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Dosas by the Dozen

Theory and Evidence of Present Bias in Microenterpreneurs

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Abstract

Why do so many poor people maintain identical small businesses? A model of choice among microenterprise types as a bandit problem with present bias argues that naïve present bias can prevent experimentation with profitable novel business possibilities. Time consistency and sophistication are each sufficient to eliminate this trap. Survey data on residents of slums around Hyderabad, India confirms that distinct indicators of present bias and of sophistication are associated with microenterprise type. Literate respondents who treat their water before drinking it, who report wanting to cut any category of spending, or who report wanting to cut spending on intoxicants are more likely to have an uncommon, rather than a common, business. These relationships are robust to a range of respecifications and controls, including for alternative explanations. This “behavioral” aspect of microbusiness decision making may suggest caution about the universality of micro-entrepreneurial ability.

1 Introduction

Many poor people earn money outside of wage labor; it is increasingly popular to encourage ever more poor people to do so. Yet, even in the smallest markets, microenterprises are often very similar. New entrants are commonly identical to established firms, despite a customer base that would be small even if many of its would-be members had not already become competing suppliers. In a survey of Hyderabadi slums, sixty percent of microbusinesses offer one of the four most common products.

Why do so many poor people maintain identical small businesses? Why do microentrepreneurs not experiment with uncommon business types? Sub-optimal microbusiness practices matter not only for the alleviation of microentrepreneurs' own poverty; they challenge some policy makers' claim that credit is the poor's binding—perhaps only—constraint and they caution yet unrealized hopes for microbusiness-led economic growth.

I offer one answer to this overdetermined question.[1] This essay models microenterprise choice as a simple bandit problem: agents learn about the distribution of outcomes of each business type by sampling them. However, experimentation with an unusual microbusiness, while ultimately valuable, is costly in the short-run. To try a new business, a microentrepreneur must temporarily forgo profits from the business she knows. A naïvely present-biased microentrepreneur—one who prefers immediate consumption, but does not realize that this preference will shape her behavior in the future as much as it does now—may decide to experiment with an innovation tomorrow... until tomorrow becomes today. Survey data on residents of slums around Hyderabad, India confirm that indicators of time preference are associated with microenterprise type.

Other observers of microbusinesses have noticed this puzzle. Banerjee and Duflo (2008), after inventorying a general store in rural India, observe that "from the owner's point of view

[1] In particular, I abstract away from programs and policies such as undifferentiated vocational training, which might proximately cause undiversified microenterprise by teaching all participants similar skills.

it would seem to be a problem that the shop was selling exactly the same things that one would find in all the other stores in the village, often within a few hundred feet of each other" (15). In an earlier essay (2007), they find that in Guntur, India "in front of every sixth house that directly faced the road, by our count, a woman was sitting behind a little kerosene stove with a cast-iron griddle roasting on it" (151). She was making and selling *dosas*,[2] though "given the fact that almost everyone owns the cooking implement that one needs to make a *dosa* and entry is free, it does not seem that *dosa*-making is an extraordinarily profitable activity" (162). Why do so many microenterprises replicate a common business model rather than experimenting with an uncommon, and potentially more profitable, business model?

Previous research has applied behavioral economics' theories to the demand side of development. Most applications have focused on present-biased preferences.[3] Ellison (2006) explains that in recent behavioral industrial organization theory "the rational firm-irrational consumer assumption has become the norm" (147): firms' structures, resources, and competitive pressures might safeguard collective decisions from individual irrationality. However, development economics—having carefully studied the agricultural household—has long emphasized that poor people are simultaneously producers and consumers. This essay's model considers present-biased suppliers.

Many proponents of microbusiness and microcredit claim that poor people already have any necessary business skills and productive talents; all they lack is credit (*cf.* Yunus 2003). While this view is extreme, it implicitly remains in some practitioners' emphasis on "expanding access" to finance. By applying behavioral economics to the supply side of developing economies, this paper cautions against exaggerated claims both for microbusiness as a uni-

[2]A *dosa* is a thin Indian rice pancake.

[3]Bertrand, *et al* (2005) find a substantial effect of psychological factors on demand for consumer loans in South Africa. Ashraf, Karlan, and Yin (2006) find demand for a commitment savings product in the Philippines. Mullainathan (2007) suggests that present bias may explain, among other things, low levels of schooling. Thornton (2008) provides experimental evidence that present bias, not social or psychological stigma, may prevent people from learning HIV status. An exception is Duflo, Kremer, and Robinson (2006), who evaluate a program capitalizing on farmers' partial sophistication about fertilizer investment.

versal solution to poverty and for the innate business acumen of the poor. If credit is not the only constraint, we might be less surprised that microbusinesses rarely grow to the point of hiring employees.

The model suggests recommendations to microbusiness programs. First, where present bias is the binding constraint on experimenting with profitable new businesses, small, immediate rewards can have a large impact. Present bias would magnify an immediate incentive for trying an unusual business; at a small initial cost to the program, the agent will receive lasting benefits of having innovated. Second, because outcomes differ according to agents' time preference and awareness of their time preference, behavioral heterogeneity among participants matters.

Section 2 models an individual microentrepreneur's decisions over time about which business to pursue. Section 3 presents evidence from Hyderabadi slums. Uncommon businesses are more frequent among households that appear to have less present bias or more sophistication about their present bias. I empirically define "uncommon" businesses as those not among the four most common types. While I cannot observe time preference directly, I use water treatment as a proxy for present bias and desire to cut spending, particularly on intoxicants, as a proxy for sophistication. These findings are robust to a wide range of controls and alternative specifications. Section 4 concludes.

2 Model

I model an agent's choice of which microbusiness to operate as a bandit problem with present bias. That business choice is a bandit problem means that the agent does not know the distribution of outcomes from all possible business types; she can learn them by experimenting with alternatives, and may or may not do so in an optimal sequence. That she has present bias means that she may postpone immediate costs—such as the opportunity cost of exper-

imenting with a new business—and may not complete her plans when future costs become present costs.

My model is stylized. It captures these two essential points while abstracting away from demand, outside options such as wage labor, the opportunity to run more than one business, intellectual property rights from innovation, and non-Bayesian probabilistic inference. In particular, because I am interested in an entrepreneur's incentives to innovate with an unusual business, I focus on a single agent's decision problem.[4]

2.1 Bandit problem

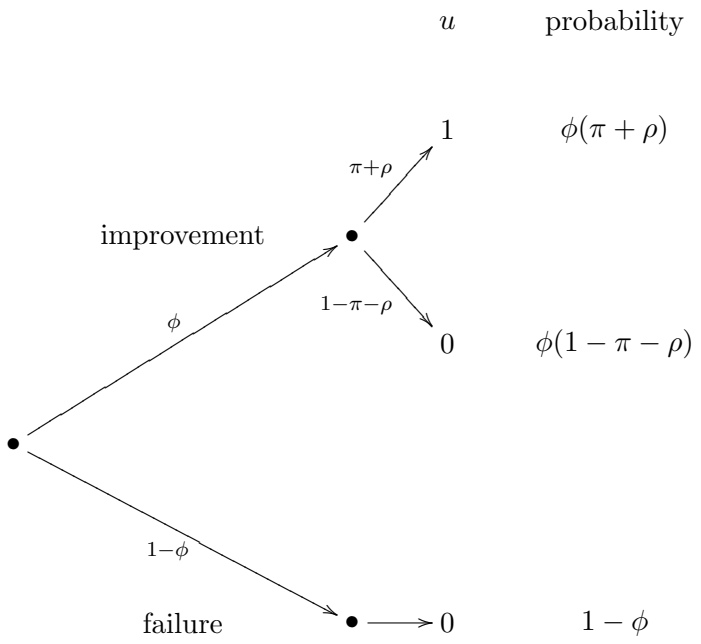
The agent acts in three periods. In each she experiences a binary utility $u \in \{0, 1\}$, which could represent ending the day hungry or not. She is experienced with her traditional business, and knows the distribution of daily outcomes to be Bernoulli with a probability of π of success. She maximizes expected utility, so she maximizes the probability of success in each period.

It occurs to her to start a novel microenterprise. While she does not know the distribution of outcomes from the alternative business, she correctly believes it will either be a disaster, with zero probability of daily success, or be an improvement, offering a daily probability of success $\pi + \rho$, with $\rho > 0$. The marginal benefit ρ of the new business reflects the rewards of operating an uncommon business with less competition, as well as any profits from the innovation itself.[5] I abstract away from the equilibrium determination of ρ and of which businesses are uncommon in order to concentrate on the agent's decision. Because daily success is a random variable, even if the alternative business is an improvement she may experience a bad outcome when she first experiments with it.

[4]In the empirical section, after showing the unconditional association of time consistency with the expectation of business type, I control for a range of household and cluster covariates representing alternative explanations and individual variation in costs and benefits of experimenting with an uncommon business.

[5]For example, though this may not translate into higher consumption, it may be more pleasant to operate a microbusiness with fewer direct competitors.

Figure 1: Experimenting with an alternative microbusiness as a compound lottery



ϕ is the probability that the alternative business is an improvement rather than a failure. If the new business is an improvement, $\pi + \rho$ is the probability of success in any period. Therefore, $\phi(\pi + \rho)$ is the unconditional probability of success in a period spent experimenting with the new business.

The agent assigns probability ϕ to the case in which the alternative business is an improvement and probability $1 - \phi$ to the case in which the alternative business is a failure, offering $u = 0$ each day.[6] Therefore, if the agent chooses to experiment, in the period when she experiments she faces the compound lottery in figure 1. While experimenting, her probability of a good outcome is the probability that the new business is an improvement and happens to succeed when she experiments: $\phi(\pi + \rho)$. If ϕ or ρ is sufficiently small this is less than π, the probability under the known business.

She may experiment by attempting the new business plan in either the first or second period. After experimenting, she will decide whether to continue with her new business or revert to her old one. In particular, while she learns nothing from spending a period in her

[6]This follows DeGroot (1970, 396-399).

traditional business because she already knows its distribution, if she observes a successful day in the new business, she becomes certain it offers a $\pi + \rho$ probability of daily success.

For this model to address my question I must make two ancillary assumptions. First, I assume that consumption—which ordinarily determines utility—fluctuates with income. Deaton (1991) shows that autarkic saving can substantially smooth consumption, especially in the stationary i.i.d. case modeled here. I abstract from this ability; perhaps income is in a perishable form, or subject to alternative social demands if not "eaten fast" (Case 2007). Second, I interpret the well-understood business as relatively common; some of the agent's knowledge may be from social learning.

2.2 Present bias

O'Donoghue and Rabin (1999) distinguish two dimensions of time preference: present bias and sophistication. An agent is present biased if she discounts utility received in any future period by a fraction $\beta < 1$. Unlike impatience more generally—which merely entails preferring utility sooner than later—present bias implies time inconsistency: the agent's ranking of alternatives can differ at different points in time. In particular, tomorrow's benefits and costs, about which a present-biased agent cares little today, become paramount once tomorrow becomes the present. An agent whose β equals 1 is time consistent.

A time inconsistent agent may or may not be aware that her desires tomorrow will differ from today's. A sophisticated agent is aware of her present bias and plans accordingly. She never selects a path that her present bias would prevent her from following because she recognizes it not to be an option.[7] A naïvely present-biased agent experiences present bias, but is unaware she will experience it in the future, and incorrectly plans as though she will henceforth be time consistent.

[7]For example, people who accepted Ashraf, Karlan, and Yin's (2006) commitment savings product may have been sophisticated about present bias: the contract eliminated their option to dissave in the future.

These dimensions are independent. An agent may be time consistent or present biased and, if present biased, may be naïve or sophisticated. Therefore, they will have distinct empirical proxies.

A microentrepreneur in this model may be present biased and either sophisticated or naïve.[8] A time consistent agent who ever chooses the original microenterprise will never later choose the novel one because she will never gain information that could reverse her initial ranking. A present-biased agent may hope to delay the cost of experimentation; she could decide to maintain the original microbusiness in the first period but innovate in the second.

2.3 Numerical example

A numerical example will demonstrate that naïvely present biased agents can be trapped in sub-optimal businesses. Let $\pi = 0.7$, $\rho = 0.2$, $\phi = 0.66$. The novel microenterprise has a two-thirds chance of raising her daily probability of not being hungry twenty percentage points from 70% to 90%. The agent discounts the future with present bias: $\beta = 0.45$.

As figure 1 showed, the expected utility of a period spent trying the new business plan is $\phi(\pi + \rho)$, in this case 0.594. Upon trying the new business, there is a $\phi(\pi + \rho)$ probability it is successful and will be kept, so the expected utility of a period after experimenting is the average of the expected utilities from the old and new businesses, weighted by the probability that the new business is kept: $\pi + \phi(\pi + \rho)\rho$. This is always greater than π and in this case is 0.819.

Table 1 presents the consequences. A time consistent agent will experiment in the first period, choosing plan B. A present biased agent would prefer experimenting in the first

[8] While I study the case where $\beta \leq 1$, I implicitly set $\delta = 1$: there is no further exponential discounting on non-present utility. This simplification is without loss of generality (the benefits of period 3 profit could be adjusted relative to period 2 profit, for example) and focuses on what will be operative: time-inconsistently mispredicting future β.

Table 1: A numerical example: when to experiment

	Plan A no exp.	Plan B exp. in 1	Plan C exp. in 2
Period 1	0.7	0.594	0.7
Period 2	0.7	0.819	0.594
Period 3	0.7	0.819	0.819
Value to TC	2.1	2.232	2.113
Value to Naïf, $t = 1$	1.330	1.331	1.336
Value to Naïf, $t = 2$	1.015	-	0.962

period to never experimenting (plan B $\succ$ plan A), but would even more prefer waiting one period, in order to postpone the immediate loss of expected utility from experimenting (plan C $\succ$ plan B).

However, when period two arrives the costs of experimenting are now immediate; unexpectedly, a naïve agent experiences present bias again.[9] As a result, the agent does not experiment and ultimately continues to pursue her traditional business in every period, implementing plan A, the plan she values least.

A sophisticate with present bias would recognize that plan C is not an option: she cannot plan to experiment in period two because she knows that, once in period two, her present bias would dissuade her from experimenting. Even in the first period, she prefers experimenting immediately to never experimenting. Therefore, she would select plan B, like the time consistent agent, and experiment in period one.

2.4 Implications

Result. *A naïvely present-biased agent who prefers experimenting with an alternative business in the first period to never experimenting may nevertheless never experiment. Low present bias ($\beta \approx 1$) and sophistication are each sufficient to prevent this time inconsis-*

[9]Moreover, in this finite-horizon model, the value of experimenting is now lower because there is only one period in which to implement the new plan, if successful.

tency.

A time consistent agent will never experiment first in period two; she will either experiment first in period one, when it is most advantageous, or not at all. She will experiment if and only if

$$\phi > \frac{\pi}{\pi + \rho} \frac{1}{1 + 2\rho}, \tag{1}$$

which is strictly less than one. This will be true if ϕ, the probability of the new business being successful, and ρ, the marginal benefit of a successful alternative business, are sufficiently large.

A naïvely present biased agent prefers experimenting in period one to not experimenting if and only if

$$\phi > \frac{\pi}{\pi + \rho} \frac{1}{1 + 2\beta\rho}. \tag{2}$$

While in period one, she prefers experimenting in period two to experimenting in period one if and only if

$$\phi < \frac{\pi}{\pi + \rho} \frac{1 - \beta}{1 - \beta + \beta\rho}; \tag{3}$$

intuitively, if the probability of the innovative business having a better distribution is sufficiently high, the cost of experimenting is low and the opportunity foregone by waiting is high.

However, a naïve agent who does not experiment in period one will again not experiment once in period two if

$$\phi < \frac{\pi}{\pi + \rho} \frac{1}{1 + \beta\rho}. \tag{4}$$

If equations 2, 3, and 4 are simultaneously satisfied then a naïve agent will behave time inconsistently, as in the numerical example. While in period one, she will plan to experiment in period two and then not do so. A sophisticated agent with such preferences would anticipate that she would not carry out a plan to experiment in period two and would therefore exper-

iment in period one, which she prefers to never experimenting. Thus, either sophistication or an absence of present bias is sufficient to inoculate an agent against this trap.

3 Empirics: Slums in Hyderabad

Is naïve present bias associated with keeping the microenterprise you know? This is not a straightforward empirical question: how should these concepts be operationalized? While I cannot observe present bias and sophistication directly, I do observe plausibly related behaviors. Treating water and wanting to cut spending—in general or on intoxicants—are associated with having an uncommon microbusiness, with or without controls for many potentially confounding variables.

The Abdul Latif Jameel Poverty Action Lab at MIT surveyed 2800 households in 120 slums of Hyderabad, India. Of these, 643 have at least one business, for a total of 813 microenterprises. These data were originally intended to be the "baseline" initial data for a field experiment on microcredit (Banerjee, Duflo, and Glennerster 2008).

3.1 Data

Table 2 reports summary statistics about the Hyderabadi households. Seventy-two percent report themselves to be poor. The mean household has five members. Sixty-three percent of households surveyed has a literate head. I focus on three sets of variables: my dependent variable is microbusiness type and my independent variables are whether the household treats its water and whether the respondent reports wanting to reduce spending.

3.1.1 Uncommon businesses

Twenty-three percent of the households have at least one business.[10] Among those who have businesses, 77.6 percent have only one; the mean number of businesses conditional on having one is 1.28. Table 3 catalogs microenterprises by type. Households with a business have statistically insignificantly less consumption per capita, but are 12.6 percentage points less likely to report themselves "poor" in the survey.

Almost 60 percent of microenterprises belong to one of the four largest categories: food vendor, tailor, product vendor, or transportation. I label these four *common* businesses and will say a household has an *uncommon* business if it has at least one that is not any of these four types.[11] As table 2 shows, households with an uncommon business have an average of 0.1 more businesses than households with no uncommon businesses. While they do not have statistically detectably different consumption levels, relative to households without an uncommon business households with an uncommon business have 0.23 more rooms on average, are 6.9 percentage points more likely to have a concrete roof, and are 5.5 percentage points more likely to have a plot of land. These could be causes or effects, or neither.

It is difficult to measure microbusiness profits (*cf.* de Mel, McKenzie, and Woodruff 2009). The survey asks participants to recall their recent revenue, almost certainly a measurement with error. There is essentially no difference between the reported revenue of common and uncommon businesses.

[10]The survey asks "Let us define a 'business' in the following way: each business consists of an activity you conduct to earn money, where you are not someone's employees. Include only those household businesses for which you are either the sole owner or for which you have the main responsibility. Include outside business for which you are the person in the household with the most responsibility. How many businesses are you involved with? What type of business is it?"

[11]For the empirical strategy to match the theory, I implicitly assume that what constitutes an uncommon business in the whole sample also does in each slum.

3.1.2 Water treatment

Respondents are asked "Do you treat the water before people other than children drink it?"[12] Twenty-three percent report treating their water in some way. Table 4 reports household water treatment by water source. Except among the seven participants who get their water from a "river/canal/lake/pond" (none of whom has an uncommon business), respondents who get their water from a tap are most likely to treat their water. Food vendors are less likely than average to treat their water and tailors are more likely to, but the main result below is robust to omitting either group of households.

Of 656 respondents who purify their water somehow, 43 percent filter it with a cloth, 38 percent use a filter, and 12 percent boil it. In this group, people who report themselves to be "poor" are 13 percentage points more likely than the non-poor to treat their water by running it through a cloth, instead of using another method. In the full sample, the self-identified poor are 13 percentage points less likely to treat their water.

I create a dummy variable for whether a household treats its water, and will use it as a proxy for time preference: taking the time to treat water is a delay, and may require forethought.[13] Clearly this is an imperfect proxy; perhaps

$$\text{purify water} \equiv \{f\left(\text{present bias}, \text{water quality}, \text{wage}, \text{resource availability}\right) + \upsilon > 0\},$$

where υ is a random error and $f(\cdot)$ is decreasing in the first three terms and increasing in the fourth. Richer households might have higher water quality and opportunity cost of time but also more resources, so the effect of wealth is ambiguous. However, researchers from the survey team report that all water available in these slums is unsafe to drink untreated, suggesting that no household fails to purify its water only because of high water quality,

[12] Respondents are previously asked "Do you treat your drinking water in any way for purifying it before children drink it?" but only if they have children under two years old.

[13] Previous research suggests that time preference influences health behavior. Farrell and Fuchs (1982) suggest this explanation for the association of schooling with cigarette smoking.

which would likely be correlated with wealth.

3.1.3 Desire to reduce spending

After cataloging respondents' spending on a range of goods, the survey asks "which of the above do you think are unnecessary expenditures that you would like to reduce?" I construct two dummy variables: *reduce spending* indicates the respondent wants to reduce spending in any category and *reduce intoxicants* indicates the respondent wants to reduce spending on "pan, tobacco, or intoxicants."

Table 5 catalogs reported desires to reduce spending. A household may mention multiple categories that it wants to cut. Twenty-four percent of households want to cut at least one category; of these, the average number of categories is 1.3. Intoxicants are the largest category, accounting for 45.5 percent of desired reductions.

Wanting to cut spending could be associated with poverty if poor people need to make better use of a small budget, or could be associated with wealth if it reflects financial slack being wasted. In these data, a one percent increase in total household monthly consumption is associated with a six percent increase in the frequency of reporting a desire to cut spending overall. Yet, richer households are not more likely to want to cut spending on intoxicants.

In a review of surveys from thirteen countries, Banerjee and Duflo (2007) find that even the very poor spend a significant fraction of their income on alcohol, tobacco, and entertainment; if so, they propose, anybody *could* cut her spending, if she wished. They summarize

> ... the poor do see themselves as having a significant amount of choice, but they choose not to exercise that choice in the direction of spending on food. The typical poor household in Udaipur could spend up to 30 percent more on food than it actually does, just based on what it spends on alcohol, tobacco, and festivals. (147)

While this does not prove a desire to reduce spending is related to time preference, it does suggest that such desire is not merely a proxy for wealth.

While I propose that both water treatment and the desire to reduce spending are influenced by time preference, they are essentially uncorrelated (0.0044). Neither, included as a control, changes the coefficient of the other in the regressions below. Time preference, however, has two dimensions: β, the absence of present bias; and sophistication, an agent's awareness of her present bias. In the model, either low present bias or sophistication is sufficient to prevent time-inconsistently failing to experiment with an uncommon business. I interpret water treatment as evidence of a lack of present bias and desire to cut spending as sophistication, an awareness of the divergence between one's immediate impulses and long-term plans.

Would not sophisticatedly present biased agents have worked out their optimal consumption paths, and therefore not want to cut spending, in general or on tempting intoxicants? Not necessarily. O'Donoghue and Rabin (1999) distinguish two types of time inconsistency: procrastination—delaying a costly activity—and preproperation—doing a beneficial activity too soon. Sophistication tempers an inclination to procrastinate. Thus, sophisticates might not indefinitely delay the costs of experimenting or filtering water. However, sophisticates are, paradoxically, more prone to preproperation than naives: they know they will take the benefit too soon, making waiting seem less attractive, so they may simply take it immediately. Spending and intoxicant use bring immediate benefits and delayed costs; they are subject to preproperation, where sophisticates are vulnerable.

3.2 Results

I would like to estimate the following linear probability regressions[14] on the set of households that have a business:

$$\text{uncommon}_i = \alpha_0 + \alpha_1 \text{time consistency}_i + \theta X_i + \varepsilon_i, \text{ and} \quad (5)$$

$$\text{uncommon}_i = \alpha_0 + \alpha_1 \text{sophistication}_i + \theta X_i + \varepsilon_i, \quad (6)$$

where $uncommon_i$ is a dummy variable recording whether household i has at least one uncommon business and X is a vector of control variables. Because time preference is not directly observable and was not experimentally measured, water treatment serves as an imperfect proxy for low present bias and desire to cut expenditure imperfectly proxies for sophistication. I also use desire to cut expenditure on intoxicants in particular.

Estimating equations 5 and 6 without control variables for the 414 households with a business and a literate head, I find that

$$\begin{array}{rccccl} \widehat{\text{uncommon}}_i = & 0.434 & + & 0.123 & \text{treats water}_i. \\ & (0.032) & & (0.043) & \\ \widehat{\text{uncommon}}_i = & 0.452 & + & 0.108 & \text{reduce spending}_i. \\ & (0.034) & & (0.060) & \\ \widehat{\text{uncommon}}_i = & 0.460 & + & 0.125 & \text{reduce intoxicants}_i. \\ & (0.030) & & (0.077) & \end{array}$$

Standard errors clustered by slum are in parentheses. I show below that these results do not hold for households with illiterate heads.

Of course, these regressions ignore many variables. Certainly the coefficients cannot be interpreted as causal effects of time preference.[15] The estimates surely incorporate some omitted variable bias, such as from the other determinants of water treatment, direct costs and benefits of experimenting, and perhaps an endogenous financial effect of having an

[14] Because *uncommon* is constructed such that 60 percent of the businesses are common, using logit changes results little.

[15] The effect of time consistency may be estimated with attenuation bias: the survey does not observe time preference directly.

uncommon business. Education may both encourage reflection on one's budget and develop skills that could contribute to an uncommon business.

Households with uncommon businesses have more wealth in their homes and land; if home quality is positively associated with water quality and if higher water quality requires less treatment, then the coefficient on water purification is biased downwards. Yet, households that call themselves poor are less likely to treat their water.

The top panels of table 6 present controlled regression results for households with a literate head. Controlling for household consumption, the water source, whether the source is shared, and with how many households it is shared does not change the coefficient on water treatment (column 1), suggesting that the estimate is not biased by omitted water quality. Similarly, controlling for household consumption does not change the coefficient on reported desire to reduce spending (columns 2 and 3), suggesting it is not merely reflecting budget size. While it is not in the table, the coefficient on *reduce intoxicants* is also essentially unchanged if spending on intoxicants in particular is included. So, richer people are more likely to want to cut something from their budget (though not intoxicants in particular), but the general result holds even controlling for consumption.

The top, right panel includes more extensive controls with little effect on the key coefficients. "Demographic controls" are the size of the household, whether it has a female head, the schooling of the household head, the highest level of education achieved by any member of the household, and six counts representing the number of old, middle-aged, and young males and females in the household.[16] "Wealth controls" are whether the household calls itself poor, its roofing material, whether it owns its home, the number of rooms in its home, whether it has a plot of land, and the size of its plot of land. The coefficients are similar to without the controls, and indeed larger for *reduce intoxicants*.

[16]The age groups are 16 years old or less, between 16 and 60 years old, and 60 years old or older. Because these six categories and household size are colinear, the count of old males is omitted.

The bottom panels of table 6 present results for households with an illiterate head and for the full sample of households with a business. There is no evidence of an effect of time preference or consistency as I measure them. One interpretation of this finding is that water treatment and desire to cut spending are not good proxies for time preference for illiterate people in particular; they may have other barriers to water treatment. For water treatment, this would be consistent with evidence that healthy behavior is associated with education.[17] Another interpretation is that for illiterate people, time consistency is not the binding constraint to experimenting with an unusual business. Perhaps ρ, the marginal benefit of the unusual business they can imagine operating, is smaller for such households.[18] Among other differences, it is little surprise that literate households are richer: they are 16 percentage points less likely to call themselves "poor" and have 3.8 cents more consumption per person per day.

3.3 Alternative explanations

Naïve present bias, even if important, is almost certainly not the only explanation for under-experimentation with unusual microbusinesses. Social learning, local patterns of demand, credit constraint, and risk preference all could influence an individual's decision to experiment. If any of these are correlated with the indicators of present bias, omitted measures of alternative explanations could be responsible for the results.

Table 7 suggests that the apparent effect of time inconsistency on microbusiness type is generally robust to controlling for alternative specifications. Column 1 replicates the coeffi-

[17] Kenkel (1991) finds that schooling's effect on health knowledge explains part of its relationship with alcohol and cigarette use. Using state by state changes in U.S. compulsory education laws, Lleras-Muney (2005) finds evidence that education has a causal impact on adult mortality.

[18] de Mel, McKenzie, and Woodruff (2008) use Sri Lankan survey data to compare "own account workers"—that is, microentrepreneurs with no employees—with wage workers and owners of small businesses with employees. In cognitive ability, financial literacy, and risk attitudes, microentrepreneurs were more like wage workers than like small business owners. While this finding has important implications for the argument that microbusiness will lead economic growth, it is relevant here for suggesting that education and ability are associated with entrepreneurial success.

cients on water treatment, desire to cut spending, and desire to cut spending on intoxicants from the fully controlled specifications in columns 4, 5, and 6 of table 6. Each of the next three columns reports three regressions. In each column, a measure of an alternative explanation is added to each of the fully controlled specifications. Each column presents the coefficient on the indicator of time consistency and on the alternative explanation for all three regressions.

Column 2 includes a measure of the prevalence of uncommon businesses in a household's slum. This could be correlated with its decision in at least two ways. First is social learning. While microenterprise choice is modeled as a bandit problem, households could learn from one another's successes and failures. If so, people in a slum with many uncommon businesses might themselves make an uncommon business. Second is demand. Though abstracted away from in the model, different areas could have more demand for uncommon businesses. High demand would encourage both a household and its neighbors to offer uncommon products.

To test this, I computed for each household the fraction of households in its slum with microbusinesses who have an uncommon microbusiness, excluding itself.[19] In each of the three regressions, relative to a household in a slum with no uncommon businesses, a household in a slum where all businesses are "uncommon" is over 20 percentage points more likely to have an uncommon businesses. Yet, including this fraction changes the coefficients on the indicators of time preference only a little.

A commonly offered explanation for microenterprise inefficiency is credit constraint. Households that did not have any loans were asked why they did not. Some did not want a loan. Others said that they were "worried [they] cannot make repayment," that the "inter-

[19]For household i in slum I,

$$\text{fraction uncommon}_i = \frac{\sum_{j \in I, j \neq i} \text{uncommon}_j}{\sum_{j \in I, j \neq i} \text{business}_j},$$

where $business_j$ indicates whether household j has a microbusiness. If the numerator and denominator are zero the fraction is set to zero.

est rate [is] too high," or that they "could not obtain one;" I created an indicator that calls households in any of these three categories credit constrained. 121 of the 414 households with businesses are credit constrained. Column 3 adds credit constraint to the controlled regressions. Again, there is almost no change in the time consistency coefficients.[20] Credit constraint has a negative association with having an uncommon business, but misses statistical significance.

Less risk averse households may be more willing to experiment. The data do not measure risk preference directly.[21] Households are asked whether anybody in the household has an insurance policy; 24 percent do. While confounded by wealth and the availability of formal and informal insurance, this may partially measure risk preference. Column 4 reports that having insurance is insignificantly positively associated with having an uncommon business and that including having insurance does not change the coefficients on time consistency.

These results do not rule out determinants of the distribution of common and uncommon microbusinesses beyond time preference and consistency. They do indicate that the apparent effect of naïve present bias is not obviously merely capturing the influence of an alternative explanation.

[20]There is some evidence of an interaction between credit constraint and desire to cut overall spending. Among the 293 households that are not credit constrained, the coefficient on desire to cut spending is 0.158; for the 121 that are it is -0.055. Among all 414 households, the interaction has a coefficient of -0.253 and a clustered standard error of 0.111. Credit constraint does not interact with water treatment or desire to cut intoxicants. Desire to cut spending may only be a good proxy for sophistication for households that are not credit constrained; or, this finding may merely reflect data mining.

[21]As mentioned above, spending on intoxicants is itself an insignificant predictor of having an uncommon business. When spending on intoxicants is added as a control to the 6th specification in table 6, the coefficient on wanting to reduce intoxicants is 0.140 with a clustered standard error of 0.080. That controlling for intoxicant spending does not change the association between wanting to cut spending on intoxicants and having an uncommon business suggests that the association is not due to common cause–such as low risk aversion encouraging both experimentation and intoxicant use.

3.4 Alternative specifications

The construction of the *uncommon* indicator used is the one suggested by the natural break in the distribution and the first I tried; it could be done differently. Table 8 replicates the uncontrolled regressions with alternative classifications.

The original *uncommon* indicator is 1 if a household has any business that is not food vending, tailoring, product vending, or transportation. The *all uncommon* indicator is 1 only if all of a household's businesses are uncommon. These differ for 60 households.

The next four rows omit households that have one of the four types of uncommon business. The last two classify "automobile" and "retail" businesses—potentially similar to "transportation" and "product vendor" businesses, respectively—as common.

The main finding is that the effect is robust to essentially all of these changes. The exception is that the coefficient on wanting to reduce spending, particularly on intoxicants, falls and loses significance if tailors are excluded from the sample. This may mean that sophistication is particularly important for having an uncommon business rather than being a tailor. Alternatively, this may be a spurious result of data mining.

The main result of the paper is not robust to adding fixed effects by slum. The coefficient on water purification falls to 0.084 and its standard error rises to 0.059, resulting in a t-statistic of 1.42. This may be merely a result of overcontrolling: there are 120 slums but only 414 literate households with businesses. The categories are quite unbalanced; many slums have only one or two households with businesses, effectively removing them from the sample, while others have many more.

4 Discussion

Why do so many poor people open the same small business as their neighbors, even where many already compete for a small group of customers, and uncommon businesses would face

little direct competition?

This essay's model argues that unsophisticated present bias prevents making the costly but temporary investment in learning that experimenting with a new type of business would represent. In the long run, experimenting can make one no worse off: if the new business fails, return to the old one. Yet, trying the new business can make one worse off in the short run. A present biased entrepreneur would postpone this immediate cost, and may unintentionally postpone it indefinitely.

Data on common and uncommon businesses in Hyderabadi slums validates this model if treating water is interpreted as a sign of time consistency and desire to cut spending in general and on intoxicants in particular is interpreted as sophistication about time preference. While these interpretations are admittedly ambiguous, these coefficients remain relatively stable as many controlling variables are included, including controls for alternative explanations.

Yet, this sample is small: 414 literate households with businesses. The t-statistics in the fully controlled specifications are sometimes small and only at the edge of significance, even at the 0.10 level. Moreover, as with all happenstantial data, the results depend on the unverifiable assumption that no omitted variable or simultaneous determination of economic resources and outcomes is responsible for the results. In addition to the clear possibility that wealth still may be an omitted variable, evidence suggests that present bias may be associated with low cognitive ability (Benjamin, *et al* 2006; Dohmen, *et al* 2008), perhaps even beyond controls for education.

A field experiment could clarify. A treatment group could be offered information on the distribution of outcomes for uncommon businesses. Alternatively, they could be given an immediately salient reward for experimenting that is too small to have an income effect or be a bribe but sufficient to counteract present bias. For example, researchers have given food to encourage vaccination and very small cash payments to learn HIV test results (Thornton 2008). Finally, though more difficultly, a treatment group could be guaranteed

an intertemporal distribution of income identical to under their current, common business while experimenting with a new one, conditionally on experimenting.

Even if this model is validated, there remain open questions. If the determinants of starting an uncommon business are indeed different for illiterate people, why? Do illiterate households have less access to, or are they less likely to consider, profitable alternative activities? Are they less able to take advantage of the benefits of reduced competition? Would this heterogeneity caution against indiscriminate microlending? Moreover, why does a type of business initially become common? More precisely, how does the common business's distribution of outcomes become widely known?

If valid, this explanation has policy implications. First, it incorporates behavioral economics into the supply side of developing economies. In particular, it suggests caution about some claims by microcredit practitioners of the innate business acumen of all poor people.[22] Second, it highlights the policy opportunity that present bias represents: small but immediate incentives may be sufficient to encourage better outcomes. Finally, the different outcomes for naïve, sophisticated, and time consistent microentrepreneurs call attention to heterogeneity among potential clients of microcredit.

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Table 2: Hyderabad slums: household summary statistics

	No business		Common business		Uncommon business		Full sample	
	$\bar{x}$	std. error	$\bar{x}$	std. error	$\bar{x}$	std. error	$\bar{x}$	std. error
self-reported poverty	0.750	0.009	0.638	0.026	0.607	0.028	0.721	0.008
per capita consumption ($/day)	0.707	0.011	0.707	0.030	0.676	0.027	0.703	0.010
total monthly consumption (Rs)	4149.626	51.228	4299.895	155.518	4177.132	143.419	4170.849	46.411
household size	5.024	0.037	5.121	0.089	5.221	0.096	5.057	0.033
treats water	0.218	0.009	0.265	0.024	0.314	0.027	0.234	0.008
wants to reduce any spending	0.249	0.009	0.191	0.021	0.264	0.025	0.244	0.008
items to reduce	0.334	0.015	0.244	0.030	0.314	0.034	0.321	0.013
wants to reduce intoxicants	0.150	0.008	0.121	0.018	0.145	0.020	0.146	0.007
female head	0.099	0.006	0.106	0.017	0.080	0.016	0.098	0.006
literate head	0.624	0.010	0.640	0.026	0.654	0.027	0.629	0.009
head's schooling	4.529	0.476	5.047	0.248	4.937	0.256	4.636	0.369
has loan	0.671	0.010	0.682	0.025	0.719	0.026	0.678	0.009
ever late on payment	0.301	0.010	0.303	0.025	0.317	0.027	0.303	0.009
number of businesses			1.229	0.031	1.330	0.033	0.293	0.011
n	2157		340		303		2800	

Table 3: Types of microenterprise in Hyderabad slums

Business Type	Count	Percent	Cumulative %
Food Vendor	160	19.68	19.68
Tailor	138	16.97	36.65
Product Vendor	118	14.51	51.16
Transportation	70	8.61	59.77
Automobile	46	5.66	65.43
Labor	33	4.06	69.49
Metallics	24	2.95	72.44
Agriculture	23	2.83	75.27
Florist	16	1.97	77.24
Retail	15	1.85	79.09
Housekeeping	14	1.72	80.81
Grooming	12	1.48	82.29
Art	10	1.23	83.52
Administrative	10	1.23	84.75
Chemical	9	1.11	85.86
Publishing	9	1.11	86.97
Mechanic	8	0.98	87.95
Manufacturer	7	0.86	88.81
Materials Supplier	7	0.86	89.67
Construction	4	0.49	90.16
Electronics	4	0.49	90.65
Business	3	0.37	91.02
Engineer	3	0.37	91.39
Carpentry	3	0.37	91.76
Technology	3	0.37	92.13
Plumbing	3	0.37	92.50
Finance	3	0.37	92.87
Communications	3	0.37	93.24
Real Estate	3	0.37	93.61
Protection Services	2	0.25	93.86
Education	1	0.12	93.98
Entertainment	1	0.12	94.10
Other	48	5.90	100.00
Total	813	100.00	

Some households have more than one business.

Table 4: Water treatment by source (number of households)

source	does not treat	treats	total
tap	1,784	582	2,366
well	44	13	57
tubewell, handpump	126	21	147
tank, reservoir	145	34	179
river, canal, lake, pond	5	2	7
other	38	4	42
total	2,142	656	2,798

Table 5: Desired reduced spending, by item

Item	Count	Percent	Cumulative %
pan, tobacco and other intoxicants	409	45.55	45.55
institutional medical expenses	64	7.13	52.68
cinema, theatre, video show, renting cd	61	6.79	59.47
meals or snacks outside the home	52	5.79	65.26
clothing	29	3.23	68.49
non-institutional medical expenses	25	2.78	71.27
ceremonies (naming, rice feeding)	25	2.78	74.05
sugar, salt, spices, coffee, tea, processed food	21	2.34	76.39
regular journeys, commuting	18	2.00	78.39
informal payments (to police, market leader, etc.)	17	1.89	80.28
weddings, not of own daughter	16	1.78	82.06
lottery tickets, gambling	14	1.56	83.62
informal fee for dwelling	14	1.56	85.18
telephone and electricity	13	1.45	86.63
funerals	13	1.45	88.08
toilet articles, soap	10	1.11	89.19
other	97	10.8	100
Total	898	100	

Table 6: Linear probability of unusual businesses

	Literate heads			Literate heads, controls		
	(1)	(2)	(3)	(4)	(5)	(6)
treats water	0.125			0.087		
	(0.045)			(0.043)		
reduce spending		0.111			0.097	
		(0.060)			(0.059)	
reduce intoxicants			0.124			0.144
			(0.077)			(0.079)
water source controls	✓			✓	✓	✓
log consumption	✓	✓	✓	✓	✓	✓
demographic controls				✓	✓	✓
wealth controls				✓	✓	✓
constant	0.873	0.784	0.750	0.885	0.916	0.859
	(0.443)	(0.458)	(0.048)	(0.507)	(0.515)	(0.516)
n	414	414	414	414	414	414
R^2	0.03	0.01	0.01	0.08	0.07	0.08

	Illiterate heads			Full sample		
	(7)	(8)	(9)	(10)	(11)	(12)
treats water	-0.120			0.056		
	(0.087)			(0.040)		
reduce spending		0.089			0.101	
		(0.089)			(0.054)	
reduce intoxicants			-0.063			0.055
			(0.099)			(0.062)
literate head				0.008	0.017	0.016
				(0.043)	(0.043)	(0.043)
constant	0.484	0.439	0.469	0.449	0.436	0.452
	(0.048)	(0.051)	(0.047)	(0.045)	(0.047)	(0.045)
n	226	226	226	640	640	640
R^2	0.01	0.01	0.00	0.00	0.01	0.00

Clustered standard errors in parentheses.

Table 7: Linear probability of unusual businesses: alternative explanations

	(1)	(2)	(3)	(4)
alternative:		fraction uncommon	credit constrained	insurance
water treatment	0.087	0.078	0.081	0.081
	(0.043)	(0.043)	(0.044)	(0.044)
alternative		0.210	-0.065	0.060
		(0.101)	(0.048)	(0.048)
R^2	0.08	0.09	0.08	0.08
reduce spending	0.097	0.085	0.097	0.091
	(0.059)	(0.058)	(0.058)	(0.059)
alternative		0.209	-0.073	0.061
		(0.100)	(0.049)	(0.048)
R^2	0.07	0.09	0.08	0.08
reduce intoxicants	0.144	0.131	0.151	0.150
	(0.079)	(0.075)	(0.078)	(0.080)
alternative		0.205	-0.077	0.071
		(0.101)	(0.047)	(0.049)
R^2	0.08	0.09	0.08	0.08

Column 1 reprints fully controlled specifications from table 6. $n = 414$.
Clustered standard errors in parentheses.

Table 8: Robustness to alternative classifications: coefficients and standard errors

	purify water	reduce spending	reduce intoxicants
original *uncommon*	0.123	0.108	0.125
	(0.043)	(0.060)	(0.077)
all uncommon	0.086	0.115	0.114
	(0.045)	(0.060)	(0.077)
no food vendors	0.112	0.144	0.110
$n = 346$	(0.048)	(0.064)	(0.078)
no tailors	0.179	0.057	0.054
$n = 303$	(0.053)	(0.064)	(0.081)
no product vendors	0.120	0.095	0.177
$n = 355$	(0.048)	(0.064)	(0.080)
no transportation	0.103	0.109	0.147
$n = 363$	(0.045)	(0.063)	(0.077)
automobile common	0.117	0.120	0.099
	(0.051)	(0.058)	(0.077)
retail common	0.152	0.110	0.120
	(0.051)	(0.059)	(0.077)