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Personality Traits and Performance Contracts: Evidence from a Field Experiment among Maternity Care Providers in India[†]

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A rapidly growing literature documents that the quality of service delivery in many developing countries, particularly in health and education, is poor (Chaudhury et al. 2006; Das and Hammer 2014; Das, Holla, Mohpal, and Muralidharan 2016; Mohanan et al. 2015). Among the large number of interventions aiming to improve service quality, three distinct types of approaches have emerged. The first, and most traditional, emphasizes improving provider skills (through training, for example) and increasing resources available to them (Das, Chowdary, Hussam, and Banerjee 2016). A second approach emphasizes increasing and redirecting effort among *existing* service providers. This approach, focused on aligning incentives within principal-agent frameworks, has received considerable recent attention in economics and emphasizes the use of overt incentives (Ashraf, Bandiera, and Jack 2014; Björkman and Svensson 2009; Deserranno 2016). In contrast to the second, the third approach instead emphasizes *selecting* workers and service providers with desirable attributes related to good performance (a common practice in industrial psychology, for example) (Ashraf, Bandiera, and Lee 2016; Dal Bó, Finan, and Rossi 2013; Finan, Olken, and Pande 2015). Little is known about how the second and third interact. In this paper, we study how agents respond to performance incentives according to personality traits—with potentially important implications for both approaches. In doing so, we use data from a field experiment in which maternity care providers in rural India were offered financial incentives for improving maternal and neonatal health outcomes.

I. Background

The use of performance incentives in health care systems in developing countries is widespread (see Finan, Olken, and Pande 2015 and Miller and Babiarz 2014 for reviews). In a broader project studying performance incentives among maternity care providers in India, we randomly assigned providers to either an incentive or a control group. Performance incentive group providers achieved postpartum hemorrhage (PPH) rates—the leading cause of maternal mortality worldwide—that were 20 percent lower than those in the control group (Mohanan et al. 2016).

Personality traits—defined as patterns of thoughts, feelings, and behavior that predict how individuals respond to circumstances (Roberts 2009)—have drawn attention from economists because of their potential as stable traits that influence performance directly (Almlund et al. 2011; Bowles, Gintis, and Osborne 2001; Cubel et al. 2016). A canonical approach to measurement of personality traits is the "Big Five" factor model.[1] Among the five traits, we focus on conscientiousness and neuroticism

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[1]See Almlund et al. (2011) for an excellent summary of Big Five personality traits and applications in recent economics literature.

because previous literature has found them to be consistently correlated with educational and labor market outcomes (Borghans et al. 2008; Heckman, Stixrud, and Urzua 2006; Heckman and Rubinstein 2001). Conscientiousness is associated with dependability, organization skills, perseverance, and achievement oriented thinking. Neuroticism—the converse of emotional stability—is associated with anxiety, worry, anger, and insecurity. With recent evidence showing that personality traits play a role in the performance of health service providers (Callen et al. 2015), we explore how behavioral response to financial incentives interact with these two key traits.

II. Experiment, Data, and Methods

Our field experiment, conducted in Karnataka, India, tested the effectiveness of performance incentives offered to solo-practice obstetric providers to improve maternal and child health outcomes (postpartum hemorrhage (PPH), sepsis, preeclampsia, and neonatal mortality) among the provider's patients. We focus on 53 providers randomized to incentive contracts based on health outcomes and 44 control group providers. Both types of providers received guidelines from the World Health Organization (WHO) and Government of India for best practices in maternity care, signed agreements to participate in the study, and were informed about data collection procedures. The contracts in the performance incentive arm also specified payments for achieving low rates of adverse health outcomes. For further details of the overall study design, data collection protocols, timelines, and results, see Mohanan et al. (2016).

We collected survey data both from women delivering babies with participating providers and from providers themselves. Each new mother was surveyed within approximately two weeks of birth, providing information about childbirth, obstetric history, and maternal and neonatal health. Our provider surveys included measures of hospital infrastructure, as well as provider characteristics (education, training, and experience—and the Big Five personality inventory).[2]

We estimate the effect of incentive contracts on PPH and how they vary by personality traits using the following general estimating equation:

$$(1)\quad PPH_{ip} = \alpha + \beta T_p + \delta P_p + \lambda T_p \times P_p + \theta X_p + \gamma Z_i + s_d + \xi_e + u_{ip},$$

where PPH_{ip} is an indicator of PPH incidence for woman i who received care from provider p, T_p is an incentive group indicator, P_p is the score of a personality trait (conscientiousness or neuroticism), X_p is a vector of provider characteristics, Z_i is a vector of time-invariant maternal characteristics (including age, education status, religion, and birth history), s_d and ξ_e represent district and enumerator fixed effects. The key parameter of interest is the effect of incentives or $(\beta + \lambda \times P_P)$.

III. Results

Our simple randomization of providers into incentive and control arms appears to have produced a balanced sample (see the online Appendix). Figure 1 then shows the distribution of conscientiousness and neuroticism among providers in the control and incentive contract arms. Most providers exhibit high levels of conscientiousness and low levels of neuroticism—and the distribution of each is heavily skewed.

Table 1 shows estimates obtained by estimating regression (1). Because the outcome is an individual mother's incidence of PPH—an adverse health outcome—negative coefficient estimates reflect better provider performance. The first column shows that more conscientious providers perform better. The coefficients for the incentive contract variable and its interaction with conscientiousness are statistically different from zero implying that the beneficial effect of the incentive is weaker among more conscientiousness providers (who, absent incentives, do relatively better).

To help interpret estimates from our regressions, we also report differences between the twenty-fifth and seventy-fifth percentiles of conscientiousness: for providers in the twenty-fifth percentile of conscientiousness (scoring 4.3

[2] We interviewed providers using a shortened version of the full Big Five Inventory (BFI), the BFI10 (Rammstedt and John 2007), and also included additional questions from a 12-adjective instrument that was piloted and tested in the Study of the Tsunami Aftermath and Recovery (STAR) project in Indonesia.

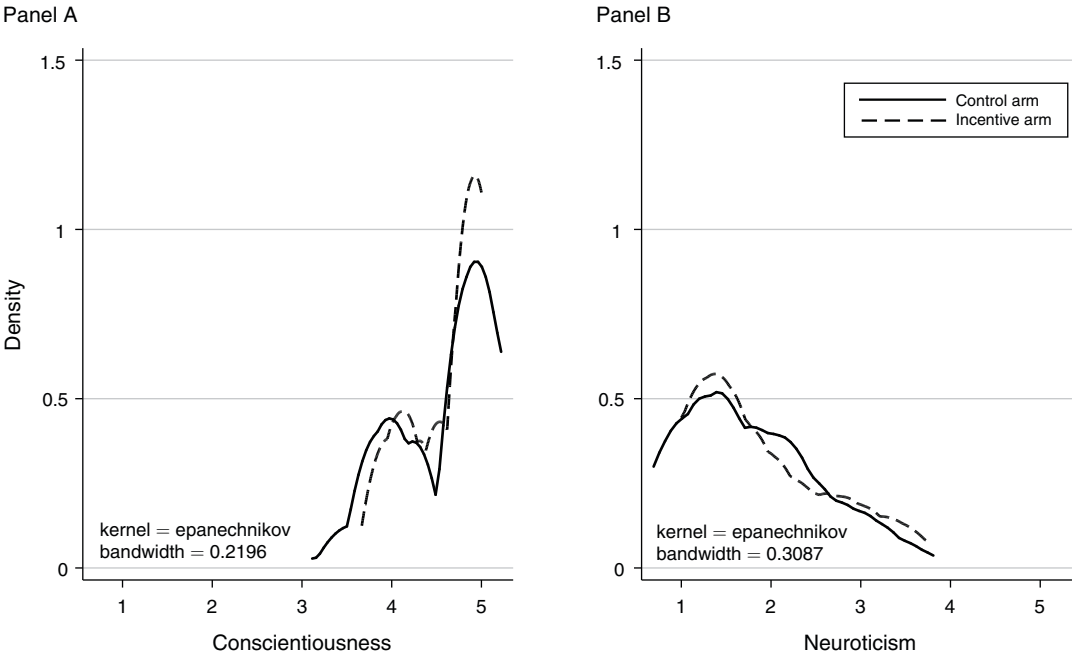

FIGURE 1. DISTRIBUTION OF CONSCIENTIOUSNESS AND NEUROTICISM AMONG CONTROL AND TREATMENT PROVIDERS

out of 5), the incentive contract decreases the PPH risk by 13.3 percentage points, whilst it is not statistically significant for those in the seventy-fifth percentile (scoring 5 out of 5). At mean levels, the incentive contract reduces PPH risk by 6.25 percentage points.

The second column then considers neuroticism and its interaction with the incentive contract. Although some studies report that neuroticism is associated with poor performance, we do not observe this association in our sample of health care providers (column 2 of Table 1). However, performance gains with incentives are amplified among more emotionally stable providers (those with low values of the neuroticism scores). For providers in the twenty-fifth percentile of neuroticism (scoring 1.25 out of 5), the incentive contract decreases the PPH risk by 13 percentage points, whilst it is not statistically significant for those in the seventy-fifth percentile with scores of 2.25. At mean levels of neuroticism, the incentive contract reduces PPH risk by 7.44 percentage points.

We find that providers with high neuroticism do not improve their performance with incentive contracts. This finding could be consistent with the "choking under pressure" hypothesis, according to which individuals' performance deteriorates due to over-arousal and distraction that accompany high stakes (Ariely et al. 2009; Baumeister 1984; Yu 2015).

IV. Conclusion

We present evidence on how two personality traits—conscientiousness and neuroticism, which are consistent predictors of performance—influence the effectiveness of performance incentives on maternal health outcomes. Our results also contribute to a growing body of empirical research on the importance of worker selection suggesting that selection strategies must be deliberate about the work environments and embedded incentives in which they are being used. Such strategies could be improved with further tailoring the personality traits that they target.

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TABLE 1—INTERACTION BETWEEN PERFORMANCE INCENTIVES AND PERSONALITY TRAITS

	Postpartum hemorrhage	
	Coefficient (1)	Coefficient (2)
Panel A. Regression results		
Incentive	−1.133	−0.255
	(0.284)	(0.079)
Conscientiousness	−0.193	
	(0.057)	
Conscientiousness × incentive	0.231	
	(0.063)	
Neuroticism		−0.0329
		(0.039)
Neuroticism × incentive		0.0997
		(0.048)
	Conscientiousness	Neuroticism
Panel B. Linear combination results		
Treatment + interaction at P25	−0.133	−0.130
	(0.032)	(0.032)
Treatment + interaction at mean	−0.063	−0.074
	(0.032)	(0.031)
Treatment + interaction at P75	0.021	−0.031
	(0.045)	(0.044)
Observations	1,993	1,993
R^2	0.297	0.296
Dependent variable mean	0.364	

Notes: Standard errors in parentheses. Both columns of panel A include provider and patient level controls as well as district and enumerator fixed effects. Linear combination results in panel B report estimated incentive effects by personality values. Conscientiousness and neuroticism are measured through provider surveys. Mean, Twenty-fifth, and Seventy-fifth percentiles: (conscientiousness: 4.64, 4.3, and 5) and (neuroticism:1.81, 1.25, and 2.25).

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