Does Intrinsic Motivation Shape Aspirations?

Evidence from Smallholder Dairy Farmers in the Bolivian Plateau

MSc. Thesis - Chair Group Development Economics

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Abstract: In this paper, we shed a light on the interconnections among aspirations and hope and intrinsic motivation, an indicator that has not been yet fully addressed in recent development economics literature. Two possible processes are isolated: "motivation as the shaping of aspiration" and "motivation as limiting factor". We used an original sample of 531 collected among milk producers in rural Bolivia. A random selection of 228 individuals took part in a Hope Curriculum, that included the screening of a video and a motivational course. Our results indicate that motivation does not act directly on the aspiration utility curve, but it shows a slightly indirect effect on the level of aspirational goal. Moreover, the utility curve is presented to be concave instead of convex as previously demonstrated. On the opposite, we find positive evidence that intrinsic motivated presented a higher degree of change on internal constraints after the participation in the Hope Curriculum. Policymakers, development practitioners and NGOs operators may take into account our considerations to decide what type of people address when preparing an intervention on the field.

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1. **Introduction**

Most studies on poverty traps focus on 'external constraints' to economic development. They do this by examining, for example, lack of access to finance, labour and product markets, as well as knowledge and education. A more recent strand of literature seeks to integrate the former by investigating the role of so-called 'internal constraints' in poverty traps. (Beaman et al. 2012; Wydick et al. 2013; Tanguy et al. 2014; Dalton et al. 2016; Lybbert & Wydick, 2016, 2018; Rojas Valdes et al. 2018). Its proponents suggest that internal psychological constraints limit the potential of development through 'psychological traps'—such as culturally imposed internal constraints—that create a belief that one is incapable of being successful in certain activities or domains in their own economic life (Sen, 1999). The argument is that if poor people are hopeless, pessimistic beliefs will create a self-fulfilling prophecy, inducing to less investment, less care in their work and lower production. Moreover, feelings of hopelessness may hamper the effectiveness of interventions from international organizations and governments, increasing even further the spiral of hopelessness. In the words of psychologist Albert Bandura "failure to address psychosocial determinants of human behaviour is the weakest link in social policy initiatives [...], simply providing ready access to resources does not mean that people will take advantage of them." (Bandura, 2009). Economists are interested in a particular dimension of hope: 'aspirational hope'. Contrary to 'wishful hope', which is characterized by low agency and vague objectives (e.g. "I hope one day someone will help me get rich"), 'aspirational hope' has an important element of self-determination, as well as clearly defined and time-bound goals (e.g. "I hope next summer I will be able to build a water tank"). It is of great importance for policymakers and practitioners to better understand how psychological factors such as aspirational hope influence poverty dynamics.

In this study, we contribute to the literature by investigating the link between aspirational hope and intrinsic motivation. This is defined as: "the doing of an activity for its inherent satisfactions rather

than for some separable consequence; [...] an intrinsically motivated person is moved to act for the fun or challenge entailed rather than because of external prods, pressures, or rewards" (Ryan & Deci, 2000). We measure intrinsic motivation using the Perceived Locus of Causality (PLOC) instrument, building upon an ongoing data collection among dairy farmers in Bolivia. We analyse to what extent PLOC affects the non-linearity (α) in utility for outcomes below an 'aspired' goal—assuming a non-linear reference-dependent utility function. We find that intrinsically motivated farmers tend to have lower 'sensitivity' to the aspirational reference point (i.e. lower α, more linear/less concave utility up to the reference point). However, this can be partially explained by the correlation between PLOC and the aspired outcome—intrinsically motivated farmers aspire to produce greater amounts of milk. Finally, we test whether intrinsic motivation is correlated with the consequences on the effectiveness of a 'hope curriculum' in shaping aspirations. The hope curriculum is designed to unbind internal constraints to three pillars of aspirational hope: aspirations, pathways, and agency. We find that intrinsically motivated individuals showed a larger increase in their own aspirations, pathways and self-agency scores after participating in the Hope Curriculum suggesting motivation plays an important role in addressing internal constraints. This study thus contributes to the ongoing debate on internal constraints and poverty traps presenting empirical evidence on a psychological indicator that has not been fully addressed in the literature.

The rest of the paper is organised as follows. In the next section, we will present a literature review on the main findings on hope, aspiration, motivation and their application in the development context. This review will help us to introduce in Section 3 the theoretical framework that will guide our experiment. Section 4 and 5 explain instruments, context and data that will be used in Section 6 to elaborate the empirical strategy. Section 7 presents the results and main findings. Finally, section 8 concludes with final discussions.

2. Literature review

Amartya Sen is the precursor in the domain of internal constraints and poverty traps. In his theory of human's capabilities, Sen argues that development is a force aiming to expand human agency to pursue meaningful goals. His theory brings him to argue that internal constraints are more significant than economic/external constraints in creating poverty traps, due to a state of mind characterized by low-agency and hopelessness (Sen, 1999). In his classic essay "The capacity to aspire", the anthropologist Arjun Appadurai (2004) further argues that aspirations are built on culture and are socially determined. Poverty traps are created from a lack of aspirations: indeed, the poor may lack the aspirational resources to imagine alternative situations to their current reality. Debraj Ray (2003) built upon the insights of Sen and the theoretical framework of Appadurai, defining aspirations as the social grounding, the experiences and behaviour of other individuals in the cognitive neighbourhood of that person: it is the whole of other people's experiences and behaviours that drive group's interaction and dynamics. Ray introduced three new concepts of "Aspiration Windows", "Aspiration Gap" and "Aspiration Failure". Aspirations Window represents "an individual's cognitive world: the lives, achievements, ideals of those who exist in her aspirations window" (Ray, 2003). The aspirations window will determine what are the goals that a person can realistically aim to pursue within its social and cultural context. Aspiration Gap refers to "the difference between the standard of living that is aspired to and the standard of living that one already has." (Ray, 2003). Those aspirations gap are the main drivers of future-oriented behaviour. He argues that individual with too narrow or too wide of an aspiration gap may lack the incentive to invest in raising their own standard of life—in this case, it is called "Aspiration Failure". This relation has been shown empirically in a later paper, in which the authors state that "aspirations […] moderately above an individual's current standard of living tend to encourage investment, while still higher aspirations may lead to frustration" (Genicot & Ray, 2017).

However, considering aspirations as the only factor which inspires hope in the individual would be disregarding the complexity of the human mind. Literature on psychology presents many theories that analyse what are the processes that make humans aspire and hope to achieve something. The positive psychologist Charles Snyder has brought important contributions to the topic: he defines Hope as "a positive motivational state that is based on an interactively derived sense of successful agency (goal-directed energy) and pathways (planning to meet goals) directed to achieve an aspirational goal" (Snyder, 2002). Pathways represent the extent to which a person can articulate what are the effective routes to pursue his goal, considering all the alternative paths. Self-Agency indicates the perceived capacity to get through all the process to accomplish the intended final goal/ambition: it is the motivational part of the model.

Recently debates on the topic flourished, since development economists conducted several experiments that provided meaningful insights into the validation of the psychological and anthropological theory of hope and aspiration. A celebrated field experiment conducted by Tanguy et al. (2014) measured the effect of an intervention aimed specifically at increase aspiration among farmers in rural Ethiopia. The researchers randomly assigned the participants in three groups: the first group was invited to watch a documentary about farmers of neighbour communities that were regarded as successful in their businesses, the second group was invited to watch an entertainment programme, and the third was the control group. Six months after the treatment, they found that aspiration improved only among the treated individuals, and there was evidence of positive effects on savings, credit use and children's school enrolment and spending.

Further confirmation of the effect that role models play in raising aspirations level is given by Beaman et al. (2012). The researchers administered more than 8000 surveys in 495 villages in rural India to youngsters up to 15 years old, in which they measured differences in aspirational levels among girls, boys, and the parents. The key here is that the government randomly assigned leadership positions to

women in randomly selected villages in the sample. The results showed that the aspirational level was substantially higher in the villages in which the councils saw female representatives for two consecutive elections compared with villages that had only one or no female leader.

Garcia et al. (2018) conducted a study among 1295 women in Sierra Leone, of whom 845 where borrowers of a microfinance institution, and they show that microcredit has a positive and significant impact in raising life aspirations and satisfaction.

Several studies conducted on child sponsorship programmes in Bolivia, Guatemala, India, Kenya Philippines and Uganda have found meaningful impacts on years of schooling, completion of school, and business outcomes, as probability to find a high-income job (Wydick et al., 2013, 2017) These changes are partially due to the relaxation of internal constraints: indeed, an instrumented analysis of the self-portraits showed that participation in the programme significantly increased level of happiness, self-efficacy and hopefulness. (Glewwe, Ross, & Wydick, 2014, 2017)

Finally, building upon the work of Appadurai (2004), Ray (2003) and Snyder (2002), T. J. Lybbert and B. Wydick, built a complete economic model of Hope including the four elements of aspiration, hope, agency, and pathways. They applied their model to graphically show the impact of different types of interventions on alleviating internal and external constraints using prototypical case from empirical literature in development economics (2018). To validate their theoretical model, the authors conducted an experimental study in Oaxaca, Mexico, in which 601 indigenous women with access to microfinance loans participated in a Hope Intervention. The intervention consisted of three elements. Firstly, similar to the experiment of Tanguy et al. (2014) they watched a documentary about successful female entrepreneurs. Secondly, they received a refrigerator magnet on which they write three personal goals. Thirdly, they participated in workshops aimed at lifting aspirations, pathways and agency. In the short term, the intervention had the effect of raising aspirations and hope, with no significant change on business outcomes (Lybbert & Wydick, 2016). In the long term, the effects on

aspirations reduced, while there has been an increase in agency and pathways, suggesting that while aspiration can be lifted quickly, the other two elements of the Hope Theory only change gradually. Furthermore, it was confirmed a mild but positive outcome on business indicator (Rojas Valdes et al., 2018).
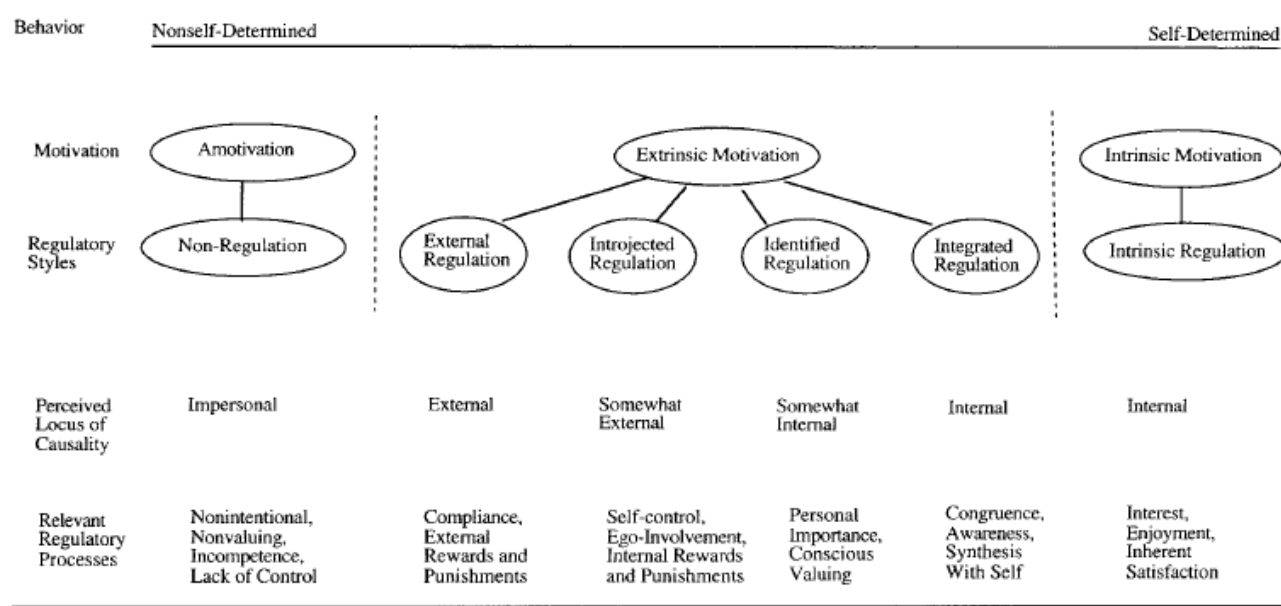
3. Theoretical framework

3.1 Introduction

There is a common agreement in literature that aspirations are externally determined (Snyder, 2002; Ray, 2003; Appadurai, 2004; Lybbert & Wydick, 2016; Rojas Valdes et al., 2018). Individuals set aspirations depending on external variables determined by society and culture. On the other side, the Self-Determination Theory (STD), developed by psychologists Ryan and Deci, analyses the processes and contents of goal pursuit in the human mind. The key point is that "motivation do not differ only in the amount of aspiration (how much), but also in the orientation (what type): it concerns the underlying attitudes and goals that give rise to action—why people are moved to do something" (Deci & Ryan, 2000). Motivation to reach an aspired goal can be distinguished on two main directions: Extrinsic or Intrinsic. Extrinsic motivation represent behaviours performed only to satisfy externally imposed demands or attainments forced by social pressure. On the contrary, Intrinsic motivation represents behaviours in which the individual embodies his own behaviours with his personal values: he enjoys pursuing his own goals. The two orientation are not mutually exclusive; indeed, they exist in a continuum, in which several major regulatory styles can be differentiated (Figure 1).

Figure 1: Self-Determination Continuum (Ryan & Deci, 2000)

Studies on Intrinsic Motivation in the development setting are not new. Kessler (2008; 2016) provided some insights into the role of intrinsic motivation in lifting people out of poverty traps. He presented a bottom-up approach for integrated soil fertility management, called PIP approach (Plan Integrè de Paysan), that lies in building a strong motivational foundation among the farmers prior to the realization of development interventions. He defines motivation as the capacity of people to influence their own future (2016). Empirical evidence on the effectiveness of this approach are scarce, but the PIP Impact Report (Kessler et al., 2018) showed that the approach has been effective in increasing awareness about integrated soil fertility management practices among intrinsically motivated farmers. It also presented qualitative evidence that these individuals were more likely to positively respond to development interventions.
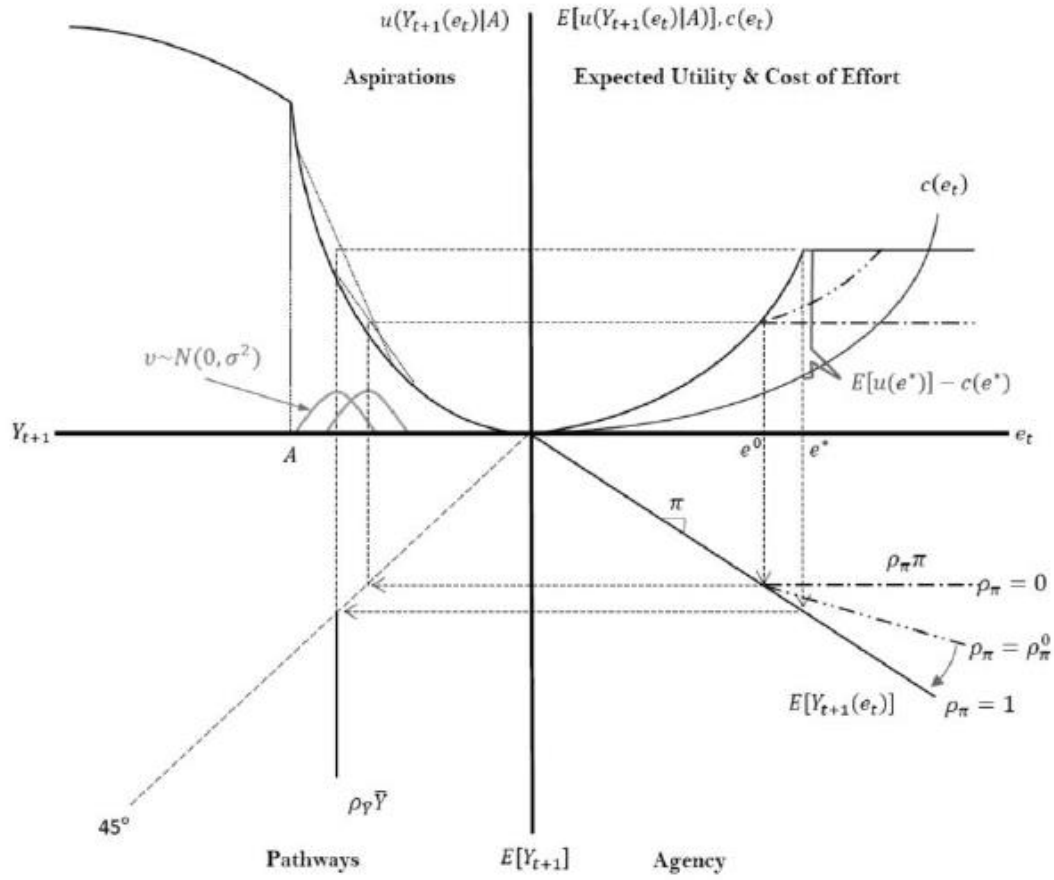
But, is it possible to change the directionality of motivation? Authors agree that people can move along the continuum through the process of internalization: "the action of actively synthesizing cultural aspects, values, regulations and incorporate them into personal values", what Appadurai (2004) defines as the cultural foundation of aspirations. However, motivation needs long time to be

internalized. Deci and Ryan (2000) state that innate motivation can be thwarted or incentivized through deep changes in the environment in which the individual exercise his activities. For instance, Kessler (2008) needed two years to create a solid foundation of intrinsic motivation among the villagers in Bolivia, and three months of fieldwork in Ethiopia (2015). Thus, we will assume for our analysis that intrinsic motivation cannot be affected by our intervention in a short time. On the opposite, experiment on the field presented in the previous paragraph shown that the other psychological indicator, such aspiration and hope, can be nurtured from external interventions. But then, how would intrinsic motivation act upon aspiration and hope? We isolated two possible processes. First, intrinsic motivation could act as an "aspiration-shaping agent": intrinsically motivated people perceive a lower psychological loss from not reaching their aspiration. Second, as Kessler argues, intrinsic motivation could be a "limiting factor" that need to be overcome in order to further develop other psychological indicators. We want to find evidence if both, only one, or none of this process actually take place.

3.2 Intrinsic Motivation as Shaping Agent for Aspiration

In order to describe how motivation act upon aspirations we will use the Hope Model from Lybbert & Wydick (2018), presented in Graph 1.

Graph 1 The Hope Model (Lybbert & Wydick, 2018)

It shows how the psychological traits in Snyder's Hope Model - Aspirations, Utility, Agency and Pathways - interrelate among each other. Quadrant North-West presents the utility curve based on aspiration and life outcomes:

$$u(Y|A) = A(\frac{Y}{A})^{\frac{1}{1-\alpha}} * 1(Y < A) + A(\frac{Y}{A})^{1-\alpha} * 1(Y > A) \qquad (1)$$

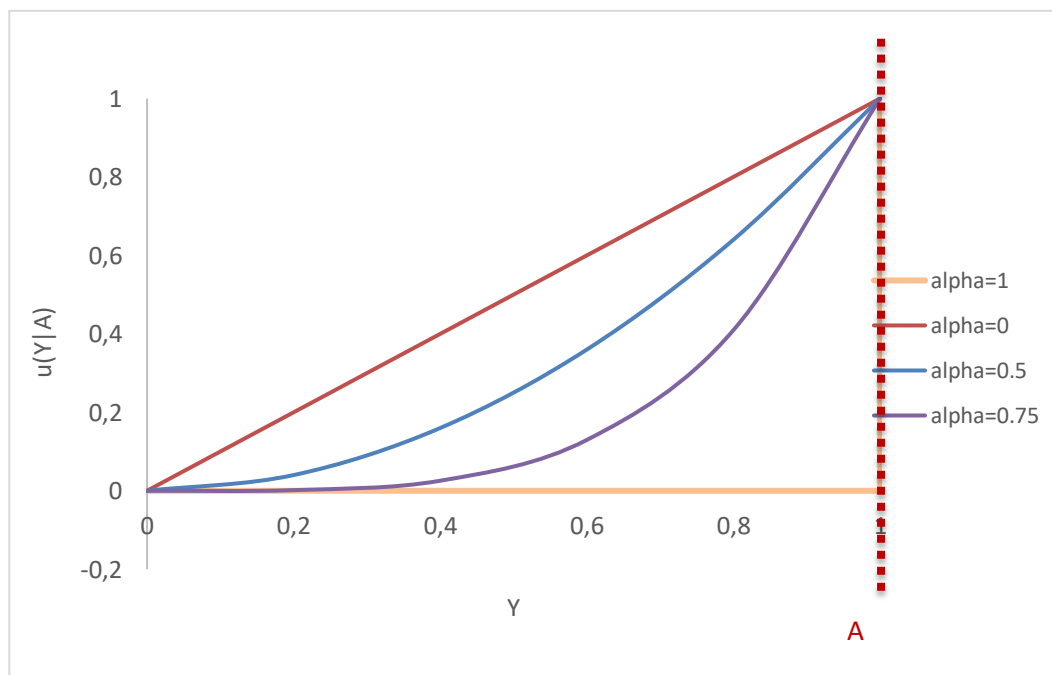In which, $u(Y|A)$ is the utility level given aspirational goal A for a certain life outcome Y and individual weight of aspirations (α). The two indicator functions $1(Y < A)$ and $1(Y > A)$ indicate that aspiration A is a reference point in the utility function. The curve follows a Kahneman & Tversky (1976) reference-dependent utility function: it is increasing and convex up until the reference point,

and diminishing and concave after it. We hypothesize that intrinsic motivation plays a role in defining the weight of aspirations on utility. This parameter is exogenous in the model, but quite interestingly scholars suggested that it is needed to distinguish in which cases it could be endogenized (Lybbert & Wydick, 2018). It is plausible to consider that intrinsically motivated people would feel on a lesser extent the psychological loss from not reaching their goal, and would present lower aspirational curves. To formally represent our theoretical model, we take into consideration (1) only for the specific case Y<A:

$$u(Y|A) = A(\frac{Y}{A})^{\frac{1}{1-\alpha}} \tag{2}$$

In Graph 2, we sketch four different utility function based on (2) with varying degree of α. It presents the same information as the North West quadrant of Graph 1 in which y-axis has been shifted on the left. It shows utility levels up until aspiration A, represented as a red-dotted line. X-axis gives Y life outcomes, while the y-axis indicates the level of utility from being in a certain life outcome Y. The graph is built in such a way that when aspirations A are reached the value of utility is at 100% (namely, 1).

Graph 2: Comparison Aspiration Utility Function

Taking an example from Ryan and Deci (2000), we can imagine the effect of intrinsic motivation considering two elementary students doing their homework at home. The red curve ($\alpha = 0$) represents the case of an intrinsically motivated, diligent student actively involved in the process of finishing its task. He values all the steps in the process, and receive a fraction of the final utility for each step The orange curve ($\alpha = 1$) represents the case of an extrinsically motivated lazy student that only complete his homework because he is forced from his parents. He fell completely alienated from the activity, and he would rather be outside in the playground. The utility he perceived from every single task is null until he has not finally completed its homework. The differences in value attainment are given by the perceived loss of utility from not being in the highest utility curve. Among these two extremes, the curves with $\alpha = 0.5$ and $\alpha = 0.75$ indicate individuals with intermediate values of intrinsic motivation. We expect a negative correlation between intrinsic motivation and α: in fact, an increasing level of intrinsic motivation tends to flatten the curve.

RQ1: Does intrinsic motivation shapes aspiration utility function?

Answering to RQ1 imply to verify following sub-questions:

RQ1.1: Is the utility function convex below the aspiration level?

RQ1.2 Does intrinsic motivation correlates negatively with the significativity of aspirations α?

3.3 Intrinsic Motivation as Limiting Factor

We want to test if low intrinsic motivation limits the development of psychological traits in Snyder's Hope psychological model – Aspirations, Self-Agency and Pathways -when an external intervention take place. In particular, we want to examine if changes are heterogeneous among intrinsically motivated people and not intrinsically motivated people. We will consider again the Hope Model by

Lybbert & Wydick (2018). Self-agency is modelled as productivity given by a combination of current personal effort and random external independent shocks:

$$Y_{t+1} = \pi e_t + \pi_v v_{t+1} \tag{3}$$

Where e_t is the individual effort at time t in producing outcome Y at time t+1; v_{t+1} is the effect of the independent shock; π and π_v represent respectively productivity and the impact of shocks.

The expected outcome Y at time t+1 is given by:

$$E[Y_{t+1}] = \pi e_t, \text{ if } e_t < e_o \tag{4}$$

$$E[Y_{t+1}] = (\rho_\pi \, \pi') \, e_t, \text{ if } e_t \geq e_o \tag{5}$$

$$\tilde{Y} = \rho_y \, (\bar{Y}) \tag{6}$$

Where e_o is the effort level that known by the agent. After this level, the agent needs to guess the outcome of its activities. π indicates the known value of productivity, while π' indicates the real value of productivity outside the "comfort zone" of the activity of the agent. Pathways are represented by an upwards threshold; there is a limit, $\overline{Y}$, over wich putting more effort will not increase Y_{t+1} anymore. ρ_π and ρ_y are the perception parameters and indicates on what extent agents are overestimating or underestimating their individual abilities: $\rho_\pi < 1$ implies low self-agency, $\rho_y < 1$ implies that constraints of the pathways are perceived as more limiting than they actually are.

Our hypothesis is that not intrinsically motivated people will present a strong resistance in changing their perceived level of agency and pathways if an external intervention takes place. Therefore, we expect that after participating to an external intervention influencing psychological factors (a motivational course) we will see larger changes among intrinsically motivated people compared with extrinsically motivated people.

RQ2: Are changes on psychological indicators homogeneous among intrinsically and extrinsically motivated people, after the participation to an external motivational course?

4. Instruments

Five different instruments have been used: Hope index, Aspiration index, Perceived Locus of Causality (PLOC) index, an Intrinsic dummy and Satisfaction index.
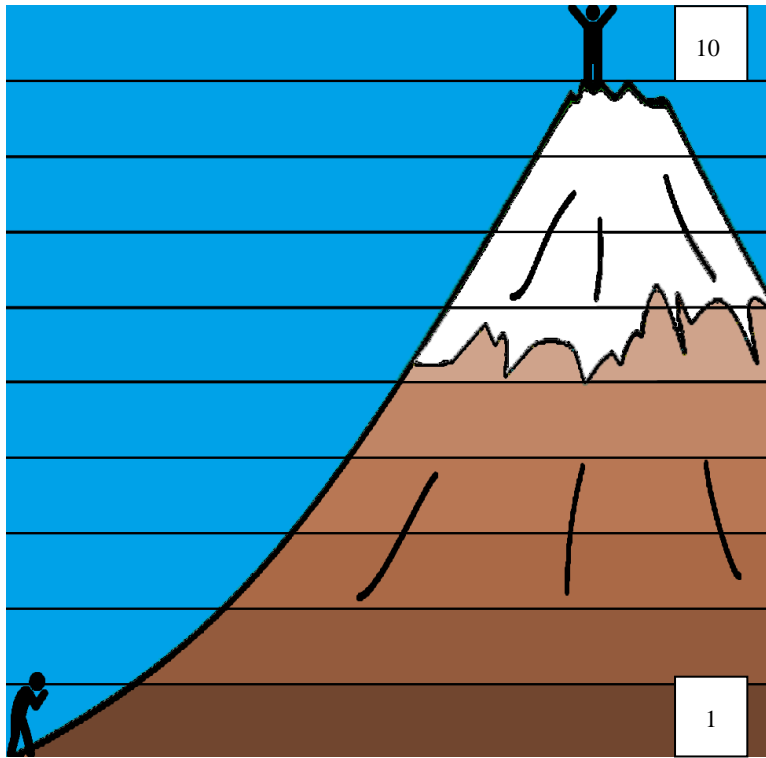
- **Hope Index.** We created this indicator using statements of the Trait Hope Scale (Snyder et al. 1991). The scale was originally validated among students, psychiatric outpatients and war veterans (Snyder, 2002) but more recently has found validation in randomized control trials in Mexico, Sierra Leone and Myanmar (Lybbert & Wydick, 2016; Garcia et al., 2018; Bloem et al., 2018). The scale is composed of eight statements, four indicating the sub-scale of agency and four for the sub-scale of pathways. Respondents are asked to indicate on what extent they agreed with each statement on a range from 1 to 6.

- **Aspiration index.** This indicator was based on the instrument of Lybbert and Wydick (2016) composed of four statements about the importance of setting goals for the future for the individual and the family. Similarly to the hope trait scale, the respondents indicated on what extent they agreed with each sentence on a range from 1 to 6.

- **Z-PLOC index.** In order to measure intrinsic motivation, we used the perceived locus of causality index, we drawn items from the Motivation at Work Scale questionnaire, that has been validated to work efficiently in defining motivational categories at work in seven languages and nine countries (Gagné et al., 2014 a, b) and the Self-Regulation Questionnaire in different specifications (Ryan & Connell, 1989, Sheldon et al., 2004, Turban et al. 2007). The sentences indicate a variety of reason for which farmers would pursue their daily activities as cowherds. As before, farmers indicated from 1 to 6 the extent on which they agreed with eight sentences, considering pairs of items for the four motivational categories: Purely

Intrinsic, Identified, Introjection and Pure Extrinsic. Some of the items needed to be contextualized to make sure the concepts embedded in the survey were interpreted correctly by the smallholder farmers of rural Bolivia. It was then calculated the PLOC - Relative Autonomy Index, giving to each scale a weight: External (-2), Introjection (-1), Identified (+1), Intrinsic (+2) (Ryan & P. Connell, 1989).

- **Intrinsic dummy.** We created a dummy variable called Intrinsic to divide people into two groups: intrinsically motivated people and extrinsically motivated. The dummy has value 1 (Intrinsic group) when z-ploc is greater than 0, and it has value 0 otherwise (Extrinsic group).

- **Satisfaction over production level.** To measure utility over production, we used a simplified version of the multidimensional aspiration index created by Tanguy et al. (2012), validated first in Ethiopia (2014) and then in Myanmar (Bloem et al., 2018). Our instrument was adapted to integrate a self-reported matrix of satisfaction over levels of milk production, following Rojas Valdes et al. (2018). The instrument was composed by an image of the Illimani, the tallest mountain of the Bolivian Andes, split into ten segments with an assigned value as represented in Figure 2.

Figure 2: Illimani mountain

The top of the mountain represents the maximum satisfaction level (10)- while the base is the minimum (1). In order to "anchor" the answer (Tanguy et al, 2012) we started asking a) what would have been the aspired level of production in two years from now corresponding to the maximum level of satisfaction at the top of the mountain. Then we asked satisfaction for different levels of milk production, corresponding at:

b) satisfaction for current average production

c) half of the current average production

d) maximum production given the assets currently owned.

e) We automatically set satisfaction to 0 for production level 0[1].

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[1] The image of the mountain could be replaced with other common object in which reaching the extreme end represents a positive achievement - for example, a tree crown (Garcia et al., 2018). The image is a tool for farmers to position different level of satisfaction along a coordinate. Depending on the position of these points, it is possible to define the shape of the curve. The shape of this curve does not need to be assumed previously, but it is derived from the points collected.

All the indicators were demeaned and standardized in order to create comparable z-indexes. The complete questionnaire was revised by a native Bolivian sociology that confirmed the adequacy of the instruments, and it was tested before use on two pilots test on villages not included in our sample.

5. Context and data

5.1 Context

Our research took place at the heart of the Bolivian plateau at an altitude of 3800 metres a.s.l, within the province of Aroma, in the four municipalities of Ayo Ayo, Patacamaya, Sica Sica and Umala. This region has become in the last decades the third most important area of milk production in Bolivia and the first for forage cultivation. (De La Torre, 2015). Cultivation of potatoes and quinoa are also very common in the area. The development of the milk sector in the area was strongly subsidized from the government of Evo Morales and international players as the WFP and the Danish International Cooperation with the objective of reducing rural poverty and increasing food security. (De La Torre, 2015). The husbandry activities are mostly carried out by all the component of the family – husband, wife, sons and daughters - with scarce or no use of machinery. Milk producers are organized at community level in associations called "Modulo" (module). Dairy companies collect milk daily using trucks that follow routes terminating in collection centres. Since all the milk is recollected in the same container, it is not infrequent that produce gets rejected due to contamination. Despite all the investments, rentability has always been low or non-existent (Ministerio de Asuntos Campesinos y Agropecuario, 2004) mostly due to climate difficulties: from April to September, the dry season, it is difficult to irrigate the land and the differences in temperature can produce frost, that heavily affects agricultural activity, During rainy season, hail, flood and droughts are frequent.

5.2 Data

We collected data in two phases. Our sample was collected in April, in which we surveyed 531 milk producers, in 52 modules located in 31 villages in the four municipalities aforementioned. The size of the modules varies from 1 to 28 members with an average of 10 members. All of them were members of the two most important dairy companies in the Aroma province. During a follow-up survey in August, we re-interviewed 228 farmers who were randomly assigned to take part in a Hope Curriculum.

Table 1: Sample Specification			
	Baseline	**Follow-up**	**Total**
Did not take part in the Hope Curriculum	248	0	248
Took part in the hope curriculum	283	228	511
Total	531	228	759.

Of 283 farmers that were originally assigned to participate in the curriculum, 55 did not participate in the last collection round. In both baseline and follow-up, we collected outcome psychological indexes altogether with usual socio-demographic indicators such as gender, age, year of education, number of cows and milk production. Data on intrinsic motivation were collected at baseline for participants who did not take part in the hope curriculum and at the follow-up for people who take

part in the curriculum. Since we assumed that intrinsic motivation would have not been changed from the intervention, we assigned the same level of intrinsic motivation to these individuals also at

baseline

Table 2 shows a summary of socio-demographic values. the percentage of women in the sample is 40%. The mean age is 48 years, with the youngest participant being 16 years old, and the oldest 89. On average, participants completed the second cycle of school (8 years of studies). Milk producers tend to have 3.27 cows producing 20.14 litres daily.

Table 2: Summary socio-demographic data					
	N	**Mean**	**SD**	**Min**	**Max**
Female	531	0.401	0.491	0	1
Age	531	48.40	15.89	16	89
Year of education	531	7.868	3.831	0	18
Number of cows	531	3.275	1.826	0	14
Average production	531	20.14	13.77	0	80

5.3 Hope Curriculum

This curriculum entailed a motivational course organized in three meetings, during which modules were divided into small groups of three, four or five people assisted by a personal coach. On each visit, farmers watched a 15 minutes documentary showing two households deemed to be the most successful among the milk producers in their same region. After the screening, coaches assisted participants with the tool of the Vision Road Journey (Figure 3). On the left of the drawing, farmers draw assets currently owned. On the right, they sketched the aspirations they were willing to achieve in two years. In the central part, guided by the coaches, they defined what activities were needed to pursue their dreams. All around the path they write down difficulties and opportunities that could have helped them along the way. Finally, they pinned moments in their lives during which they felt most successful.

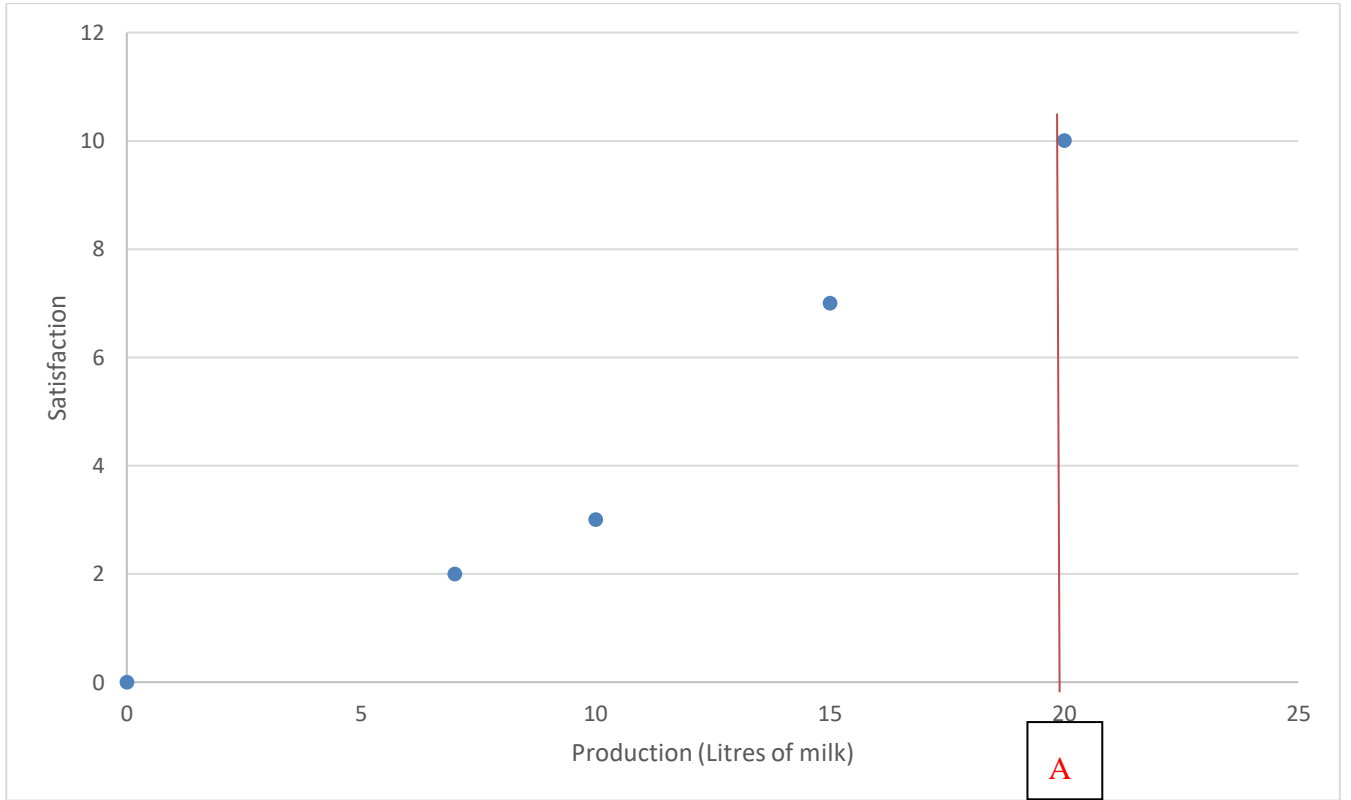**Figure 3: Vision Road Journey**

6. Empirical strategy

6.1 Shape of the aspirational curve.

We constructed a matrix of aspiration curve $M_i(2;5)$ for each respondent I, instrumenting utility with satisfaction as explained in ch.4. Table 3 and Graph 3 shows an example of this matrix for a given individual i. .

	Production	Satisfaction
Table 3: Example of Matrix Aspiration Curve (for a given individual i).		
No production	0 (fixed)	0 (fixed)
Half of Average	7	2
Average Production	10	6
Maximum production with current asset	15	7
Aspired production	20	10 (fixed)

Graph 3: Example of Aspiration Curve for a given individual i

We will use non-linear least square estimations to find the best fitting curve for the five points defined by each matrix M_i in order to estimate the extent of its non-linearity. We will first use a non-linear least square estimation based on Kahneman and Tversky (2).

As a robustness check of our results, we run two further benchmark models.

Firstly a quadratic model, defined as:

$$u(Y|A) = b0 + b1\,x + b2\,x^2 \tag{7}$$

In which the condition for concavity and convexity are given by the sign of the quadratic coefficient: for b2>0, the curve is convex upward-looking, for b2<0 it is concave downward-looking. Secondly, we will run the exponential model:

$$u(Y|A) = b0 + x^{\epsilon} \tag{8}$$

It differs from (2) because it does not consider aspired production as a point of reference in the function. ϵ is the opposite of the inverse of the indicator α. Therefore, condition for concavity and convexity are the opposite of the inverse with respect to α: for $0 < \epsilon < 1$ the curve is concave, and for $\epsilon > 1$ it is convex. The expected value of the variables of interests is estimated as the mean:

$$\bar{\alpha} = \frac{\sum_i^n \alpha_i}{n} \tag{9}$$

$$\overline{b2} = \frac{\sum_i^n b2_i}{n} \tag{10}$$

$$\bar{\epsilon} = \frac{\sum_i^n \epsilon_i}{n} \tag{11}$$

Table 4: Criterion of convexity and concavity and expected values			
	Kahneman and Tversky (2)	Quadratic Model (7)	Exponential Model (8)
Criterion of concavity and convexity:	Convex: $0 < \alpha < 1$ Concave: $\alpha < 0$	Convex: b2 >0 Concave: b2<0	Convex: $\epsilon > 1$ Concave: $0 < \epsilon < 1$
Expected values:	$\bar{\alpha} = \dfrac{\sum_i^n \alpha_i}{n}$	$\overline{b2} = \dfrac{\sum_i^n b2_i}{n}$	$\bar{\epsilon} = \dfrac{\sum_i^n \epsilon_i}{n}$

6.2 Correlation among non-linearity and intrinsic motivation

We will use an ANCOVA to find significant correlation among the non-linearity of the aspiration curve calculated in the previous sub-chapter and the estimate of intrinsic motivation. The ANCOVA model specification is given by:

$$\alpha_i = \beta_o + \beta_1 * zploc_i + X_i + \varepsilon \tag{12}$$

In which X is a vector of covariates including the socio-demographic indicators as sex, age, year of education, and enumerator fixed effect. ε is the error term. , We expect to see a negative correlation explicated in the variable of interest β_1. Our test hypothesis is:

Ho: There is no correlation between the two parameters. $(\beta_1 = 0)$

Ha: There is a negative correlation between the two parameters. $(\beta_1 < 0)$

6.3 Impact among intrinsically and extrinsically motivated individual

We want to measure changes occurred in the psychological outcomes among intrinsically and extrinsically motivated respondents shortly after the completion of the Hope Curriculum. We estimate these changes in the outcome variables before and after intervention trough a double difference.

Table 5: Double Difference reference table

	Intrinsically motivated (I=1)	Extrinsically motivated (I=0)	Difference
Baseline (S=0)	$E(Y_0^1\|I=1)$	$E(Y_0^0\|I=0)$	Δ_0^I
Follow-up (S=1)	$E(Y_1^1\|I=1)$	$E(Y_1^0\|I=0)$	Δ_1^I
Difference	Δ_S^1	Δ_S^0	$\Delta\Delta$

The DD can be represented as:

$$y = \beta 0 + \beta 1 * did + \beta 2 * S + \beta 3 * I \qquad (13)$$

In which y indicates the outcome variables (z-indexes of aspiration, pathways, agency, hope), S is a dummy distinguishing survey round (baseline or follow-up), I differentiates the effect among the two groups (Intrinsic and Extrinsic), while "did" is the combination of $S * I$. $\beta 1$ is our variable of interest.

Ho: There is no difference between the two groups in the time period considered ($\beta_1 = 0$)

Ha: The Intrinsic group had a larger effect compared with the Extrinsic group in the time period considered ($\beta_1 \neq 0$)

7 Result

7.1 Non-linear least square estimations

We used non-linear least square estimations inferring model (2), (7), (8) on 525 participants out of 531: six participants had incoherent values and were not included in the analysis.
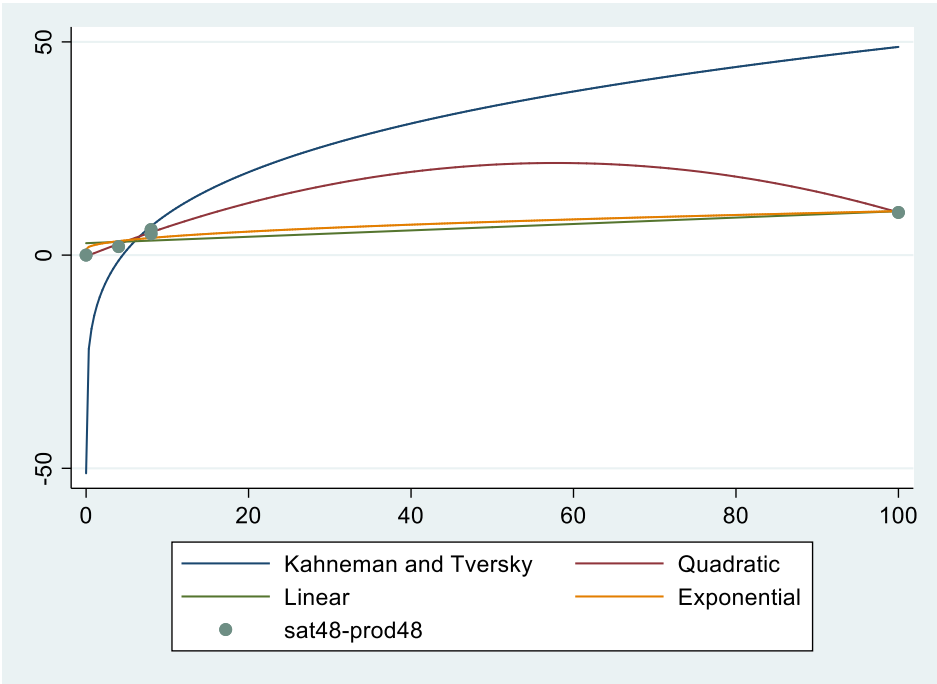
Table 6: Summary results for non-linear least square estimations

	Kahneman and Tversky (2)	Quadratic Model (7)	Exponential Model (8)
Count of significant non-linear relations among the sample	2	463	522
Criterion of concavity and convexity:	Convex: $0 < \alpha < 1$ Concave: $\epsilon < 0$	Convex: b2 >0 Concave: b2<0	Convex: $\epsilon > 1$ Concave: $0 < \epsilon < 1$
Average (std.)	$\bar{\alpha} = -1.153\ **$ (0.879)	$\overline{b2} = -0.004\ ***$ (0.012)	$\bar{\beta} = 0.585\ ***$ (0.098)
	Curve is expected to be concave	Curve is expected to be concave	Curve is expected to be concave

The first line of the table indicates how many times a given model was able to successfully regress a meaningful variable of interest among the participants. We used F-tests criterion of goodness. With our surprise, the Kahneman and Tversky model was not able to fit the data correctly. We obtained significant estimates for only two respondents, whilst in all other cases, α_is were not significant. The two benchmark models seem to be more adequate for our dataset: the quadratic function presented significant non-linear estimation for 467 respondents, and the exponential model provided significant non-linear estimation for all the respondent apart from three cases. The expected value of the quadratic coefficient $\overline{b2}$ is -0.004, significant at 0.01 level: the negative sign indicates the curve is concave downward-looking. Similarly, $\bar{\epsilon}$ is 0.585, significant at 0.01 level, confirming the existence of a concave curve. These results give no reason to assume the aspiration curve is convex: on the opposite, they show the existence of a concave non-linear relation.
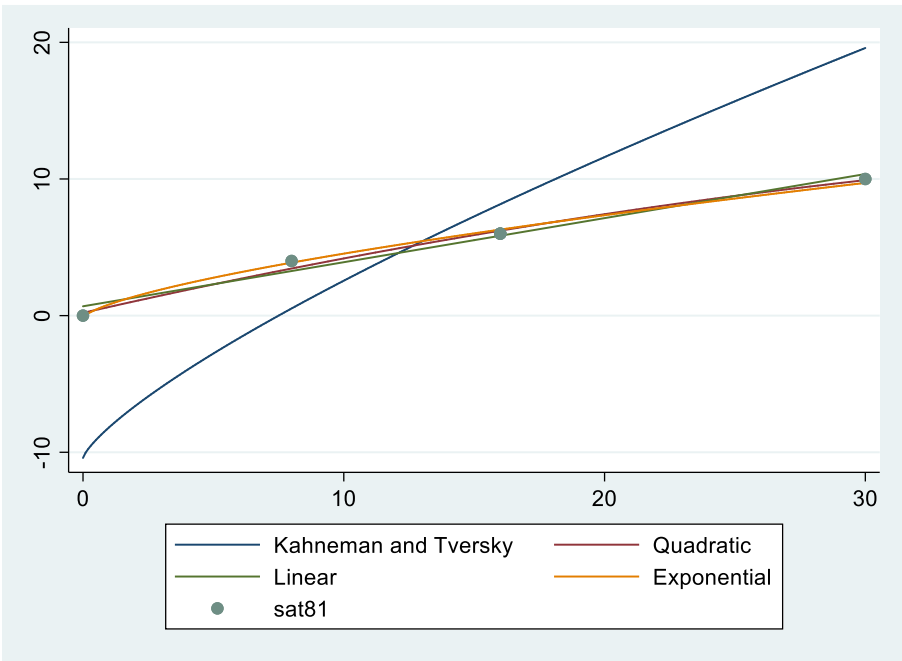
7.2 Visual analysis

We decided to perform a visual analysis of the aspiration curve for 8 randomly chosen respondent. We created the curve as represented in Fig. 4 using the non-linear estimation models. The eight participants have id numbers: 48, 81, 185, 197, 233, 240, 339, 419.
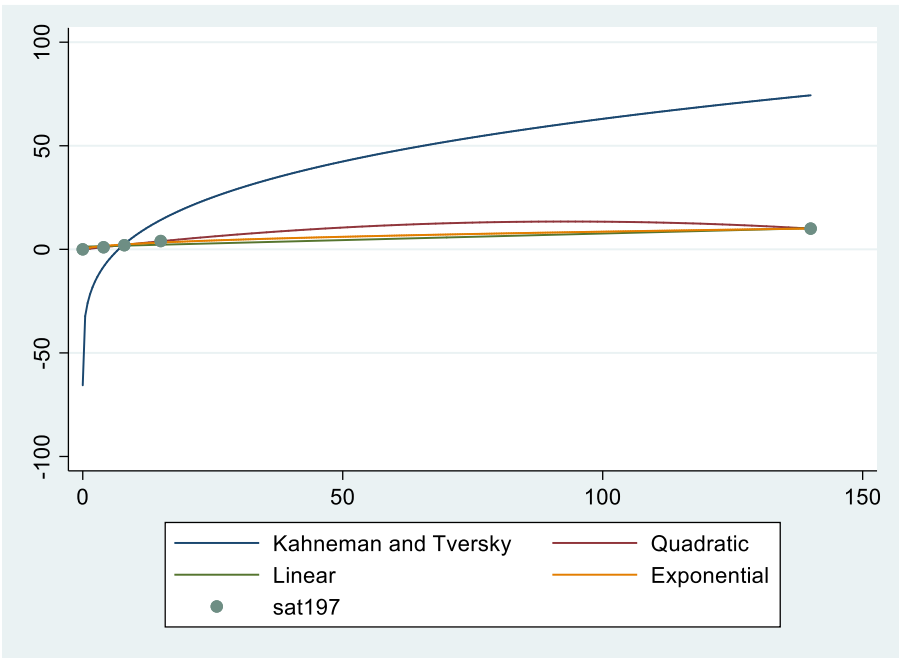
Aspiration Curve Respondent 48

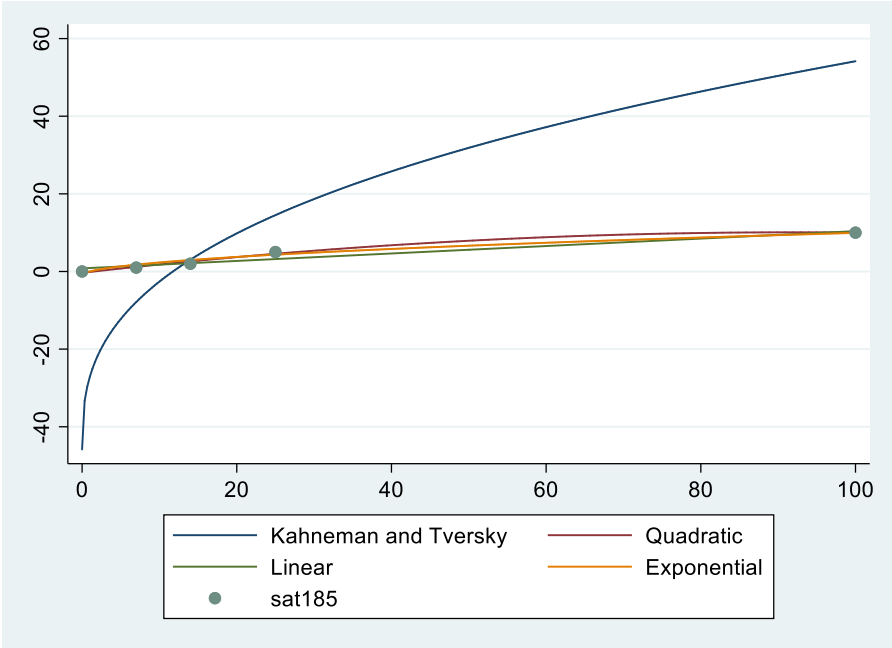## Aspiration Curve Respondent 81

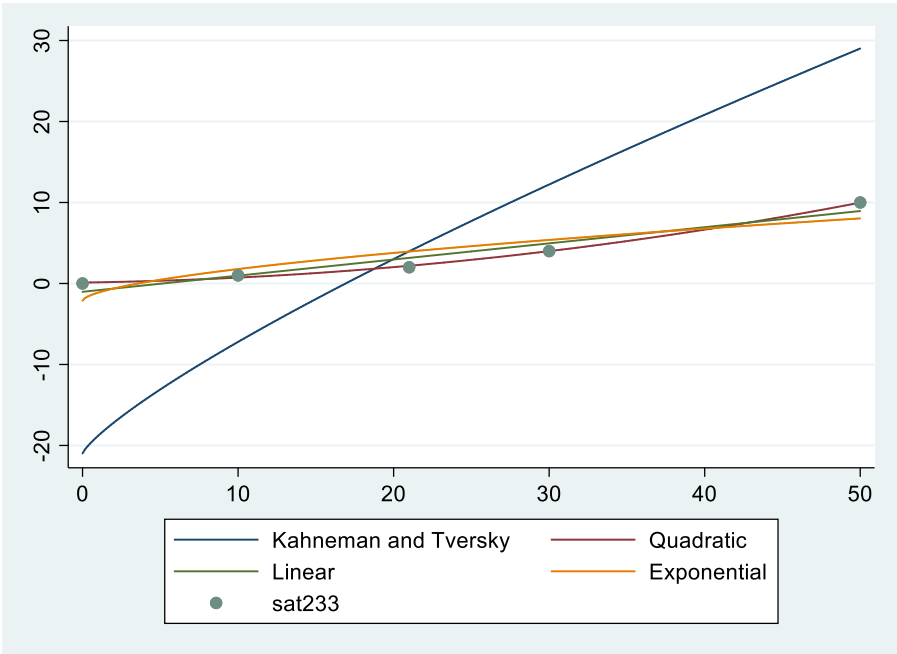## Aspiration Curve Respondent 185
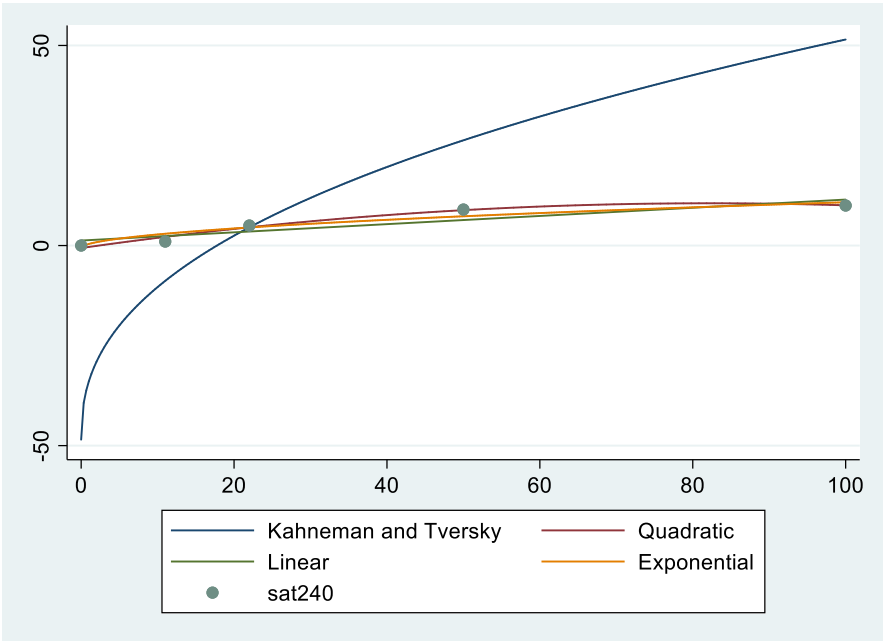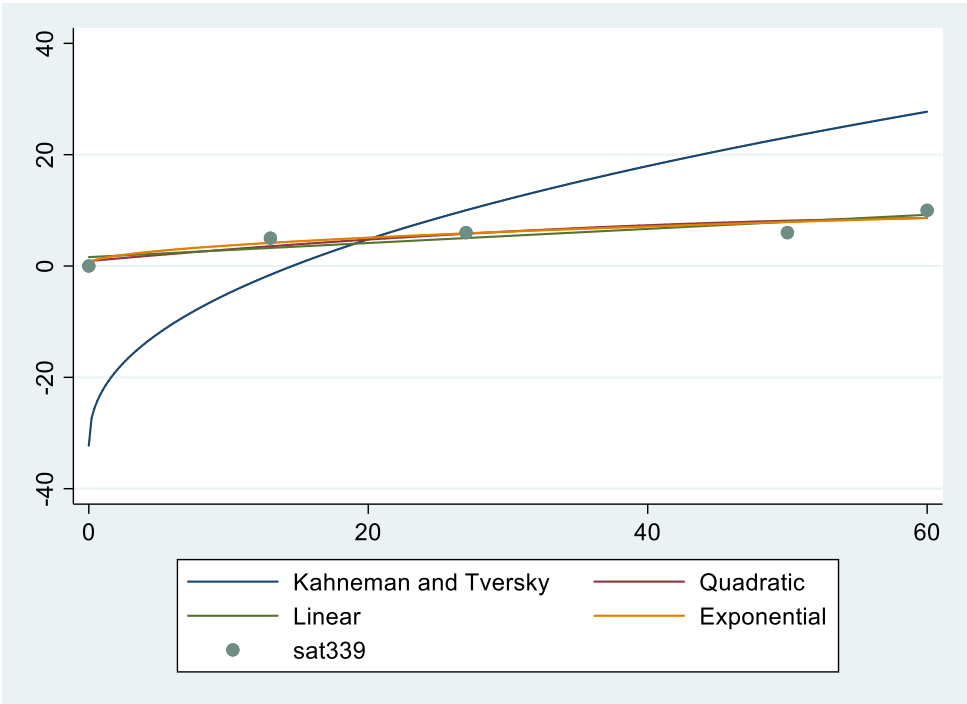

Aspiration Curve Respondent 197
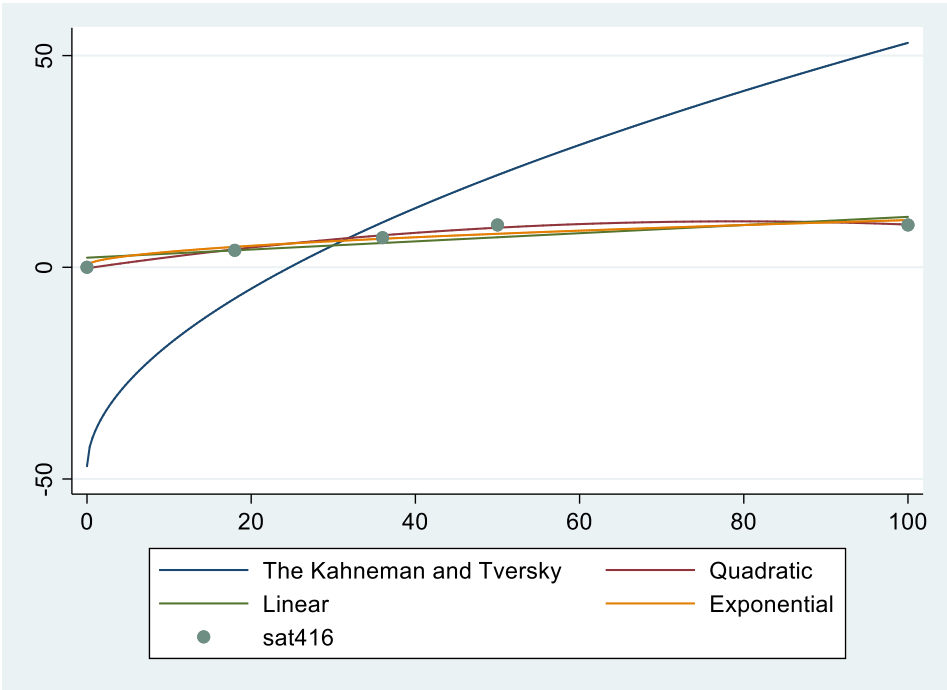
Aspiration Curve Respondent 233

Aspiration Curve Respondent 240

Aspiration Curve Respondent 339

Aspiration Curve Respondent 419

It is clear from the images that the Kahneman and Tversky model, represented by the blue line, failed completely in fitting the data: it overestimated or underestimated values above and below average production. Benchmark models seem to better fit the dataset. Also the quadratic model pis not able to properly fit data when aspired production is very distant from current level of production. In case 48, the respondent aspires to 150 litres of milk daily, while its current production is only 10 litres. The function overestimated values for all intermediate points. The exponential model gives more conservative estimations. , The graphical analysis further confirms the existence of a concavity in the aspiration curve: all data appears to be better represented by a downward-looking curve.

RQ1.1: We found no evidence of the existence of convexity in the aspiration curve. On the opposite, evidence suggests that the expected curve is concave-shaped.

There is no evidence that farmers suffer from a "psychological loss" for not reaching their aspired goal. In line with classical economic theory, farmers closer to reaching their aspiration would perceive progressively smaller incentives to utility. A possible explanation is that the curve is concave due to an extremely narrow "aspiration window" (Ray, 2003). It could be that the cognitive world is so limited that farmers would lack the capacity to aspire; aspirations would be virtually unreachable. Another possible explanation could depend on culture: Bolivian farmers are used to living day by day, making their living out of simple things. The exercise of setting an "aspired production" could have been completely alienated from their experiences of life.

7.3 Correlation among intrinsic motivation and aspirational curve

Even if we did not verify the hypothesis of convexity, we still want to test if there is a significant correlation among the aspirational curve and intrinsic motivation. As we saw in the previous paragraph, the exponential model (8) proved to be the most adequate fit for the dataset. Thus, we will use the estimates of ϵ to check for significant correlation. The sample used includes both individuals

that did not take the hope curriculum and the individuals who took the curriculum but were interviewed in the second phase. The sample includes 476 observation. Table 7 presents the outcome of the analysis: (2) includes standard errors clustered at module level.

Table 7: Non-linearity and intrinsic motivation		
	(1)	(2)
VARIABLES	Non-linearity ϵ	Non-linearity ϵ
z_ploc	-0.00819**	-0.00819*
	(0.00400)	(0.00446)
Female	0.0315***	0.0315***
	(0.00926)	(0.00999)
Age	0.00110***	0.00110***
	(0.000331)	(0.000330)
Year education	-0.00355**	-0.00355**
	(0.00140)	(0.00140)
Constant	0.601***	0.601***
	(0.0308)	(0.0294)
Observations	475	475
R-squared	0.302	0.302

Standard errors in parentheses
Enumerator fixed effects
included
*** p<0.01, ** p<0.05, * p<0.1

The table clearly shows a significant negative correlation among non-linearity and perceived locus of causality. We want to find insights into the nature of this relation. Thus, we tested how intrinsic motivation correlates with the indicators that compose the matrix M(2;5).

Table 8: Intrinsic motivation and component of Matrix M

VARIABLES	(1) z_ploc	(2) z_ploc
Satisfaction with maximum asset	0.0270	0.0270
	(0.0292)	(0.0285)
Satisfaction at average production	-0.00135	-0.00135
	(0.0346)	(0.0306)
Satisfaction at minimum production	0.00855	0.00855
	(0.0346)	(0.0389)
Aspired production	0.00295***	0.00295*
	(0.00110)	(0.00157)
Production with maximum asset	-0.00912**	-0.00912*
	(0.00428)	(0.00528)
Average production	0.0432	0.0432
	(0.0923)	(0.0972)
Minimum production	-0.0621	-0.0621
	(0.184)	(0.195)
Constant	-0.384**	-0.384*
	(0.180)	(0.207)
Observations	476	476
R-squared	0.027	0.027

Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

The table shows that PLOC is positively correlated with aspired production and negatively with the maximum production at current assets: intrinsically motivated people have higher aspirations for the future and tend to produce less with asset currently owned. The insights that aspiration is influencing intrinsic motivation is meaningful. It could be the case that there is a three-way relation among Intrinsic Motivation, Aspiration and non-linearity ϵ, in which the three elements mutually influence

each other. We regressed ϵ over ploc and regresed the value of all the component the matrix M(2;5); (1) includes the aspired level of production, while (2) does not.

Table 9: Non-linearity, intrinsic motivation and aspired production

VARIABLES	(1) Non-linearity ϵ	(2) Non-linearity ϵ
z_ploc	-0.00761**	-0.00294
	(0.00355)	(0.00322)
Satisfaction with maximum asset	0.00178	-0.00122
	(0.00178)	(0.00196)
Satisfaction at average production	0.00244	0.00249*
	(0.00162)	(0.00147)
Satisfaction at minimum production	-0.00677***	-0.00674***
	(0.00251)	(0.00232)
Aspired production		-0.000999***
		(0.000150)
Production with maximum asset	-0.00233***	-0.000656
	(0.000256)	(0.000436)
Average production	0.0113	0.00811
	(0.00804)	(0.00609)
Minimum production	-0.0225	-0.0172
	(0.0161)	(0.0121)
female	0.0187**	0.0126*
	(0.00809)	(0.00669)
age	0.00123***	0.000830***
	(0.000247)	(0.000189)
edu_year	-0.00146	-0.00110
	(0.00116)	(0.000791)
Constant	0.607***	0.675***
	(0.0270)	(0.0217)
Observations	475	475
R-squared	0.497	0.654

Fixed enumerator effects included.
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

We can see that including aspiration in the regression eats away all the effect of intrinsic motivation. Aspiration is a confounder on both intrinsic motivation and the shape of the aspirational curve.

Figure 4 Triangle of relations

What is the mechanism that relates these three elements? We can imagine the effect of aspiration on the aspirational curve considering two perfectly equal individuals with different aspired production (50 litres and 200 litres). Since maximum satisfaction level is capped at 10, the individual with a higher level of aspired production will present a stretcher and lower aspirational curve. But since more intrinsically motivated individuals also have higher aspiration, they would also present a lower curve.

Graph 4 Relation between aspiration and non-linearity

The graph shows curves with labels:
- u(Y|A) (y-axis label)
- "Intrinsically motivated people have higher aspiration…"
- "Higher aspirations implies lower curves!"
- A1, Y, A2 (x-axis labels)

RQ1.2: Evidence shows a negative correlation among sensitivity of aspiration and intrinsic motivation, but part of this effect seems to depend on the confounder effect of aspiration. No causal claim on the direction of causality can be claimed.

RQ1: From one side it did not hold the assumption on convexity. From the other, there is not enough evidence to affirm that intrinsic motivation has a direct effect on shaping the aspirational curve. Thus, we cannot state that intrinsic motivation operates as a shaping agent for the aspirational curve.

7.4 Difference in difference analysis

For the second research question, we proceeded to test differences among Intrinsically motivated and Extrinsically motivated people.

VARIABLES	(1) hope_index	(2) asp_index	(3) agency_index	(4) pathways_index
survey_round	0.245**	-0.0173	0.260**	0.172
	(0.123)	(0.119)	(0.122)	(0.126)
intrinsic	0.286**	0.225*	0.173	0.328**
	(0.131)	(0.127)	(0.130)	(0.135)
did	0.501***	0.696***	0.506***	0.378**
	(0.185)	(0.180)	(0.183)	(0.190)
Constant	-0.302***	-0.179**	-0.279***	-0.253***
	(0.0866)	(0.0843)	(0.0859)	(0.0891)
Observations	456	456	456	456
R-squared	0.129	0.128	0.113	0.093

Table 10: Outcomes Double Differences

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10 shows the outcomes from (13). Respondents in the Intrinsic group changed more intensely in all the outcome variables than the Extrinsic group: from 0.5 to 0.7 standard deviation. Our identification cannot properly distinguish time effects from treatment effects: we cannot state a causal claim. However, we can stress intrinsic people show a drastic increase in their psychological outcomes compared with the other group after the participation in the curriculum. There is a clear divide. Our results are in line with previous experiments. Libbert & Wydick (2016) measured effect comparable in magnitude among women entrepreneurs in Mexico in a similar time-frame period. Finally, motivation seems to be a limiting factor for people taking part in the Hope Curriculum.

RQ2: Results showed intrinsically motivated people presented more prominent changes in the given psychological determinant compared with extrinsically motivated people after participating in the Hope Curriculum. There are strong insights that Intrinsic Motivation is a limiting factor for development interventions.

8 Discussion & Conclusion

In this paper, we shed a light on how motivation plays a role in fostering the effectiveness of development intervention. We did not find convincing evidence that intrinsic motivation plays a role in shaping the aspirational curve. However, there are clear cuts on the changes on psychological indicator after the participation to a Hope Curriculum among intrinsically and extrinsically motivated people. Individuals moved by their own choices that are inherently enjoying their activities are correlated to be more likely to positively react to external intervention. We also have insights that people with a higher motivation presented higher aspiration. These results agree with the cornerstone idea of the PIP approach and confirm the importance of building a motivational foundation among the recipients prior to the actual initiation of a development project. In order to maximize the effect of the intervention, policymakers and practitioners may consider prioritizing interventions to highly motivated participants, and include other recipients in a later phase of the project when eventually enthusiasm in the project has increased. Psychological literature confirms that intrinsic motivation is an innate characteristic of individuals and it is rather resistant to change; people do not become intrinsically motivated from one day to the other. Thus, who would potentially profit most from these considerations are the initiators of long-term potentially controversial programmes that involve important socio-economic disbursement from the participants: i.e. application of new agricultural technologies or the introduction of new microfinance services. In conclusion, our results show that taking in consideration intrinsic motivation is a successful strategy for the initiator of development interventions.

Even if our outcomes are consistent, some critics could be addressed to our research methodology. First, an important critic concerns the relationship between intrinsic motivation and intervention. Indeed, we assumed that intrinsic motivation is not affected by the intervention itself, and we presented several cases in the literature to support this. However, we did not present any test to verify

that the assumption holds. Indeed, the lack of a proper control group at follow-up impede us to realize a formal demonstration that Hope Curriculum did not act to modify the level of intrinsic motivation itself. Several critics can be raised about the process we used to estimate the aspiration curve. Some could argue if using satisfaction over the production level can be deemed to be a reliable procedure to build a utility curve. Enumerators in the field proved that participants were able to understand the meaning of the exercise provided, and we are confident that our measurements are reliable within the sample we collected. However, the limit of using instrumental variable is that their reliability cannot be formally tested. Also, it can be further raised the question if it is possible to build a proper curve with such few points available. We are aware of the limit of this procedure but, even if unconventional, this strategy has been applied in similar contexts in development studies (Rojas Valdes et al., 2018) and has provided meaningful insights. Third, the size of our sample is quite limited, since only 531 participants were included. However, our sample included all the milk suppliers of the two main important distributors of the region, and they have been randomly assigned to the participation of the Hope Curriculum. We are confident our results are internally valid within the population of interest. External validity is more problematic: we cannot claim our outcomes to be still meaningful outside of the cultural and regional context in which this experiment has been carried out. Fourth, we only measured short-term changes, with no consideration of long-term effects. It cannot be excluded that effects are only temporary, and would eventually dissipate on the next months. Finally, we did not include at this time business outcomes in our analysis, and we did not provide results on what has been the impact of the participation at the Hope Curriculum on production and employment. More data are being collected to this day, and we hope to extend the validation of our conclusions and answers to these concerns on further papers.

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