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Trust in Scientists and Food Manufacturers, with Implications for the Public Support of Biotechnology

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Abstract: The purpose of this paper is to determine what factor affect trust in scientists and food manufacturers, and to examine how trust in these institutions affects public support for biotechnology. Data from the U.S. Biotechnology Study reveal that benefits from biotechnology and expectations of trustworthiness are correlated with trust in scientists, but benefits and costs of biotechnology, and expectations of trustworthiness and competence of biotechnology institutions, are important determinants of trust in food manufacturers. The data also reveal that trust in scientists and food manufacturers has a large and important effect on public support for biotechnology, but trust in scientists is more important for public support than trust in food manufacturers.

JEL Classifications: L65, Q18

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Introduction

We might expect a relationship between the trust people place in biotechnology institutions and the support they are willing to give to biotechnology research and commercialization. Indeed, many scholars believe that low public support for biotechnology is a sign of a lack of public trust (Brom, 2000; Hampel, Pfenning, and Peter, 2001; see also Slovic, 1993). One reason offered is that consumers perceive that biotechnology institutions have two biases – a *reporting bias*, which is an incentive to overstate benefits and understate risks, and a *knowledge bias*, which is an inability to fully anticipate all contingencies – when publicly communicating the risks and benefits of biotechnology research (Eagly, Wood, and Chaiken, 1978; Kasperson, 1986; Renn and Levine, 1991; Dholakia and Sternthal, 1997; Peters, Covello, and McCallum, 1997). These biases are a reflection of the public's perceptions of trustworthiness (e.g., reporting bias) and competence (e.g., knowledge bias), which are recognized within the literature as necessary for trust formation (Hardin, 2004).

Although there is a theoretical basis for linking trust to public support for biotechnology and genetic engineering, the empirical evidence is mixed. For example, experiments by Frewer and Shepherd (1994) and Finlay, Morris, Londerville, and Watts (1999) find little, if any, effect of trust on public support, while survey research by Rosati and Saba (2000) and Siegrist (2000) show a positive but small effect of trust on public support. Recently, James (2003) argued that the low measured effect of trust on public support is explained by the fact that trust is endogenously determined with public support. When this endogeneity is controlled for, public trust of biotechnology institutions is shown to have a large effect on public support for the genetic modification of crop plants and the application of biotechnology in food production. This paper extends the James (2003) study by separately modeling the trust in scientists developing the technology and agribusinesses commercializing it and by showing how trust in these particular institutions affects the general support by the public for biotechnology.

Trust in Biotechnology Institutions

Trust is "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor" (Mayer, Davis, and Schoorman, 1995, p. 712). According to this definition, *willingness*, *vulnerability*, and *expectations* are keys aspects of trust and trust formation. Willingness reflects confidence that correctly trusting will result in benefits for the truster. Vulnerability reflects the perception that losses can arise when trust us misplaced – that is, when trust in placed in someone who might (willingly or unwillingly) exploit that trust. Expectations entail a belief in the trustworthiness and competence of the person or entity in whom trust is placed, both of which are necessary for trust. For instance, Hardin (2004, p. 8) says that "trust depends on two quite different dimensions: the motivation of the potentially trusted person to attend to the truster's interests and his or her competence to do so."

James (2002) develops a model linking willingness, vulnerability, and expectations to trust. In his model, individuals trust when the expected benefits from correctly trusting exceed the expected losses from mistrusting. The expected benefits exceed expected losses as the losses from mistrusting decrease, the gains from correctly trusting increase, and the expectation that trust will not be exploited increases. The expectation of being exploited is assumed to be a function of the trustworthiness and competence of the person or institution in whom trust is placed. Although previous research has linked these factors to trust (e.g., Hunt and Frewer, 2001; Peters, Covello, and McCallum, 1997; Kasperson, Golding, and Tuler, 1992), this paper uses a national survey of U.S. household to examine how perceived benefits, costs, and expectations of trustworthiness and competence affect trust in specific biotechnology institutions, namely scientists and agribusiness food manufacturers.

Public trust of biotechnology institutions can be modeled by the binary dependent variable equation

(1) $$T_i = \gamma' Z_i + \varepsilon_i ,$$

where $T_i = 1$ if we observe trust, and $T_i = 0$ if we observe no trust, Z_i represents characteristics of individual *i*, γ is a vector of parameters, and ε_i represents unknown characteristics affecting trust. We observe trust when the expected benefits of correctly trusting exceed the expected costs of mistrusting, which is a function of perceived benefits from correctly trusting, perceived losses from mistrusting, and expectations of trustworthiness and competence. Therefore, the set of explanatory variables, Z_i, should include elements representing individual *i*'s assessments of the potential benefits and costs of biotechnology, the trustworthiness and competence of biotechnology institutions, and other control factors. The probability that individual *i* will trust biotechnology institutions is expected to increase as the perceived benefits from biotechnology increase, the risks or costs of using biotechnology decrease, and the likelihood that trust will not be exploited increases through untrustworthiness or incompetence, other things being equal.

Public Support for Biotechnology and Trust

Studies have identified a number of factors affecting public support for biotechnology, such as perceived risks and benefits, uncertainty, the level of understanding of biotechnology, and moral beliefs about biotechnology. Although public trust of biotechnology institutions has been recognized as a factor, some scholars have argued that it is not an important factor (e.g., Rosati and Saba, 2000; Siegrist, 2000).

James (2003) showed that previous empirical studies failed to account for the endogeneity of trust in models of public support, thus accounting for the fact that trust is often not found to be important. In other words, suppose we model the effect of trust and other factors on public support for biotechnology by the equation

(2) $$S_i = \beta' X_i + \delta T_i + u_i,$$

where S_i is a measure of public support, β is a vector of parameters, X_i is a vector of explanatory variables other than trust, T_i is a dummy variable equal to one if the individual trusts biotechnology institutions and zero otherwise, δ is a coefficient measuring the effect of trust on public support, u_i is an error term, and i is an index for individuals $i = 1 \ldots N$. If T_i in equation (2) is modeled by equation (1), the error terms ε_i and u_i will be correlated. The implication is that trust must be treated as an endogenous rather than exogenous variable in equation (2), otherwise an estimation of δ will be biased. According to James (2003), one way of correcting for the endogeneity of trust is to replace T_i in equation (2) with an instrumental variable expected to be correlated with S_i but not correlated with the error term u_i. This is done as follows: Equation (1) is estimated with a Probit analysis. Then the predicted probabilities of T_i, denoted as $\hat{T}_i$, are inserted in equation (2) in place of T_i, resulting in the following corrected version of equation (2):

(3) $$S_i = \beta' X_i + \delta \hat{T}_i + \mu_i \, .$$

This equation provides a means of examining the unbiased effect of trust on public support for biotechnology. James (2003) found that trust in biotechnology institutions is positively correlated with public support for biotechnology. Accordingly, it is expected that an estimation of equation (3) will show that both trust in scientists and trust in food manufacturers will have a positive impact on public support for biotechnology, controlling for other factors expected to affect support.

Methods

Data for this study comes from the United States Biotechnology Study, 1997-1998. This dataset was created from telephone interviews of 1,067 randomly sampled U.S. citizens, 18 years of age and older, between November 1997 and February 1998 (see Miller, 2000). In this sample, 58.7 percent of respondents had at least some post high school education, 49.8 percent of respondents were male, 54.7 percent of respondents were married, and the average respondent was approximately 45 years old. Because the data for this study comes from a pre-existing, publicly available dataset, variable and proxy selection are limited by the type and quality of questions utilized in the survey. Table 1 presents a description of all variables used in this study.

The Trust Model

Equation (1) describes the relationship between trust and factors expected to affect trust. Trust in scientists is proxied by a dichotomous variable equal to one if respondents placed a lot or some trust in a statement by university scientists about biotechnology. Trust in food manufacturers is a dichotomous variable equal to one if respondents placed a lot or some trust in a statement about biotechnology by food manufacturers. As shown in Table 1, more than 90 percent of respondents reported at least some trust in university scientists, while 55 percent of respondents placed at least some trust in food manufacturers. Moreover, the standard deviation of trust in scientists is smaller than the standard deviation of trust in food manufacturers, even after controlling for the variable means. This suggests not only that respondents place higher trust in scientists than food manufacturers, but also that few factors will likely explain variations in trust in scientists, since such trust is high and variability it low, at least relative to trust in food manufacturers.

In order to examine factors reflecting perceived benefits, costs, and expectations of trustworthiness and competence on trust, a Probit model is estimated in which trust in scientists and trust in food manufacturers are treated as dependent variables. Perceptions of benefits of biotechnology are proxied by variables representing respondent beliefs about whether biotechnology will improve our way of life, whether biotechnology will likely reduce environmental pollution, and whether biotechnology will reduce world hunger. In each case, an increase in the variable is expected to have a positive impact on trust in both scientists and food manufacturers. Perceptions of costs arising from biotechnology are proxied by variables representing respondent beliefs about whether biotechnology and genetic engineering is risky, whether new diseases are likely to emerge because of biotechnology research, and whether biotechnology will reduce the range of fresh foods available. In each of these cases, an increase in each variable is expected to have a negative impact on trust.

The trustworthiness of biotechnology institutions is proxied by a variable indicating whether respondents believe current regulations are sufficient to protect people from risks and a variable indicating whether respondents believe the biotechnology industry can self-regulate. Each of these variables is expected to be positively correlated with improved trustworthiness of university scientists and food manufacturers, suggesting that they should positively affect trust in these biotechnology institutions. Competence is proxied by a variable indicating whether respondents agree that biotechnology is too complex to be adequately regulated and by a variable indicating whether respondents agree that it is not worth labeling genetically-modified (GM) food. Because a reduction in perceived competence is expected to lower trust, the variable measuring complexity and regulation is expected to be negative, while the variable representing attitudes toward food labeling is expected to be positive. (In the latter case, the justification is that if respondents are not concerned about the competence of biotechnology institutions, they may not perceive a need to distinguish between GM and non-GM foods.)

The Support Model

Equation (3) describes the relationship between public support and trust, controlling for the expected endogeneity of trust and other factors expected to affect support. Public support for biotechnology is proxied by a dichotomous variable equal to one if respondents expressed support rather than opposition to biotechnology in agriculture and food production. As shown in Table 1, approximate three quarters of respondents expressed support for biotechnology.

Siegrist (2000) and Rosati and Saba (2000) reported that increases in perceived risks tend to reduce public acceptance, while increases in the expected benefits of biotechnology research improve public acceptance (see also Wolt and Peterson, 2000; Hampel, Pfenning, and Peters, 2000). Therefore, we include variables representing respondent beliefs that biotechnology will improve life and that biotechnology is risky. Additionally, Rosati and Saba (2000) found that uncertainty regarding biotechnology and moral beliefs affected public acceptance. Therefore, a variable measuring the strength of the respondent's religious beliefs is included, as well as variables expected to reflect the degree of uncertainty a respondent feels towards biotechnology. These include a variable indicating beliefs about how important biotechnology is to the respondent, a variable measuring how informed the respondent is on biotechnology, a variable indicating whether the respondent has negative feelings towards biotechnology, and a variable indicating the level of understanding the respondent has about biotechnology and genetic engineering.

Results

Table 2 presents the results of the Probit analysis of equation (1), in which trust in scientists and trust in food manufacturers are regressed on variables representing benefits, costs, trustworthiness, and competence – factors expected to be important for trust. Table 3 presents the results of the Probit analysis of equation (3), in which a measure of public support for biotechnology is regressed on predicted trust in scientists and food manufacturers, controlling for other factors expected to affect support. The estimated slope, which represents the change in the probability of the dependent variable for a unit change in the explanatory variable, is calculated by multiplying the estimated coefficient by the average density function of the standard normal distribution evaluated for each observation (Greene, 2000).

Table 2 reveals that few variables affect trust of scientists. Indeed, the only variables significantly correlated with trust in scientists are perceptions of whether biotechnology will improve life and beliefs that current regulations are sufficient to regulate biotechnology institutions. That is, perceived benefits and expectations of trustworthiness alone are key factors explaining trust in scientists. However, the effect of these two variables is relatively small, improving trust by approximately five percent each.

In contrast, trust in food manufacturers is affected by variables representing perceived benefits, perceived costs, expectations of trustworthiness, and expectations of competence, as expected. For example, perceptions that biotechnology will result in improved life, reduced pollution, and reduced world hunger increase trust in food manufacturers by 8.7 percent, 5.6 percent, and 9.9 percent, respectively, while perceptions that biotechnology is risky lowers trust by nearly 10 percent. Moreover, expectations of trustworthiness appear to be particularly important for trust in food manufacturers. For example, respondents who believe that the biotechnology industry can regulate itself (e.g., that it is trustworthy) show a 19 percent improvement in trust in food manufacturers, relative to respondents who do not believe the industry can self-regulate. Finally, expectations of competence also appear to be important for trust in food manufacturers, suggested by the finding that respondents who believe it is not worth labeling GM foods – perhaps because they are not concerned enough about the competence of biotechnology institutions to worry about the need to distinguish between GM and non-GM foods – are 19 percent more likely to trust food manufacturers than respondents who believe GM foods should be labeled.

Table 3 shows that trust in scientists and food manufacturers has an important effect on public support for biotechnology, even after controlling for the endogeneity of trust as well as other factors expected to affect public support. Indeed, of the variables included in this analysis, trust has the largest effect on public support. For instance, based on results reported as Model 1, which examines the effect of trust of scientists, a one standard deviation in the trust of scientists improves public support for biotechnology by 41 percent. Similarly, the results reported as

Model 2, which examines the effect of trust of food manufacturers, indicate that a one standard deviation in trust in food manufacturers improves public support by nearly 23 percent. The statistically insignificant effect of trust in scientists in Model 3 is likely due to multicollinearity between trust in scientists and trust in food manufacturers. Nevertheless, the magnitudes of the estimated coefficients are still large relative to the other reported variables.

Interestingly, the analysis shows that trust in scientists appears to have a comparatively larger effect on public support for biotechnology than trust in food manufacturers, even as few factors affect that trust (see Table 2). Additionally, perceptions that biotechnology is risky result in lower public support, as do negative feelings for biotechnology. In contrast, respondents who believe biotechnology is important, who are informed about biotechnology, or who have a basic understanding of the science of biotechnology (e.g., genetics) are more likely to support biotechnology.

Discussion

This study finds that only perceived benefits and expectations of trustworthiness affect trust in scientists, while variables reflecting perceived benefits and costs, and expectations of trustworthiness and competence, collectively explain trust in food manufacturers. The fact that fewer variables are correlated with trust in scientists than with trust in food manufacturers, and that trust in scientists seems to have a stronger effect on public support for biotechnology than trust in food manufacturers, is curious. One possible explanation is based on Uslaner's (2002) distinction between generalized and particularized trust. *Generalized* trust is trust placed in most people; it is relatively stable and is largely unaffected by other factors, such as regression covariates. This is in contrast to *particularized* trust, which is trust placed in specific institutions or institutions associated with certain characteristics. As such, particularized trust would be affected by institutions or individual characteristics and hence would be relatively more affected by covariates than generalized trust. This characterization fits the data presented here. The data reveal not only that few variables (e.g., only two in this study) are correlated with trust in scientists, but also that most people trust scientists, particularly when compared to trust of food manufacturers. Thus, trust in scientists might be relatively more *generalized* than trust in food manufacturers.

According to Uslaner (2002), generalized trust is important for the development of social capital, which in turn is necessary for the functioning of democratic and market-oriented societies. Thus, if trust in scientists is generalized, then trust in scientists should have important benefits to society *generally*, especially in the context of potentially controversial issues such as biotechnology research and applications to food, medicine and other consumer products. The data appear to be consistent with this argument. Trust in scientists has a comparatively larger effect on public support for biotechnology than trust in food manufacturers (see Table 3). This will likely have important implications for the public support of biotechnology, since information the public receives about biotechnology often comes from the scientists engaged in the research. This is also consistent with previous scholarship showing that scientists are regarded by both the public and other scientists as most likely to tell the truth about biotechnology (see Lang, O'Neill, and Hallman, 2004). Hence, even if there are negative stories about biotechnology (e.g., reports of GM contamination of non-GM foods or crops), information reported by scientists might still be regarded as reliable.

Even though trust in scientists is generalized, trust in food manufacturers is affected by a full range of variables reflecting public perceptions of risks and benefits, as well as perceptions of trustworthiness and competence. This makes sense, since it is from food manufacturers that we get our food. Consumers are closer to food manufacturers than to scientists along the value chain, suggesting that public perceptions ought to be more salient in the case of food manufacturers than for scientists. Importantly, this study has shown that perceptions of trustworthiness and competence are particularly important for trust in food manufacturers. As explained above, perceptions of trustworthiness and competence are necessary for trust formation, meaning that if absent, trust will not exist. For instance, public announcements of biotechnology problems (such as GM contamination of human food products) can have negative impacts on trust, even though the trustworthiness of biotechnology institutions is not an issue. Conversely, questions of trustworthiness, which might arise because of corporate accounting scandals of both biotechnology and non-biotechnology companies, could also destroy trust. This supports Slovic's (1993) argument that a negative announcement can destroy trust quickly, but building trust is difficult because it takes time.

This study has also shown that trust in scientists and food manufacturers has a large and important effect on public support for biotechnology. Indeed, trust is shown to be more important than perceptions of risks or benefits *alone*. Given the inevitably increasing scientific advances of biotechnology research, an understanding of the relationship between trust and public support is important in guiding the social debate over GM foods and the role of biotechnology in food production. Risk assessment and communication will matter little if public trust in biotechnology institutions is lacking.

Recognizing this is essential for post-market surveillance of GM foods, for instance (see Health Canada, 2002). In developing an infrastructure for conducting post-market surveillance, effort should not be placed exclusively on determining the processes by which we assess the human health effects of new technologies, particularly those involving biotechnology and GM foods. Rather, the social impacts of conducting post-market surveillance must also be recognized. The reason is that the formation or destruction of public trust in biotechnology institutions will be directly related to the processes and outcomes of post-market surveillance, because these affect public perceptions of the trustworthiness and competence of biotechnology institutions in addition to the perceived risks and benefits of biotechnology research. For example, suppose post-market surveillance repeatedly reveals no adverse health effects of certain GM foods. Over time, public perceptions of the competence of biotechnology institutions would likely be reinforced, thus resulting in increased public trust and, consequently, public support for biotechnology applications in food production. Suppose, on the other hand, it is revealed that certain GM foods pose health risks and that biotechnology institutions (or government regulators) have systematically concealed these risks to the public. Public trust in biotechnology institutions would become seriously eroded because of a reduction in the perceived trustworthiness of biotechnology institutions, thus resulting in a decrease in public support for biotechnology – and this would be independent of the *actual* risks and benefits of GM foods.

Clearly, more research is necessary in order to understand the mechanisms by which public trust in biotechnology institutions is created and destroyed, especially since trust has such a strong effect on public support. For instance, one avenue of research is examining the processes by which risks and benefits of biotechnology are communicated to the public in addition to who does the communicating. Does the process of communicating have an important effect on trust formation? If so, then by implication it will have an important effect on public support. Another direction is to examine more recent data on public attitudes towards biotechnology in different contexts, such as comparing European attitudes to those of Americans.

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Table 1. Sample Means and Standard Deviations of Dependent and Independent Variables

Variable	Definitions	Mean	St. Dev
Dependent Variables			
Trust scientists	Dichotomous variable equal to one if respondent placed a lot or some trust in a statement by university scientists about biotechnology.	0.9035	0.2955
Trust food manufacturers	Dichotomous variable equal to one if respondent placed a lot or some trust in a statement by food manufacturers about biotechnology.	0.5511	0.4976
Support biotechnology	Dichotomous variable equal to one if respondent expressed support (rather than opposition) to biotechnology in agriculture and food production.	0.7516	0.4323
Variables in Trust Model			
Will improve life	Dummy variable equal to one if respondent believe biotechnology or genetic engineering will improve our way of life.	0.5989	0.4904
Will reduce environmental pollution	Dummy variable equal to one if respondent believes biotechnology will likely reduce environmental pollution within the next 20 years.	0.6073	0.4886
Will reduce world hunger	Dummy variable equal to one if respondent believes biotechnology will likely reduce world hunger.	0.4827	0.4999
Too risky	Dummy variable equal to one if respondent definitely agreed or tended to agree that each of the following are risky for society: use of biotechnology in food and drink; inserting genes from plants to crops; and introducing human genes into animals.	0.2371	0.4255
Likely result in new diseases	Dummy variable equal to one if respondent believes biotechnology will likely result in new diseases within the next 20 years.	0.6514	0.4768
Likely reduce range of foods	Dummy variable equal to one if respondent believes biotechnology will likely reduce the range of fruits and vegetables we can get.	0.4114	0.4923
Current regulations sufficient	Dummy variable equal to one if respondent strongly agrees or agrees that current regulations are sufficient to protect people from risks of biotechnology.	0.3702	0.4831
Industry can self-regulate	Dummy variable equal to one if respondent strong agrees or agrees that the biotechnology industry can regulate itself.	0.1921	0.3942
Too complex for policy	Dummy variable equal to one if respondent strongly agrees or agrees that biotechnology is too complicated to be sufficiently regulated.	0.1715	0.3771
Not worth labeling	Dummy variable equal to one if respondent strongly agree or agree that it is not worth putting labels on genetically modified foods.	0.1603	0.3670
Variables in Support Model			
Religious	Scale variable ranging from 0 to 10, based on respondent assessment of how religious he is, where 0 is not at all religious and 10 is very religious.	6.3330	2.7709
Biotechnology is important	Scale variable ranging from 0 to 10, based on respondent assessment of how important biotechnology is to oneself, where 0 is not at all important and 10 is extremely important.	7.2110	2.0132
Informed about biotechnology	Scale variable ranging from 0 to 10, based on respondent assessment of how informed he is about biotechnology, where 0 means not at all informed and 10 means very well informed.	4.6792	1.9765
Negative feelings about biotechnology	Dummy variable equal to one if the respondent has strongly negative or negative feelings about modern biotechnology.	0.1425	0.3497
Understanding of basic genetics	Dummy variable equal to one if the respondent correctly answered each of the following questions: (1) DNA regulates inherited characteristics in all plants, animals, and humans (correct answer true); (2) Given today's biotechnology, scientists can now create new genes that never existed in nature (false); (3) Ordinary tomatoes do not contain genes while genetically modified tomatoes do (false); and (4) By eating a genetically modified fruit, a person's genes could also become modified (false); and (5) It is impossible to transfer animal genes into plants (false).	0.0450	0.2074
Control Variables for Trust and Support Models			
College	Dummy variable equal to one if the respondent had some college education.	0.5867	0.4927
Male	Dummy variable equal to one if the respondent is male.	0.4977	0.5002
Married	Dummy variable equal to one if the respondent was married.	0.5473	0.4980
Age	Respondent age.	44.6572	15.5541

Table 2. Probit regression of trust in scientists and trust in food manufacturers.

	Trust in Scientists		**Trust in Food Manufacturers**	
Variable	Coefficient (St. Error)	Est. Slope	Coefficient (St. Error)	Est. Slope
Intercept	1.1882** (0.4915)	0.1914	-0.4762 (0.3540)	-0.1716
Will improve life	0.3057*** (0.1140)	0.0492	0.2434*** (0.0845)	0.0871
Will reduce environmental pollution	0.1264 (0.1169)	0.0204	0.1550* (0.0860)	0.0559
Will reduce world hunger	0.0347 (0.1189)	0.0056	0.2746*** (0.0855)	0.0990
Too risky	-0.1960 (0.1244)	-0.0316	-0.2758*** (0.0969)	-0.0994
Likely result in new diseases	-0.1031 (0.1245)	-0.0166	-0.0952 (0.0879)	-0.0343
Likely reduce range of foods	-0.0322 (0.1143)	-0.0052	-0.0066 (0.0841)	-0.0024
Current regulations sufficient	0.3428*** (0.1308)	0.0552	0.2633*** (0.0883)	0.0949
Industry can self-regulate	0.0643 (0.1545)	0.0104	0.5393*** (0.1137)	0.1944
Too complex for policy	-0.1603 (0.1420)	-0.0258	-0.1166 (0.1109)	-0.0420
Not worth labeling	0.1286 (0.1641)	0.0207	0.2400** (0.1141)	0.0865
College	0.0433 (0.1159)	0.0070	-0.1403* (0.0848)	-0.0506
Male	-0.1412 (0.1123)	-0.0227	0.0813 (0.0815)	0.0293
Married	0.0274 (0.1161)	0.0044	0.0378 (0.0855)	0.0136
Age	0.0035 (0.0204)	0.0006	0.0041 (0.0150)	0.0015
Age squared	-0.0001 (0.0002)	-0.00002	0.0000 (0.0002)	0.0000
Pseudo R-square	0.0706		0.1427	
Likelihood ratio (df=15)	35.5065***		119.3660***	
% correctly predicted	66.6		68.2	
Ave Density	0.1611		0.3604	

Standard errors in parentheses. Estimated slope calculated by multiplying coefficient with average density.
*** significant at 1%; ** significant at 5%; * significant at 10%

Table 3. Probit analysis of support of biotechnology, controlling for trust and other factors.

	Model 1		Model 2		Model 3	
Variable	Coefficient (St. Error)	Est. Slope	Coefficient (St. Error)	Est. Slope	Coefficient (St. Error)	Est. Slope
Intercept	-4.2728*** (1.2894)	-1.1374	-0.4284 (0.4677)	-0.1137	-1.9287 (1.6198)	-0.5109
Trust scientists (predicted)	5.2128*** (1.3203)	1.3876			1.8597 (1.9234)	0.4926
Trust food manufacturers (predicted)			1.7134*** (0.3822)	0.4546	1.3237** (0.5556)	0.3506
Will improve life	0.0611 (0.1247)	0.0163	0.1755* (0.1059)	0.0466	0.1093 (0.1259)	0.0290
Too risky	-0.3679*** (0.1197)	-0.0979	-0.3896*** (0.1134)	-0.1034	-0.3522*** (0.1199)	-0.0933
Religious	-0.0112 (0.0174)	-0.0030	-0.0171 (0.0175)	-0.0045	-0.0156 (0.0175)	-0.0041
Biotechnology is important	0.0645*** (0.0251)	0.0172	0.0691*** (0.251)	0.0183	0.0672*** (0.0252)	0.0178
Informed about biotechnology	0.0999*** (0.0259)	0.0266	0.1014*** (0.0261)	0.0269	0.1017*** (0.0261)	0.0269
Negative feelings about biotechnology	-0.2963** (0.1264)	-0.0788	-0.2946** (0.1262)	-0.0782	-0.2916** (0.1264)	-0.0772
Understanding of basic genetics	0.6121** (0.2795)	0.1629	0.5986** (0.2784)	0.1588	0.6027** (0.2792)	0.1597
College	0.1077 (0.0946)	0.0287	0.2707*** (0.0997)	0.0718	0.2307** (0.1078)	0.0611
Male	0.3429*** (0.0982)	0.0913	0.1759* (0.0956)	0.0467	0.2271** (0.1096)	0.0602
Married	0.0116 (0.0985)	0.0031	0.0133 (0.0985)	0.0035	0.0062 (0.0989)	0.0016
Age	-0.0395** (0.0177)	-0.0105	-0.0365** (0.0178)	-0.0097	-0.0365** (0.0178)	-0.0097
Age squared	0.00049*** (0.00018)	0.00013	0.00036*** (0.00018)	0.00010	0.00039** (0.00019)	0.00010
Pseudo R-square	0.2128		0.2188		0.2199	
Likelihood ratio (df=13)	158.7074***		163.5604***		164.4992***	
% correctly predicted	75.4		75.4		75.5	
Ave Density	0.2662		0.2653		0.2649	

Standard errors in parentheses. Estimated slope calculated by multiplying coefficient with average density.
*** significant at 1%; ** significant at 5%; * significant at 10%