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Learning versus status quo bias and the role of social capital in technology adoption: The case of cocoa farmers in Côte d'Ivoire

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Abstract

In this study, we allege that the hypothesis in favour of a status quo bias is a plausible explanation when it comes to better understanding the lack or the absence of adoption of the best farming practices in small rural communities in sub-Saharan Africa. Our results also suggest that the greater a farmer's social capital, the more likely he is to exchange information, learn and eventually revise his farming practices. Such information about farming techniques disseminates through weak ties (bridges) built within agricultural organisations more than across family or diaspora members (i.e., via their stronger ties).

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1. Introduction

In this study, we investigate why Ivorian cocoa farmers have a yield per hectare which is far below what they could "relatively easily" obtain (i.e., from 1500 up to 3000 kg/ha in pilot farms vs. less than 500 kg/ha on average in real life). More generally, how to account for family farming's failure to improve their crop yields in sub-Saharan Africa? The first answer that springs to mind is that they usually do not implement/invest into the most efficient agronomic practices. Less obvious is why? More specifically, what attitude (e.g., status quo or routine versus proactive behaviour) does the farmer adopt about uncertainty, risk and investment? What drives the adoption/diffusion of new agricultural technologies? Firstly, one may want to consider the smallholder's awareness of the need to adopt new technologies or to change his farming practices in order to reach higher yields. This implies that the smallholder shows some intellectual curiosity and interest in developing his agricultural skills and acquiring new knowledge in terms of agronomic practices. Secondly, one must take into account the farmer's capability to weigh up the pros and the cons (i.e., the benefits to be gained against the costs) of adopting them. Eventually, this implies that the farmer shows capability to adopt and effectively use the new agricultural technology, should he so decide.

Barriers to agricultural technology adoption in the economic development literature mostly include external constraints like credit, inputs and output, land and labour market imperfections as well as informational inefficiencies[1]. In this study, we focus instead on internal constraints in order to better understand agronomic decision-making. We take seriously what the Nobel Laureate Herbert Simon (1955, 1957) called "bounded rationality," which refers to situations where actors face alternatives for which they lack information about the problem in question and/or the cognitive capacity to weigh the pros and the cons in order to make a decision, even such a basic decision as learning (see also Kahneman 2003).

To some extent, we expect learning to occur only if the farmer expresses some dissatisfaction, which is a corollary of his awareness about an anomalous state of knowledge. In fact, the farmer may not even be aware of his needs or willing to make an effort to satisfy his needs for information. Eventually, this prevents him from getting out of a habitual behaviour or any mental/cultural trap that limits *in fine* his decision-making freedom (Haushofer and Fehr 2014).

It is also recognized that the need for information may become apparent to the farmer during interactions with peers who may be perceived as more or less trustworthy depending on both their individual and aggregate (i.e., at the community/village level) stocks of social capital. In other words, what about social learning through more or less active participation in social networks (Conley and Udry 2001; Munshi 2004, 2008)? How important is an individual's social capital in shaping agricultural technology adoption, where social capital refers to one's perception about community members' solidarity, fairness and trust and each member's willingness to live by the norms of community as well as more or less active participation into community activities (Bowles and Gintis 2002).

2. Preliminary evidence for a status quo bias in decision-making

Both a farmer's need for information and his social capital are difficult to pin down. For instance, the need for information cannot be observed directly but only through the farmer's actions. What is observable and measurable is the action or, on the contrary, maintaining the status quo with respect to agronomic practices (i.e., "business as usual", habits, automaticity bias, etc.), where we usually call status quo bias the resistance to change. Because a smallholder's need

1. See, for instance, the literature review by Jack (2013).

for information is not directly observable, we explicitly asked them in September 2014: "Have you changed your farming practices over the last two years?" That was about three years after the Ivorian post-election crisis.

Our social capital and agronomic practices survey covers five villages/communities located in the so-called "last cocoa belt" (i.e., South-West Nawa region) of Côte d'Ivoire[2], and concerns more than twelve hundred smallholder cocoa producers. Only 30% (i.e., less than four hundreds) had revised their agronomic practices. Thus, smallholders disproportionately stick to the status quo, which corroborates results from a lot of decision-making experiments (see, for example, Samuelson and Zeckhauser 1988).

What are the possible explanations for this bias? We asked them what is the main reason why they have (not) made any change via an open-ended question. Among those farmers who did not modify their agricultural practices over the last two years, 40% declared that this was because they were "satisfied". Only 20% claimed to "lack resources" whereas 19% referred to "habits" thus suggesting routine behaviour. This is preliminary evidence, which suggests that a smallholder may not be a rational "maximiser" (i.e., striving to get the best out of every decision and any action that follows). Rather, he may be closer to a "satisficer" in accordance with Simon's neologism for "satisfying-sufficing". Interestingly, farmers who did not change their farming practices over the last two years do perform worse on average today in only two villages over the total of five villages surveyed[3]. The null hypothesis of independence between "having changed farming practices over the last two years" and "productivity change over the last three years" is rejected at the 5% significance level. Among those farmers who did (not) modify their practices, two-thirds (three-quarters) experienced no productivity change whereas one-fourth (one-fifth) experienced an increase in productivity.

It is also worth noting that, among those farmers who changed their practices, three-quarters report agricultural organisations and cooperatives as their main source of agricultural information and learning. Other sources of learning or information like media (TV, radio) or business relationships (input suppliers, output buyers) are very few in number, 4% and 16%, respectively.

Next, what about the difference in behaviour between internal (mostly Baoulé) and external (mostly coming from Burkina Faso and Mali) migrants? Do they have a particular propensity for having changed their farming practices relative to natives? Are we able to infer that natives are more conservative and thus less inclined to take risks? Interestingly, natives are more inclined to favour the status quo compared to migrants. The null hypothesis of independence is here rejected at the 1% significance level. The opposite is true for those farmers who claim to have administration rights for their plantation. Finally, farmers working a relatively small plantation exhibit a stronger status quo bias, while farmers among the highest performers show a proactive behaviour. Thus, a native farmer working a small plantation and who does not have administration rights over it tends to exhibit a stronger status quo bias[4].

3. Social capital, information exchange, and new technology adoption

How to explain the status quo? In this study, we explore the role of both structural and cognitive social capital. To this end, we first build using a multiple correspondence analysis, a two-

2. The average yield is 442,7 kg/ha, ranging from 354,5 kg/ha in the least productive village up to 583,9 kg/ha in the most productive village.
3. At least, farmers who did revise their practices over the last two years do not, on average, perform worse whatever the village we consider…
4. The null hypothesis of independence between "having changed practices over the last two years" and age on the one hand, and education on the other hand, cannot be rejected.

dimensional civic capital space within which each farmer is located through coordinates relative to the others (see Bourdieu 1979, for a well-known application of this data analysis technique). Our civic capital space reflects (classified in decreasing order): i) solidarity (e.g., "most of the time, people try to help."); ii) reciprocity (e.g., "people try to take advantage."); iii) trustworthiness (e.g., "most people can be trusted."); and iv) cooperation (e.g., "how often did you take part in a collective action with others over the past three years?")[5]. Thus, we end up with a distribution of civic capital in each surveyed village/community (see Figure 1.a-b). These individual coordinates provide a much less noisy measure of individual trust than usual discrete variables such as "in general, one can trust people."

Firstly, farmers are located in the 2D (two dimensional) civic capital space as depicted in Figure 1.a where those located in the Northeast quadrant tend to see people in their community as trustworthy, fair, and caring. They are also more actively involved in community actions. In contrast, farmers located in the Southwest quadrant are distrustful and suspicious of other people in their community. Note that, similarly to results obtained across countries or for regions belonging to the same country (e.g., Italy), there is a wide degree of diversity across villages, even though they do not lie very far apart from each other geographically. Thus, Villages 4 and 5 are characterised by the highest mean civic capital. Incidentally, they are also the most productive ones, which suggests that it may be useful to look at their characteristics (e.g., ethnic, religious, and political balances, history, infrastructures).

Secondly, the distributions along the first (x-) axis[6] of the civic capital space of farmers who did (red line), and respectively did not (blue line), change their farming practices over the last two years, are depicted in Figure 1.b, where vertical lines indicate median levels of civic capital for each group of farmers. The message here is clear: Most farmers who did modify their practices are concentrated on the right of the distribution of civic capital, while the distribution of farmers who did not adjust their practices is skewed to the left.

Figure 1.a. Cloud of farmers across communities and representative farmers for each village (mean level and 95% confidence ellipse) in the 2D civic capital space.

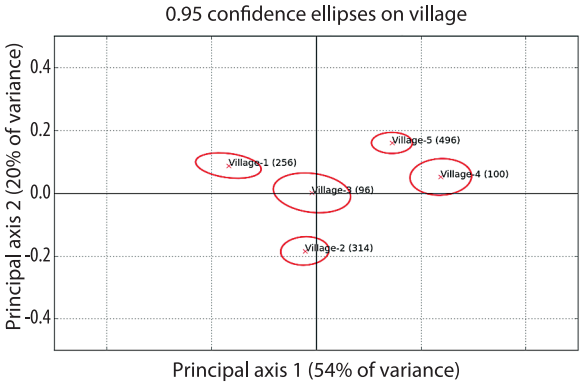
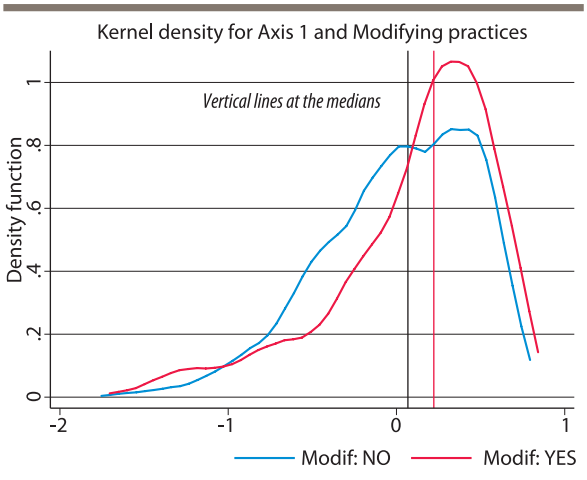


Figure 1.b. Distributions of civic capital along the 1st axis and modification of agronomic practices ('yes' = red, 'no' = blue).



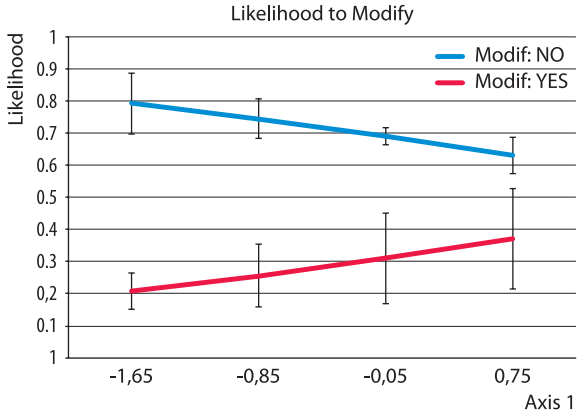
5. See, among others, the literature reviews by Durlauf and Fafchamps (2005) and Fehr (2009). Guiso et al. (2011) is our reference text to civic capital.

6. That is, the most important dimension in terms of the amount of variance accounted for: 54%. (The first and second axes account together for 74% of the variance.)

Our study aims at testing the following null hypothesis: Individual social capital has no impact on a farmer's decision to have revised his agronomic practices over the last two years. Indeed, a rather optimistic belief about community members' trustworthiness (compared to rather pessimistic beliefs) should lead a farmer to be more proactive in seeking information and trusting those in possession of it like, for instance, representatives and/or members of agricultural organisations, family or diaspora members, neighbours, and friends, eventually leading him to revise his current farming practices.

The determinants of civic capital are examined as a preliminary step to testing the above null hypothesis. To this end, we perform a (OLS) regression where the dependent variable is the first axis of the above MCA[7]. Firstly, following Granovetter (1973, 1985), our model corroborates the strength of weak ties in exchanging agricultural information, learning, and technology adoption, which influence a farmer's civic capital. We also find that relational (i.e., outside the family/diaspora networks) in contrast to structural (e.g. family network) embeddedness is positively, respectively negatively, related to civic capital[8]. More specifically, in contrast to agricultural information exchange and learning, the exchange of personal information between members (as a declared benefit of group membership) is not significantly related to an individual's civic capital. Secondly, the smallholder who has the administrative rights on his plantation is endowed with more civic capital while migrants are more inclined to mistrust and suspicion than natives. Thirdly, civic capital is related neither to the age nor to the education of the farmer. Fourthly, civic capital does not depend on the size of the plantation. And last, but not least, there is an inverted-U shaped relationship between the crop life cycle and civic capital. A farmer's civic capital increases during the early stage of growth of the plantation. It then reaches a maximum when the plantation reaches maturity (i.e., highest yield) and, eventually, decreases.

Figure 2. Marginal effects of civic capital (x-axis) on having changed or not farming practices (y-axis).



We now perform a Logit regression where the dependent variable is the answer ('Yes' or 'No') to our key question: "Have you changed your farming practices over the last two years?" The farmer's civic capital is a robust determinant of agricultural technology adoption even after controlling for group memberships, smallholder's characteristics[9], plantation size (quartiles), and the crop life cycle, which, interestingly, exhibits now a significant U-shaped relationship with fine-tuning processes and technology adopted by the farmer. More precisely, the probability that a farmer has changed his farming practices over the last two years increases monotonically from 20% up to almost 40% with civic capital as measured by the first axis obtained from the MCA. In Figure 2, we depict the marginal effects

7. All models are estimated with and without dummies for villages: A check about the relative importance of inter- versus intra-variability.
8. Most farmers (90%) belong to at least one group and less than one hundred farmers are members from more than two groups. For two-thirds of them, the group that they would consider the most important is an agricultural organization (e.g., cooperative, "groupe d'intérêt économique"). Finally, as to whether they found something back in belonging to a group, this is an almost unanimous 'yes'.
9. Control variables here include migrant versus native, age (entered in quadratic form), education (binary), administration rights (binary), household size (continuous), and the number of males older than 18 years who work in farming (continuous).

of civic capital on having changed (red line) or not (blue line) farming practices for different levels of individual civic capital. In addition, it should be noted that both internal and external migrants on the one hand, and farmers with the administration rights on their plantations on the other hand, are more likely to have changed their farming practices.

These relationships between a farmer's civic capital and the decision to make changes in his farming practices with the crop life cycle intrigue us. In our view, it should lead us to wonder about the different spheres of knowledge, in this case, the traditional agricultural knowledge (i.e., technical-practical) and the more technical-scientific knowledge, which requires to be effectively relayed through experts and scientists who most often come from international organisations or Northern academic institutions (Olivier de Sardan 1995). Is it relevant to address the natural and social environments separately? In our view, such a question is important and should be addressed in future research.

The next challenge now is to better understand the attachment of such a large share of farmers to the status quo. At this stage, it is interesting, based on our research, to emphasize that Ivorian cocoa farmers already make use of inputs (fertilisers, pesticides, and fungicides) as well as give special attention to shade. Indeed, they are more than 80% to report having made use of pesticides and fungicides during the year preceding the survey, and nearly all of them took care of the trees by removing suckers. Maybe, the only downside is that they are only slightly more than half to have applied fertiliser. Thus, most farmers seem to apply a mixture of practical and scientific rules of thumb year after year, whereas those who fine-tune their choices from one year to the next independently from the tree life cycle are the exception rather than the rule.

4. Conclusion

If a status quo bias in terms of technology adoption emerges from our survey of cocoa farmers whereas they only get an average yield three to four times below what they could quite easily obtain, it also appears that the individual social capital of a community member is positively associated with the benefits he derives from interacting with peers within farming organizations. This eventually leads him to revise and fine-tune his farming practices over time. Thus, weak ties built up across members of farming organisations (e.g., cooperatives) appear to be more conducive to both information exchange and new technology adoption than are stronger ties developed among family or diaspora members.

References

- **Bourdieu, P.** (1979) *La Distinction*. Les Éditions de Minuit.
- **Bowles, S.** and **Gintis H.** (2002) "Social capital and community governance." *The Economic Journal*, 112: F419-F436.
- **Conley, T.** and **Udry C.** (2001) "Social learning through networks: The adoption of new agricultural technologies in Ghana." *American Journal of Agricultural Economics*, 83(3): 668-73.
- **Durlauf, S.N.** and **Fafchamps M.** (2005) "Social capital." *Handbook of Economic Growth*, eds. Aghion, P. and S.N. Durlauf. North-Holland.
- **Fehr, E.** (2009) "On the economics and biology of trust." *Journal of the European Economic Association*, 7(2-3): 235-66.
- **Guiso, L.**, **Sapienza P.** and **Zingales L.** (2011) "Civic capital as the missing link." *Handbook of Social Economics*, eds. Benhabib, J., A. Bisin and M.O. Jackson. North-Holland.
- **Granovetter, M.S.** (1973) "The strength of weak ties." *American Journal of Sociology*, 78(6): 1360-80.
- **Granovetter, M.S.** (1985) "Economic action and social infrastructure: The problem of embeddedness." *American Economic Journal of Sociology*, 91(3): 481-510.
- **Haushofer, J.** and **Fehr E.** (2014) "On the psychology of poverty." *Science*, 344(6186): 862-67.
- **Jack, B.K.** (2013) "Market inefficiencies and the adoption of agricultural technologies in developing countries." Literature review, Agricultural Technology Adoption Initiative, J-PAL (MIT) and CEGA (UC Berkeley).
- **Kahneman, D.** (2003) "Maps of bounded rationality: Psychology for behavioural economics." *American Economic Review*, 93(5): 1449-75.
- **Munshi, K.** (2004) "Social learning in a heterogeneous population: Technology diffusion in the Indian Green Revolution." *Journal of Development Economics*, 73(1): 185-213.
- **Munshi, K.** (2008) "Social learning." *The New Palgrave Dictionary of Economics*, 2nd Edition, Edited by S.N. Durlauf and L.E. Blume.
- **Olivier de Sardan, J-P.** (1995) *Anthropologie et développement*. Karthala.
- **Samuelson, W.** and **Zeckhauser R.** (1988) "Status quo bias in decision making." *Journal of Risk and Uncertainty*, 1(1): 7-59.
- **Simon, H.A.** (1955) "A behavioral model of rational Choice." *Quarterly Journal of Economics*, 69(1): 99-118.
- **Simon, H.A.** (1957) *Models of man, social and rational: Mathematical essays on rational human behaviour in a social setting*. New York: John Wiley and Sons.

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