 32 | 1200 | 1.5 | 57,600 | 944.26 | |
| Stationery and Kit | 52 | 100 | 1 | 5,200 | 85.25 | |
| Translation | 15 | 135 | 1 | 2,025 | 33.20 | 5 pages each in 6 languages |
| DATA Entry Costs | | | | 44,000 | 721.31 | |
| Laptop rental | 2 | 2000 | 2 | 8,000 | 131.15 | |
| DEO | 2 | 9000 | 2 | 36,000 | 590.16 | |
| TOTAL (Census) | | | | 2,195,800 | 37,824.59 | |

Appendix B:

Brick Industry Census: Round 2

| | |
|--|--------------------------------------|
| | Unique ID |
| | Confirm Unique ID |
| | Date of Interview ____ / ____ / ____ |
| | Code of the Interviewer |
| | District |
| | Block |
| | Market Area |
| | GPS Latitude: _____._____ |
| | GPS Longitude: _____._____ |

| | | |
|--|--|--|
| | What is the name of this brick kiln? | |
| | What is the word or letters on the bricks from this kiln? <i>If there are several, write the most commonly used symbol.</i> | |
| | What is the name of the munshi incharge of the brick kiln? | |
| | Is the incharge/munshi also the owner? | 1. Yes 2. No |
| | What is the name of the owner of the brick kiln? <i>If the kiln is owned by a partnership, write the name of the owner who is most involved in direct management.</i> | |
| | In what year was this kiln first opened? | |
| | Do you produce bricks all months of the year, or only during certain months of the year? | 1. All 12 months of the year (Throughout the year) 2. Some months of the year >> go to 17 |

| | | |
|--|--|---|
| | How are the bricks fired? | <ol style="list-style-type: none"> 1. Fixed Chimney bull trench kiln 2. Movable Chimney bull trench kiln 3. Clamp>> go to 31 4. Open kiln (permanent structure, no chimney) >> go to 30 5. Intermittent kiln>> go to 30 6. Hoffman Kiln>> go to 30 7. Other>> go to 30 |
| | How many brick are there in a full round of the bull trench kiln? | |
| | Is the land where the kiln is located owned by the owner of the kiln? | <ol style="list-style-type: none"> 1. Yes 2. No, rented from a private party 3. No, rented from govt./panchayat/lake bed. |
| | How many bricks were produced at this kiln in the last year, that is the year before the one that we are in now? | >> go to 18 |
| | How many bricks were produced at this kiln in the last season, that is the season before the one that we are in now? | |
| | How many bricks have you produced so far in the current year/season? | |
| | How many bricks | |
| | What is the main source of fuel you use to fire the bricks? | <ol style="list-style-type: none"> 1. Coal 2. Wood 3. Husk/Paddy 4. Cow Dung 5. Coconut husk 6. Leaves 7. Other: _____ |
| | What is the price you pay <i>per unit</i> for this fuel, including all transport costs? | _____/ Rs. |
| | What are the units in which you buy the fuel? | <ol style="list-style-type: none"> 1. Trolley 2. Quintal 3. Truck – Tata 407 size 4. 6-wheel truck 5. 10 wheel truck |

| | | |
|--|--|---|
| | | 6. Tonnes 7. Cubic metres 8. Other: _____ |
| | Do you use any machine to mix the mud before making bricks? | 1. No 2. Yes – JCB 3. Yes – other machine |
| | In this season, are you using a machine to mold the bricks? <i>Select 'Yes' even if some bricks are still made by hand.</i> | 1. Yes 2. No |
| | On an average day this year/season, how many people are working at this kiln, including all staff and any family members that work on this kiln? | |
| | Aside from broken bricks, do you separate normal bricks into different qualities for sale at different prices? | 1. Yes 2. No >> go to 34 |
| | How many bricks have you sold so far this season? <i>Include bricks made last season but sold this season.</i> | |
| | What is the current price (per 1000 bricks) of your... | Highest quality (Aval) : _____ 2 nd highest quality (Naram aval) : _____ 3 rd highest quality (Pila): _____ 4 th highest quality (???): _____ |
| | What is the current price for 1000 bricks? | |
| | Do you sell the majority of your bricks | 1. Within 10 km 2. Within 20 km 3. Within 50 km 4. Within 100 km 5. Over 100 km |
| | Mobile number of the munshi in charge: | _____ |
| | Mobile number of the kiln owner (if different): | _____ |
| | What is the status of the questionnaire? | 1. Fully completed 2. Partially complete due to refusal 3. Not completed due to refusal from respondent |