

# AUTHOR ACCEPTED MANUSCRIPT

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Personality Traits, Technology Adoption, and Technical Efficiency  
Evidence from Smallholder Rice Farms in Ghana

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Appendix for “Personality Traits, Technology Adoption, and Technical Efficiency:  
Evidence from Smallholder Rice Farms in Ghana”<sup>¶</sup>

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## **Appendix:** Entrepreneurial Psychology Survey Questions following McKenzie & Woodruff (2010)

Responses to all questions are on a scale of one to five, with five indicating “agree strongly” and one indicating “disagree strongly.”

### **1. Impulsiveness:**

I plan tasks carefully (scale reversed).

I make up my mind quickly.

I save regularly (scale reversed).

### **2. Tenacity:**

I can think of many times when I persisted with work when others quit.

I continue to work on hard projects even when others oppose me.

### **3. Polychronicity:**

I like to juggle several activities at the same time.\*

I would rather complete an entire project every day than complete parts of several projects (scale reversed).

I believe it is best to complete one task before beginning another (scale reversed).\*

### **4. Locus of control:**

It is difficult to know who my real friends are (scale reversed)

I never try anything that I am not sure of (scale reversed)

A person can get rich by taking risks

### **5. Achievement:**

It is important for me to do whatever I'm doing as well as I can even if it isn't popular with people around me.

Part of my enjoyment in doing things is improving my past performance.

When a group I belong to plans an activity, I would rather direct it myself than just help out and have someone else organize it.

I try harder when I'm in competition with other people.

It is important to me to perform better than others on a task.

I try harder when I'm in competition with other people.

It is important to me to perform better than others on a task.

### **6. Power motivation:**

I enjoy planning things and deciding what other people should do.

I find satisfaction in having influence over others.

I like to have a lot of control over the events around me.

### **7. Passion for work/work centrality:**

I look forward to returning to my work when I am away from work.

The most important thing that happens in life involves work.

It is important for me to do whatever I'm doing as well as I can even if it isn't popular with people around me.

Part of my enjoyment in doing things is improving my past performance.

### **8. Organized person:**

My family and friends would say I am a very organized person.

### **9. Optimism:**

In uncertain times I usually expect the best.

If something can go wrong for me, it will (scale reversed).

I'm always optimistic about my future.\*

I hardly ever expect things to go my way (scale reversed).\*

I rarely count on good things happening to me (scale reversed).\*

Overall I expect more good things to happen to me than bad.\*

Note: The attitude variables are constructed by rescaling each question from -2 to 2. The questions within each attitude category are then summed and divided by the number of questions to produce an indicator of range [-2,2].

\* Indicates question pairs used to calculate acquiescence score

**Appendix Table 1: Logit Regression for Adoption of Transplanting (Acquiescence Bias Adjusted)**

	Model			
	All Traits Incl.	Pre-Selection	LARS	Stepwise
Achievement Orientation	-0.013 (0.623)			
Power Motivation	-0.000 (0.976)			
Tenacity	0.029 (0.192)	0.026 (0.230)	0.025 (0.242)	
Work Centrality/Passion	-0.048* (0.081)	-0.054** (0.035)	-0.054** (0.035)	
Internal Locus	0.001 (0.963)	0.001 (0.959)		
Optimism	0.053** (0.049)	0.050* (0.058)	0.048* (0.058)	0.047** (0.021)
Polychronicity	0.041*** (0.009)	0.043*** (0.005)	0.044*** (0.004)	0.046*** (0.002)
Organization	0.023 (0.234)	0.022 (0.252)	0.022 (0.245)	
Impulsiveness	0.012 (0.643)			
Digitspan	0.010 (0.372)	0.010 (0.357)	0.009 (0.381)	
Weta Irrigation Scheme	-0.667*** (0.000)	-0.668*** (0.000)	-0.663*** (0.000)	-0.671*** (0.000)
Cultivator Age	-0.002* (0.076)	-0.002* (0.080)	-0.002* (0.063)	-0.003** (0.024)
Cultivator Education	0.012*** (0.000)	0.012*** (0.000)	0.012*** (0.000)	0.013*** (0.000)
Rice Experience (years)	0.000 (0.821)	0.000 (0.820)		
Female	0.072** (0.012)	0.073** (0.010)	0.071** (0.012)	0.068** (0.014)
Value of Assets (log)	0.016 (0.141)	0.015 (0.155)	0.016 (0.124)	
Planted Area (log)	0.039* (0.094)	0.039* (0.088)	0.039* (0.090)	0.050** (0.026)
Parcel Fallow Last 5 Years	-0.020 (0.791)	-0.018 (0.818)		-0.025 (0.740)
<b>Tests for Joint Significance</b>				
All Personality Traits	0.083*	0.022**	0.011**	0.002***
Standard Human Capital Traits	0.000***	0.000***	0.000***	0.000***
Motivational Traits Only	0.354	0.107	0.106	
No. of Observations	1,659	1,659	1,659	1,659

*Note:* Self-reported soil quality, slope, and presence of erosion control or water harvesting facilities included in all regression but not reported. P-values in parentheses (\*\*\*) p<0.01, \*\* p<0.05, \* p<0.1). Standard human capital traits are age, education and experience. Motivational traits are achievement motivation, power motivation, tenacity and work centrality/passion.

**Appendix Table 2: Elasticities from Stochastic Frontier Translog Production Function (Acquiescence Bias Adjusted)**

	Model				
	No traits	All traits	Pre-selection	LARS	Stepwise
Area (log)	0.461*** (0.000)	0.460*** (0.000)	0.460*** (0.000)	0.461*** (0.000)	0.460*** (0.000)
Value of Pesticide (log)	0.023*** (0.028)	0.023*** (0.028)	0.024** (0.025)	0.022** (0.036)	0.023** (0.028)
Value of P & K (log)	0.165*** (0.000)	0.163*** (0.000)	0.163*** (0.000)	0.165*** (0.000)	0.163*** (0.000)
Value of N (log)	0.179*** (0.000)	0.178*** (0.000)	0.178*** (0.000)	0.179*** (0.000)	0.178*** (0.000)
Cost of Threshing/ha (log)	0.066 (0.382)	0.075 (0.305)	0.065 (0.393)	0.066 (0.382)	0.067 (0.372)
Cost of Ploughing/ha (log)	0.225*** (0.000)	0.231*** (0.000)	0.226*** (0.000)	0.227*** (0.000)	0.229*** (0.000)
Labor Days (log)	-0.009 (0.440)	-0.014 (0.240)	-0.010 (0.422)	-0.010 (0.390)	-0.012 (0.319)
Parcel Fallow Last 5 years	-0.185*** (0.002)	-0.176*** (0.004)	-0.177*** (0.004)	-0.175*** (0.004)	-0.177*** (0.004)
Soil Quality Fair	-0.082*** (0.001)	-0.079*** (0.002)	-0.081*** (0.002)	-0.080*** (0.002)	-0.081*** (0.001)
Soil Quality Poor	-0.410*** (0.000)	-0.408*** (0.000)	-0.408*** (0.000)	-0.405*** (0.000)	-0.406*** (0.000)
Constant	4.510*** (0.000)	4.697*** (0.000)	4.662*** (0.000)	4.687*** (0.000)	4.601*** (0.000)

**Appendix Table 2 (cont'd): Inefficiency Parameters from the Stochastic Frontier Translog Production Function (Acquiescence Bias Adjusted)**

	<b>Model</b>				
	<b>No traits</b>	<b>All traits</b>	<b>Pre-selection</b>	<b>LARS</b>	<b>Stepwise</b>
Achievement Orientation		0.136 (0.799)	-0.044 (0.935)		
Power Motivation		0.518* (0.090)	0.558* (0.077)	0.451 (0.131)	
Tenacity		0.008 (0.984)	-0.037 (0.933)		
Work Centrality/Passion		-0.700 (0.171)	-0.888* (0.086)		
Internal Locus		0.031 (0.934)	-0.091 (0.810)	-0.007 (0.985)	
Optimism		-0.855* (0.085)		-1.065** (0.021)	
Polychronicity		-0.986*** (0.001)	-1.004*** (0.001)	-0.928*** (0.002)	-0.945*** (0.001)
Organization		0.720* (0.064)	0.593 (0.133)	0.517 (0.140)	
Impulsiveness		0.213 (0.675)	0.248 (0.638)	0.312 (0.538)	
Digit Span		-0.330* (0.093)	-0.349* (0.087)	-0.332* (0.095)	-0.408** (0.034)
Weta Dummy	2.510*** (0.009)	2.478*** (0.001)	2.295*** (0.003)	2.487*** (0.001)	3.020*** (0.000)
Cultivator Age	0.003 (0.927)	-0.007 (0.747)	-0.007 (0.762)		
Cultivator Education	-0.072 (0.271)	-0.040 (0.456)	-0.043 (0.443)	-0.038 (0.485)	
Cult. Experience	0.016 (0.684)	0.016 (0.590)	0.019 (0.532)	0.010 (0.717)	
Female Cultivator	1.423** (0.035)	1.092** (0.036)	1.117** (0.038)	1.087** (0.037)	1.226** (0.015)
No. HH Members (log)	1.180** (0.033)	0.984** (0.021)	0.986** (0.025)	1.019** (0.019)	1.108** (0.015)
Transplanting Used	-3.615*** (0.000)	-2.581*** (0.000)	-2.707*** (0.000)	-2.575*** (0.000)	-2.875*** (0.000)
<b>Tests for joint significance</b>					
All Personality Traits		0.011**	0.018**	0.004***	0.001***
Standard Human Capital Traits	0.655	0.831	0.797	0.718	
Motivational Traits Only		0.345	0.158	0.131	
No. of Observations	1,778	1,778	1,778	1,778	1,778
/Usigma	1.501 (0.119)	1.209 (0.105)	1.244 (0.104)	1.229 (0.105)	1.294 (0.108)
/Vsigma	-2.791*** (0.000)	-2.775*** (0.000)	-2.775*** (0.000)	-2.779*** (0.000)	-2.790*** (0.000)

*Note:* Indicators of seed type and parcel's tenure status included throughout but not reported. Likelihood ratio p-values in parentheses (\*\*\* p<0.01, \*\* p<0.05, \* p<0.1). Standard human capital traits are age, education and experience. Motivational traits are achievement motivation, power motivation, tenacity and work centrality/passion.

**Appendix Table 3: Logit Regression for Adoption of Transplanting (Acquiescence Bias Adjusted and Traits with Low Cronbach's Alpha Score Removed)**

	Model			
	All Traits Incl.	Pre-Selection	LARS	Stepwise
Achievement Orientation	-0.014 (0.603)			
Power Motivation	-0.001 (0.943)			
Tenacity	0.029 (0.194)	0.026 (0.230)	0.025 (0.242)	
Work Centrality/Passion	-0.049* (0.073)	-0.054** (0.035)	-0.054** (0.035)	
Optimism	0.052** (0.047)	0.050* (0.054)	0.048* (0.058)	0.047** (0.021)
Polychronicity	0.042*** (0.008)	0.043*** (0.005)	0.044*** (0.004)	0.046*** (0.002)
Organization	0.023 (0.234)	0.022 (0.253)	0.022 (0.245)	
Digitspan	0.010 (0.370)	0.010 (0.353)	0.009 (0.381)	
Weta Irrigation Scheme	-0.666*** (0.000)	-0.668*** (0.000)	-0.663*** (0.000)	-0.671*** (0.000)
Cultivator Age	-0.002* (0.080)	-0.002* (0.079)	-0.002* (0.063)	-0.003** (0.024)
Cultivator Education	0.012*** (0.000)	0.012*** (0.000)	0.012*** (0.000)	0.013*** (0.000)
Rice Experience (years)	0.000 (0.807)	0.000 (0.818)		
Female	0.072** (0.011)	0.073** (0.010)	0.071** (0.012)	0.068** (0.014)
Value of Assets (log)	0.016 (0.142)	0.015 (0.156)	0.016 (0.124)	
Planted Area (log)	0.039* (0.092)	0.039* (0.088)	0.039* (0.090)	0.050** (0.026)
Parcel Fallow Last 5 Years	-0.018 (0.813)	-0.017 (0.821)		-0.025 (0.740)
<b>Tests for Joint Significance</b>				
All Personality Traits	0.035**	0.011**	0.011**	0.002***
Standard Human Capital Traits	0.000***	0.000***	0.000***	0.000***
Motivational Traits Only	0.312	0.107	0.106	
No. of Observations	1,659	1,659	1,659	1,659

*Note:* Self-reported soil quality, slope, and presence of erosion control or water harvesting facilities included in all regression but not reported. P-values in parentheses (\*\*\* p<0.01, \*\* p<0.05, \* p<0.1). Standard human capital traits are age, education and experience. Motivational traits are achievement motivation, power motivation, tenacity and work centrality/passion.

**Appendix Table 4: Elasticities from Stochastic Frontier Translog Production Function (Acquiescence Bias Adjusted and Traits with Low Cronbach's Alpha Score Removed)**

	Model				
	No traits	All traits	Pre-selection	LARS	Stepwise
Area (log)	0.461*** (0.000)	0.460*** (0.000)	0.461*** (0.000)	0.461*** (0.000)	0.460*** (0.000)
Value of Pesticide (log)	0.023** (0.026)	0.023** (0.028)	0.024** (0.023)	0.023** (0.026)	0.023** (0.028)
Value of P & K (log)	0.165*** (0.000)	0.163*** (0.000)	0.163*** (0.000)	0.165*** (0.000)	0.163*** (0.000)
Value of N (log)	0.179*** (0.000)	0.178*** (0.000)	0.178*** (0.000)	0.179*** (0.000)	0.178*** (0.000)
Cost of Threshing/ha (log)	0.066 (0.380)	0.075 (0.305)	0.065 (0.388)	0.066 (0.380)	0.067 (0.372)
Cost of Ploughing/ha (log)	0.224*** (0.000)	0.231*** (0.000)	0.225*** (0.000)	0.225*** (0.000)	0.229*** (0.000)
Labor Days (log)	-0.009 (0.437)	-0.014 (0.240)	-0.010 (0.411)	-0.009 (0.426)	-0.012 (0.319)
Parcel Fallow Last 5 years	-0.185*** (0.002)	-0.176*** (0.004)	-0.177*** (0.004)	-0.176*** (0.004)	-0.177*** (0.004)
Soil Quality Fair	-0.082*** (0.001)	-0.079*** (0.002)	-0.081*** (0.002)	-0.079*** (0.002)	-0.081*** (0.001)
Soil Quality Poor	-0.410*** (0.000)	-0.408*** (0.000)	-0.410*** (0.000)	-0.408*** (0.000)	-0.406*** (0.000)
Constant	4.510*** (0.000)	4.711*** (0.000)	4.685*** (0.000)	4.714*** (0.000)	4.601*** (0.000)



**Appendix Table 4 (cont'd): Inefficiency Parameters from the Stochastic Frontier Translog Production Function (Acquiescence Bias Adjusted and Traits with Low Cronbach's Alpha Score Removed)**

	Model				
	No traits	All traits	Pre-selection	LARS	Stepwise
Achievement Orientation		0.118 (0.819)	-0.050 (0.924)		
Power Motivation		0.488* (0.096)	0.526* (0.084)	0.497* (0.085)	
Tenacity		0.001 (0.999)	-0.046 (0.914)		
Work Centrality/Passion		-0.695 (0.157)	-0.902* (0.068)	-0.648 (0.126)	
Optimism		-0.825* (0.081)		-0.798* (0.082)	
Polychronicity		-0.945*** (0.001)	-0.983*** (0.001)	-0.956*** (0.001)	-0.945*** (0.001)
Organization		0.695* (0.063)	0.581 (0.130)	0.710* (0.053)	
Digit Span		-0.318* (0.094)	-0.341* (0.084)	-0.318* (0.092)	-0.408** (0.034)
Weta Dummy	2.512*** (0.009)	2.409*** (0.001)	2.252*** (0.003)	2.392*** (0.001)	3.020*** (0.000)
Cultivator Age	0.003 (0.927)	-0.006 (0.771)	-0.006 (0.782)	-0.006 (0.753)	
Cultivator Education	-0.072 (0.271)	-0.038 (0.462)	-0.041 (0.451)	-0.037 (0.472)	
Cult. Experience	0.016 (0.684)	0.016 (0.583)	0.019 (0.524)	0.016 (0.569)	
Female Cultivator	1.424** (0.035)	1.058** (0.035)	1.101** (0.035)	1.055** (0.034)	1.226** (0.015)
No. HH Members (log)	1.181** (0.033)	0.956** (0.020)	0.971** (0.023)	0.956** (0.019)	1.108** (0.015)
Transplanting Used	-3.618*** (0.000)	-2.497*** (0.000)	-2.645*** (0.000)	-2.488*** (0.000)	-2.875*** (0.000)
<b>Tests for joint significance</b>					
All Personality Traits		0.003***	0.006***	0.001***	0.001***
Standard Human Capital Traits	0.655	0.832	0.798	0.833	
Motivational Traits Only		0.346	0.134	0.110	
No. of Observations	1,778	1,778	1,778	1,778	1,778
/Usigma	1.501 (0.126)	1.177 (0.102)	1.217 (0.105)	1.173 (0.102)	1.294 (0.108)
/Vsigma	-2.791*** (0.000)	-2.781*** (0.000)	-2.780*** (0.000)	-2.782*** (0.000)	-2.790*** (0.000)

*Note:* Indicators of seed type and parcel's tenure status included throughout but not reported. Likelihood ratio p-values in parentheses (\*\*\* p<0.01, \*\* p<0.05, \* p<0.1). Standard human capital traits are age, education and experience. Motivational traits are achievement motivation, power motivation, tenacity and work centrality/passion.