



## Measuring Entrepreneurial Aptitude: An Analytical (Not Psychological) Approach

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**Abstract:** As part of wide-ranging curricular reforms, Philippine education authorities have created Entrepreneurship “strands” that Grade 11 and 12 students may take. Several private sector initiatives are underway to measure an individual student’s aptitude for taking Entrepreneurship.

Yet measuring entrepreneurial aptitude is trickier than it seems. Consider three constraints: first, aptitude is innate talent or “pre-input knowledge”. This means one cannot simply assess what students have learned after completing related Grade 10 subjects, as this would measure achievement, not aptitude. Second, nearly every available test for entrepreneurial aptitude takes the form of a self-administered psychological test. Yet the Entrepreneurship strand is a course of study, so we must emphasise cognition and reasoning as well, and not just create psychological profiles. Finally, to reduce the burden of marking, the items must be amenable to a multiple-choice format, even as entrepreneurial decision-making is so obviously dependent on context.

Our approach is to profile students based on a novel test of economic reasoning. By this we do not mean their knowledge of economic terms and concepts. We mean their intuitions about how markets work when faced with everyday small-business situations. We believe that those who show stronger intuitions about how markets work (even if they cannot explain them formally), and those who, from their decisions, seem to value efficiency more than their peers, stand a better chance of succeeding as students of entrepreneurship, and future entrepreneurs.

In this paper, I construct and illustrate sample items for such a test. I demonstrate that there are first-best answers to all the items, derived analytically from economic principles. I also show how even second-best and third-best answers can be useful in developing a profile of entrepreneurial aptitude that is built on cognitive skill, not just psychological traits.

**Key Words:** entrepreneurial aptitude; economic reasoning



## 1. INTRODUCTION

Apart from increasing the number of years in the basic education cycle, K-12 as a reform also introduces “tracks” that students may take, among them Entrepreneurship. As a result, a number of private initiatives<sup>1</sup> are now at work to measure entrepreneurial aptitude and help students assess their fitness to study Entrepreneurship.

Yet measuring entrepreneurial aptitude is trickier than it seems. Consider three constraints: first, the difference between aptitude and achievement. Achievement may be measured by outcomes such as tests and projects, but aptitude is innate talent, “pre-input” knowledge. To assess learning outcomes from, say, related Grade 10 subjects and use them to guide students into an Entrepreneurship track would be wrong-headed, as this would measure student achievement, the amount of skill already acquired and not aptitude, which is the ability to learn and further develop proficiency in an area (Sommer, n.d.).

Second, nearly every available test for entrepreneurial aptitude takes the form of a self-administered psychological test. A typical example, the “Hearts, Smarts, Guts, and Luck” test (Tjan, Harrington & Hsieh, 2012), features items like:

- My friends would be more likely to say that:*
- It's important I do something meaningful*
- I have above-average vision and passion*
- I distinguish myself by love for what I do, Etc.*

Yet Entrepreneurship in Grade 11 and 12 is meant to be a course of study, and will require its students to exhibit and develop reasoning and cognitive skills, not just preferred character traits. Further, evidence from both MIT's Poverty Action Lab (Banerjee & Duflo, 2011) and the 2014 Global Entrepreneurship Monitor (Tullao et al, forthcoming) suggests that individuals systematically over-

estimate their entrepreneurial ability, and this gap between estimated and actual ability may explain persistently high failure rates for small to medium enterprises. If so, this is not a trivial matter. At best, self-administered psychological tests may simply be inflating one's confidence in trying out entrepreneurship as a career. At worst, inflated confidence may result in wasteful social spending, as resources are poured into supporting entrepreneurs whose enthusiasm may not be matched by their actual business acumen.

Finally, any test to be taken by tens of thousands of students must take the practical burden of marking into account. A multiple-choice format mechanises and therefore minimises the effort of marking, yet the “forced-choice” format suffers serious disadvantages. Items tend to focus on low-level learning objectives, may be biased by students' reading ability and test savvy, may overestimate learning because answers can be selected by elimination, among others (Fisher & Frey, 2007). These weaknesses are magnified in the case of entrepreneurship, where real-world decisions are often based on ill-defined or open-ended problems, and where the “right” answer depends so heavily on situations and context.

My solution is to profile entrepreneurial aptitude in part by a test of economic reasoning. I ought to stress this is not a test of knowledge of economic terms and concepts. Instead, I propose a test in which students encounter everyday small-business situations that reveal their “intuitions” about how markets “work”; their “intelligence” about markets. I hypothesise that those who show stronger intuitions about how markets work — even if they cannot explain these intuitions formally — ought to be the ones with greater aptitude for succeeding as students of Entrepreneurship.

## 2. TEST CONSTRUCTION

In this section, I describe the method for generating test items. There are two parts to this, the first discussing the parameters of “economic reasoning”, and the second covering general considerations to ensure validity and reliability when formulating multiple-choice items.

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<sup>1</sup> Among them a company called Global Resources for Assessment, Curriculum and Evaluation (GRACE). I disclose that from Aug to Sept 2015, I served as consultant and item-writer for one of these initiatives. The approach outlined here is my original contribution however, and the sample items here are not the same ones I submitted to GRACE.



Economic reasoning. To reveal aptitude for studying entrepreneurship, we present students with situations frequently encountered in operating small to medium enterprises. They range from scoping out business opportunities to costing, marketing, financing, etc. The key requirement is that the situations remain simple (appropriate for Grade 10 students) and the items remain jargon-free. I cannot over-emphasise how important these are as a way of separating achievement from aptitude.

The items are then designed to reveal signs of sound entrepreneurial reasoning. Opinions will of course vary about what constitutes “sound” entrepreneurial reasoning, but for the purposes of this paper, I select two uncontroversial examples: (1) good entrepreneurial reasoning means having a strong sense of how markets work, the “logic” of markets, and (2) good entrepreneurial reasoning means valuing efficiency when conducting business. As a general rule, entrepreneurs have a greater chance of succeeding when they understand how markets work, and when they prioritise efficiency in costing, pricing, marketing, etc. On the other hand, it is unlikely for entrepreneurs to succeed if they persistently misunderstand how markets work, or when they display a cavalier attitude toward efficiency and costs.

An important note on entrepreneurial reasoning: the real world offers all sorts of exceptions to every rule. One can no doubt come up with a list of entrepreneurs who were successful despite being clueless about markets and careless about efficiency. Yet if we are to become intelligent consumers of business theory, we must see the value of both the rule and the exception, and consider each properly. As Christensen & Raynor (2003) famously counsel, exceptions merely confirm that entrepreneurship is a complex phenomenon. They don’t automatically overthrow theories of, say, how markets work, especially if these theories contain rigorous explanations of how the world works. Rather, counter-examples and exceptions reveal the boundaries of a prevailing theory, and help clarify the conditions under which the general rule is strongest and weakest.

Each item in our test is best seen as a general application of market and efficiency principles, a classic case of *ceteris paribus* for which we are meant to consider whether the “first-best” answer would hold as a general rule, even as there must obviously exist exceptions.

Validity and reliability. Once the substantive content of the item is established, I craft the question based on the following well-known principles of multiple-choice item construction, of the sort one might find, say in Malamed (2010):

(1) Use simple sentence structures and precise wording; (2) Place most of the words in the question “stem”, so that the answer options remain short; (3) Make all “distractors” (options) plausible; (4) Keep all answer choices the same length; (5) Avoid double negatives; (6) Mix up the order of the correct answers, to avoid rewarding guesswork; (7) Keep the number of options consistent; (8) Use *all of the above* and *none of the above* with caution (with the latter, one cannot ascertain whether the student knows the right answer).

### 3. SAMPLE ITEMS DISCUSSION

Consider the following six items, discussed in turn. What each has in common is that a “first-best” answer exists, derived from fundamental economic principles. This makes each an example of “cognition” or economic reasoning). Each item also features “second-best”, even “last-best” answers, which allows us to either assign weights when evaluating student responses, or to construct parallel items in which we ask students for the “last-best” (worst) answers. Doing this increases both the validity and reliability of the test.

#### Item 1

*Each of your friends spent the same amount of money to produce the same product. But which of them will be able to charge the most for it?*

- Angie, who sells it as an unbranded or generic product
- Bok who sells it together with another product
- Camille who sells it as a product essential for survival
- Don who sells it as a unique or one-of-a-kind product

The first-best answer is d, the worst answer is a. This item derives from the standard microeconomics principle that a steep or inelastic demand curve allows a producer to increase prices without suffering a sharp decline in sales. More importantly, the steepness of a demand curve (a good measure of monopoly power) is determined by how unique a good is. That is why a. is the worst answer,



but also why c. is not the best answer: even goods essential for survival will likely have substitutes; the more substitutes, the flatter the demand curve will be.

The bet behind this item is that a student with entrepreneurial aptitude would be able to sense the best answer intuitively, without necessarily being able to explain why in the argot of economics. One might also ask, as a follow-up item, which of the friends would least likely be able to charge a high price for the good.

Item 2

*If transporting raw materials is your biggest business expense, where should you locate your factory?*

- a. Nearer the mall, where your customers are
- b. Nearer the source of your raw materials
- c. Exactly halfway between a and b
- d. Nearer the bank where you have an account

A straightforward test of whether the student can respond to cost structures in the most efficient way. The best answer is b. There is no obvious “worst” answer, although one can always include additional data, even a sketch of where the raw materials site, mall, and bank are.

Item 3

*Which of the following small businesses would you consider most successful?*

- a. The one making a profit of 60% and taking home PhP 1,000 per day
- b. Making a profit of 10% and taking home PhP 2,200 per day
- c. Making a profit of 50% and taking home PhP 2,000 per day
- d. Making a profit of 15% and taking home PhP 1,800 per day

This item is somewhat tricky and the best answer will attract dispute. But it is motivated by a warning by Banerjee and Duflo (2010) about how many small businesses fail despite ostensibly high marginal rates of return: they still generate low overall profits.

In this item, I test whether students can use both pieces of information, or whether they are “blinded” by either number. Choosing on the basis of

the highest rate of return alone would mean accepting the lowest overall return, a situation that would put a small business at risk. In addition, unusually high rates of return are consistent with very small investment levels (this is somewhat self-evident, but Banerjee & Duflo provide the useful example of neighbourhood stores in the developing world where investment and therefore inventory remains very low despite high rates of return for items sold).

On the other hand, choosing on the basis of the highest overall return alone would mean accepting the lowest marginal rates of return and leave a business likewise at risk. On this basis, the best answer is c.

Item 4

*Which offer would you prefer the most?*

- a. To get PhP 100 for sure today
- b. To get PhP 150 for sure next month
- c. To have a 50% chance of getting PhP 200 today (and a 50% chance of getting nothing)
- d. To have a 25% chance of getting PhP 1,000 next month (and a 75% chance of getting nothing)

This item is part psychological, part cognitive. It combines intuition about how to calculate risks and returns with a student’s attitude toward risk and return. Analytically, a student with aptitude for assessing risk and return would end up calculating “expected” returns, à la Bernoulli: the return multiplied by the probability of the return being realised. The highest expected value is found in d. (PhP 250, less the backward discount to today). I consider this the first-best answer for a budding entrepreneur as choosing it would reveal both a willingness to take risks and to wait for rewards, both strong predictors of entrepreneurial aptitude.

Item 5

*If you stored your money hidden away in a safe place, which of the following would best summarise your feelings?*

- a. It’s a good thing because it will be saved
- b. It’s not such a good thing because it’s not growing
- c. It’s a good thing because no one can find it
- d. It’s not such a good thing because it means I can’t spend it



Another item meant to reveal aptitude for entrepreneurial/market logic and one's attitude toward efficiency. In this case, efficiency means making the most productive use of one's resources, making them grow. Students who select a. and c. may be revealing high levels of risk aversion less consistent with entrepreneurial aptitude, while those who select d. may be revealing high propensities to spend. Choice b. seems the best as it is most consistent with the profile of a successful entrepreneur: one willing to save but one who prioritises making resources grow.

#### Item 6

*You spent PhP 10,000 to set up a small business and earned PhP 14,000. Today you found that you could have earned PhP 15,000 if you had pursued a different business instead. Which statement best describes your feelings?*

- a. I feel bad missing out on the chance to earn PhP 1,000 more
- b. I feel all right, at least I earned PhP 4,000 and made a profit

A final example to test both cognition and attitudes toward efficiency. The PhP 1,000 forgone by the entrepreneur represents the opportunity cost of the business not pursued. The student once again is not required to name the concept, but the one with stronger entrepreneurial instincts ought to be able to intuit it and respond accordingly: that is, to feel bad about the missed opportunity to put one's resources to their best use, and therefore select a.

## 4. CONCLUSION

This exercise provides a proof of concept to the idea that entrepreneurial aptitude may be measured analytically, not just psychologically. While successful entrepreneurs no doubt possess the "soft skills" of persistence, resilience, creativity, etc., the spectre of widespread entrepreneurial failure warns us to consider the "hard skills" needed to analyse markets and opportunities as well. A complete aptitude test ought to feature both types of items. With historically high levels of social support for entrepreneurship in a country like the Philippines anyway (Tullao et al, forthcoming), the real challenge is to solve the second-order problem:

how to get small and medium-scale businesses "over the hump", to help them achieve the minimum scale needed to leave the high-risk failure zone. At least part of the solution must involve separating, as it were, those with aptitude from those with mere enthusiasm.

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