2022007-EEF

Belief-based Poverty Traps and the Effects of Material and Psychological Development Interventions

August 2022

Mark Treurniet
Robert Lensink

SOM is the research institute of the Faculty of Economics & Business at the University of Groningen. SOM has seven programmes:
- Accounting
- Economics, Econometrics and Finance
- Global Economics & Management
- Innovation & Organization
- Marketing
- Operations Management & Operations Research
- Organizational Behaviour

Research Institute SOM
Faculty of Economics & Business
University of Groningen

Visiting address:
Nettelbosje 2
9747 AE Groningen
The Netherlands

Postal address:
P.O. Box 800
9700 AV   Groningen
The Netherlands

T +31 50 363 9090/7068/3815

www.rug.nl/feb/research

Belief-based poverty traps and the effects of material and psychological development interventions

Mark Treurniet
University of Groningen, Faculty of Economics and Business, Department of Economics, Econometrics and Finance
m.treurniet@rug.nl

Robert Lensink
University of Groningen, Faculty of Economics and Business, Department of Economics, Econometrics and Finance

Belief-based poverty traps and the effects of material and psychological development interventions

Mark Treurniet and Robert Lensink

August 1, 2022

We study how development interventions can affect economic outcomes via agency beliefs. We model an agent who is uncertain about her agency, and focus on the situation that the agent underestimates her agency. Material development interventions increase the agent's initial wealth, but may negatively affect her beliefs about her agency, thus decreasing effort and final wealth, and potentially generating a belief-based poverty trap. Instead, psychological interventions can increase beliefs about agency, thus turning the effect on effort and final wealth. A combination of both interventions can combine the positive effects of increased initial wealth and increased agency beliefs. (*JEL* O12, D91, F35)

I.   Introduction

While the number of people living in poverty has dropped in the last decade, still approximately 10% of the world population is suffering from extreme poverty by surviving on less than $1.90 per day (Development Initiatives, 2021). In several regions, especially in South Asia and sub-Saharan Africa, poverty has persisted and has remained a wide-spread and enduring problem.

Consequently, studies that examine the causes of poverty and/or suggest appropriate policies to reduce poverty in the world continue to be a top priority. The empirical literature on aid effectiveness is highly controversial, though. Some studies point at positive effects of aid (e.g. Arndt, et al., 2010; Qian, 2015; Galiani et al., 2016; Addison et al., 2017). Several studies suggest that many development interventions do not reach their intended results (e.g. Rajan and Subramanian 2008; Doucouliagos and Paldam, 2009; Easterly, 2009). Some papers even suggest that foreign aid has negative effects, using macro level explanations, such as corruption and the existence of an "aid curse" (e.g. Djankov et al., 2008).

The aim of the paper is to theoretically study the effectiveness of development interventions from a micro-level, behavioral perspective. We develop a model in which agents are uncertain about their own abilities to realize better outcomes, henceforth referred to as agency, and we focus on the situation that they underestimate their agency. We distinguish between the impact of material development interventions and psychological development interventions, and examine how these policies affect effort[1] and wealth. Material development interventions relieve constraints that are "external" to the individual, for example by providing cash, but may

---

[1] In this paper, we broadly interpret effort as the amount or intensity of non-monetary investments in producing better economic outcomes. Examples may include the level of education completed, the hours worked, the number of business ideas explored or the amount of preventative health measures taken.

be interpreted by recipients as a negative signal about their own agency. In this way, material interventions may negatively affect the individual's beliefs in agency, and consequently negatively affect effort and final wealth. While evidence on the (negative) psychological consequences of material development interventions is still limited, an increasing amount of studies indicate that material interventions can negatively affect beliefs and/or related psychological outcomes. For example, giving children shoes that were not directly needed led to feelings of dependency on aid from outsiders (Wydick et al, 2018), and receiving money from a higher socio-economic status individual led to feelings like embarrassment and shame (Sandstrom et al., 2019). Instead, a (costly) psychological development intervention that does not relieve "external" constraints, but aims to reduce constraints that are "internal" to the individual, may be interpreted as a signal that actual agency is higher than expected, and therefore positively affect the individual's agency beliefs, and consequently effort. For example, a self-efficacy training led to increased self-efficacy and employment among women in India (McKelway, 2021); a psychological training program designed to improve self-image among sex workers in India increased their self-efficacy, health-seeking behavior and savings (Ghosal et al., 2022); and an intervention that explicitly addressed aspirations, perceived pathways and perceived agency increased perceived agency 12 months after the intervention (Rojas Valdes et al., 2022).[2] We also show that psychological interventions can undo the negative effects of material interventions, so that a combination of material and psychological interventions can lift both material and psychological constraints, which becomes important if lifting just psychological constraints improves outcomes insufficiently.

---

[2] In a different context, Darolia and Wydick (2011) show that altruistic parents affect their children's self-esteem, effort and performance by providing encouragement and assistance.

The idea that agency beliefs can be distorted is central to this paper. We argue that learning about agency can be limited, and that agency beliefs may be distorted as a result, for a number of reasons. First, poor households typically have limited resources to experiment with new options and risk losing investments (Bryan, Chowdhury and Mobarak, 2014). Second, the effects of effort may not be immediate, but may take years. This holds, for example, for the returns to education (Jensen, 2010). Third, it may be challenging for people to keep track of outcomes, for example for microenterprises operating in cash environments (De Mel, McKenzie and Woodruff, 2009). Fourth, there may be barriers to the use of information, for example because individuals are illiterate, innumerate or unable to use information technology (Aker, Ksoll and Lybbert, 2012). Fifth, it may be difficult to causally attribute changes in outcomes to investments. In agriculture, for example, it is often challenging to distinguish the result of efforts from the impacts of weather conditions on a specific plot. Sixth, agency beliefs may be distorted due to psychological factors like depression (de Quidt and Haushofer, 2016, 2019). Finally, even if one has learned the results of effort, contexts are changing, so that previous results may not be valid anymore (Lobell, Schlenker and Costa-Roberts, 2011).

The results of this study imply that it is crucial to assess the psychological effects of material development interventions. One way to avoid negative psychological effects may be to focus on interventions that do not directly improve the beneficiaries' situations, but improve the conditions for them to improve their situations themselves (Bernard et al., 2017); or prevent their situations to degrade after a crisis (O'Toole et al., 2004). However, in case the psychological effects of a material interventions are negative, one may supplement the intervention with a psychological intervention that turns the negative signal of the material intervention into a positive signal of the combined intervention. This may involve, for example, providing information about actual agency (Dupas, 2011; Jensen, 2010), where relevant specifically tailored to the individual's situation (Jalan and Somanathan, 2008; Tjernström);

allowing self-experimentation (Lybbert, Frattarola Hernández and Correa, 2021); helping to process information (Hanna, Mullainathan, Schwartzstein, 2014); priming with good experiences (Munro, D'Excelle and Verschoor, 2019); helping to recall personal experiences that made people feel successful (Hall, Zhao and Shafir, 2014); or providing an aspirational intervention that also addresses perceived agency (Rojas Valdes et al., 2022). In combination with a material intervention, a psychological intervention may also involve using agency-strengthening framing of the material intervention (Thomas et al. 2020) or explicitly allowing the talents and efforts of beneficiaries to flourish (Blattman, Fiala and Martinez, 2014). Importantly, according to our model's logic, the recipient should believe that she[3] is offered this psychological intervention, because she actually has higher agency than previously believed.

This paper contributes to three literatures. First, this paper builds on various strands of literatures on the importance of internal, psychological constraints to development, both in economics and psychology (Duflo, 2012, 2013). Appadurai (2004) and Ray (2006) introduced the importance of aspirations in the economic literature. Appadurai (2004) argued that aspirations are determined in interaction with others. Ray (2006) developed the idea of an *aspirations window,* i.e. the standard of living that an individual aspires. He also argued that the difference between the aspired and current standard of living, the so-called *aspirations gap*, affects behavior. Increasing aspirations can spur development and help people escape from a poverty trap (Dalton, Ghosal and Mani, 2016), but if they are raised too much they may become frustrated (Ray, 2006; Genicot and Ray, 2017; La Ferrara, 2019). Indeed, both positive economic effects and frustration effects have been found in empirical studies on aspirational

---

[3] While our model is not specific to one gender, for ease of expression and because this paper is the result of a project on women empowerment, we consistently refer to a female agent.

interventions (Bernard et al. 2014; Aguinaga et al., 2019; Lubega et al. 2021; McKenzie et al. 2022; Riley, 2022). Our paper contributes to this literature by studying the economic effects that development interventions may indirectly have via beliefs about agency, a complementary psychological aspect that may drive economic outcomes – even when increasing aspirations would lead to aspirations failure.

An influential strand of literature in psychology derives from Snyder (2000, 2002). Snyder has developed hope theory that emphasizes that a determined movement towards a goal or aspirations requires that an individual (i) visualizes *pathways* towards this goal, and (ii) believes to have agency to follow the pathways towards the goals. Lybbert and Wydick (2018) used Snyder's theory to construct an economic model, in which aspirations form a reference point in the utility function, and pathways and agency are modelled by means of (constraints on) a production function. While this model provides a valuable framework to analyze psychological and economic interventions, aspirations, pathways and agency are all exogeneous. Our paper contributes by zooming in on the role of agency, and fundamentally differs from Lybbert and Wydick (2018) by making agency endogenous with respect to development interventions.

An even older strand of literature in psychology developed the notion of "self-efficacy". Self-efficacy refers to *"the beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments"* (Bandura 1997, p.3), and is consistently shown by a vast amount of empirical studies to contribute to aspirations, motivations and performance (Bandura and Locke, 2003).[4] Self-efficacy, based on cognitive psychology, is defined as a

---

[4] Bandura (1997) points at four sources of self-efficacy: (1) Mastery Experiences: self-efficacy may increase if somebody is successful in completing a task; (2) Vicarious Experiences: self-efficacy can be increased by observing role models with a similar cultural and/or economic background; (3) Verbal Persuasion: self-efficacy

cognitive bias, and thus differs from one's actual ability to deal with a task or situation. Actual and perceived abilities may even diverge enormously, which is signaled by the fact that behavior of capable and competent people may be constrained by feelings of inefficacy, an issue we will explicitly address in our model. A major assumption in our model is that perceived abilities may differ from actual abilities: the agent is uncertain about her abilities, and forms expectations about them. We argue that development interventions can affect the agent's perceived abilities if the agent perceives the intervention as a signal about her abilities, and thus may induce an update of the recipient's belief about her uncertain abilities. The adjustment of these beliefs will affect effort and final wealth. Like perceived agency, self-efficacy refers to a perception about one's own abilities, but self-efficacy is typically assumed to be more domain-specific (Wuepper and Lybbert, 2017). Since in our model beliefs about ability are not specific to one domain, we will henceforth consistently use the term "perceived agency" to refer to one's perceived abilities, and "expected agency" when we explicitly refer to beliefs in the context of uncertainty about abilities. However, as our model can also be applied to a specific domain, one may also read "self-efficacy" instead.

Secondly, this paper contributes to the literature on poverty traps, which argues that households for a variety of reasons can be *trapped* in a low poverty equilibrium (Ravallion, 2016, Box 1.6; Barrett et al., 2019).[5] Economists have considered a wide range of constraints that may create

---

may be increased by important people in somebodies life; and (4) Emotional & Physiological States: self-efficacy can be affected by your own situation, e.g. if somebody is depressed, her self-efficacy may be negatively affected.

[5] In the literature there is a discussion about the empirical existence of poverty traps. Kraay and McKenzie (2014) argue that the evidence suggests that in practice poverty tarps are rare. However, they acknowledge that even if poverty traps are rare in practice, they can exist. Moreover, poverty traps may be very difficult to detect with quantitative economic data: "Just because you can't see it does not mean it is not there" (Ravallion, 2016, Box 8.16). Most importantly, even if in practice poverty traps are not that prevalent, poverty trap models have been

poverty traps at the individual level, such as malnutrition (Dasgupta and Ray, 1986), credit market imperfections combined with technological non-convexity (Banerjee and Newman, 1991, 1993; Galor and Zeira, 1993; Barham et al., 1995), and geographic externalities (Jalan and Ravallion, 2002), all of which are external to the individual.[6] The studies that are most relevant for our study are exploring "behavioural" poverty traps, where poverty reduces some aspects of the cognitive and socioemotional skills that determine decisions of the agent, which in turn perpetuates the situation of poverty. These studies are very much influenced by the anthropological and psychological literature surveyed above, and primarily focus on constraints that are "internal" to the agent. Banerjee and Mullainathan (2010), for instance, explain a poverty trap by assuming that the fraction that is spent on temptation goods, rather than on nontemptation goods, is declining in the level of consumption. They show that the implication may be that the poor stay poor as they are present-biased and not willing to invest in high-return investments. Bernheim et al. (2015) develop a model to show that poverty traps may be related to self-control problems. The model suggests that self-control problems are related to low initial wealth, while high initial wealth may induce self-control. Moav and Neeman (2012) explain the existence of a poverty trap by arguing that poor people spend a higher fraction of their income on conspicuous consumption than rich people in order to signal success. The papers that are most related to our model are Dalton et al. (2016) and De Quidt and Haushofer (2016, 2019). Dalton et al. (2016) present a theoretical framework in which poverty may cause an aspiration failure, and consequently a behavioral poverty trap. De Quidt

---

extremely useful to better understand what the returns are of different types of interventions, and which barriers cause low growth. The existence of poverty traps is not necessary for our results on the impacts of aid.

[6] There are also papers that explain poverty traps at the *country level* such as Bardhan (1997) who surveys the literature on corruption and growth.

and Haushofer (2016, 2019) argue that poverty traps can be caused by pessimistic beliefs (depression) about returns to individual efforts. Our study differs from these studies by arguing that agency may be distorted for a variety of reasons, and that development interventions may affect agency beliefs, and even exacerbate behavioral biases. Thus, our paper sheds further light on belief-based behavioral poverty traps, and studies how such a poverty trap may be sustained or even be created by material development interventions, although in our model negative effects of aid can also occur outside poverty traps. Our behavioral poverty model is unique in showing that externally increasing wealth may under certain conditions actually hurt development.

Finally, this paper builds on the literature on informational frictions about the returns to investments. Such frictions have been found for the returns to, amongst other things, preventative health measures (Dupas, 2011; Jalan and Somanathan, 2008); education (Jensen, 2009; Dizon-Ross 2019); labor (Chetty and Saez, 2013; Wiswall and Zafar); and agricultural technology (Magruder, 2018; Tjernström, Lybbert, Frattarola Hernández and Correa, 2021). Our paper links informational frictions to poverty traps, and argues that material development interventions may provide signals about actual returns to investments, either unintentionally or intentionally, and either negative or positive. Material development interventions may thus increase or decrease informational frictions.

We proceed as follows. Section II introduces a model in which effort, agency and initial wealth are complements, and in which the agent is uncertain about her agency. It then derives the baseline equilibrium, and shows how low agency beliefs can cause a behavioral poverty trap. Section III analyzes how material and psychological development interventions can affect effort and final wealth via an individuals' belief in her agency. Section IV concludes.

II. Agency beliefs and poverty

In this Section, we will introduce a model in which effort, material endowments and agency are strategic complements. The agent is uncertain about her actual agency. We focus on the situation that the agent underestimates her agency, and derive baseline levels of effort and final wealth.

Basic model

Following Dalton, Ghosal and Mani (2016) we assume that utility is increasing in final wealth and decreasing in effort:

$$u(e, \pi, \theta) = \theta(e, \pi) - c(e) \tag{1}$$

Where e represents effort, π denotes agency, θ represents final wealth and $c(e)$ is the cost of effort.[7]

We continue to follow Dalton, Ghosal and Mani (2016) by assuming that final wealth θ is proportional to initial wealth θ_0, where the factor of proportionality is determined by effort. In addition, we follow Sachs (2005), and assume that final wealth will decrease with the basic needs of living $K \geq 0$:[8]

$$\theta(e, \pi) = \big(1 + \pi(e)\big)\theta_0 - K \tag{2}$$

where $\pi(e)$ measures how an agent's effort affects final wealth.

---

[7] Dalton, Ghosal and Mani (2016) also include a term for aspirations. We do not need aspirations in our model, so we left this out.

[8] Since the basic needs reduce final wealth, they allow the agent to end up in a poverty trap. Alternative ways to model poverty traps would be to assume depreciation of wealth or discrete effort choice (Dalton, Ghosal and Mani, 2016). With either of these options, our model yields similar results.

We differentiate between actual and perceived agency to change final wealth. We assume that actual agency (henceforth, the actual agency function) is linearly increasing in effort, i.e.

$$\pi_a(e) = \pi_H e \tag{3}$$

where π_H denotes high agency.

We also assume that perceived agency (henceforth, the perceived agency function) is linearly increasing in effort. However, we follow Lybbert and Wydick (2018) and assume that the agent beliefs that there may be a kink at some effort level $e_0 \geq 0$:

$$\pi_p(e) = \begin{cases} \pi_H e & if \ e \leq e_0 \\ \pi_H e_0 + \pi_1(e - e_0) & if \ e > e_0 \end{cases} \tag{4}$$

where π_1 is the agency beyond the effort level e_0.

We assume that the parameters π_H and e_0 are fixed and known to the individual, so that actual and perceived agency match until the point e_0. The motivation for this is that until some effort level e_0, the agent may have obtained decent information from their own past experiences and those of their peers. However, beyond common effort levels, the agent may not have such information and is uncertain about her abilities:[9]

$$\pi_1 \in \{\pi_L, \pi_H\} \tag{5}$$

with $\pi_H > \pi_L \geq 0$ and prior belief $0 < \Pr[\pi_1 = \pi_H] < 1$, so that at effort level e_0 the perceived agency function becomes less steep in expectation, meaning that the agent underestimates her actual agency.

---

[9] The kink in the perceived agency function (i.e. $e_0 > 0$) is not necessary to obtain our results.

We assume that $c(e)$ is continuously differentiable, strictly increasing and convex in effort e, and $c(0) = 0$.

We define $e_a^* \equiv \arg\max_{e \geq 0} u(e, \pi_a, \theta)$ as the optimal effort level given the actual agency function. We further define $e_p^* = \arg\max_{e \geq 0} \mathrm{E}[u(e, \pi_p, \theta)]$ as the optimal effort level given the perceived agency function and the prior belief $0 < \Pr[\pi_1 = \pi_H] < 1$, and $\theta^* \equiv \theta(e_p^*, \pi_a)$ as the actual final wealth given e_p^*.

Finally, we want to focus on situations where beliefs about π_1 are relevant. In our set-up, beliefs are relevant if and only if optimal effort $e_a^* > e_0$. For $e \leq e_0$, the marginal final wealth equals $\pi_H \theta_0$ and the marginal cost of effort equals $c'(e) \leq c'(e_0)$. To make the model interesting, we thus assume that $\pi_H \theta_0 > c'(e_0)$.

Baseline levels of effort and final wealth

Given this set-up, the agent faces the following optimization problem:

$$\max_{e \geq e_0} \mathrm{E}[u(e, \pi_p, \theta)] = \mathrm{E}[\theta(e, \pi_p)] - c(e) = \left(1 + \pi_H e_0 + \mathrm{E}[\pi_1](e - e_0)\right)\theta_0 - c(e) \quad (6)$$

Setting the first-order derivative with respect to e equal to zero yields the following first-order condition:

$$\mathrm{E}[\pi_1]\theta_0 = c'(e) \quad\quad\quad (7)$$

If the marginal expected final wealth $\mathrm{E}[\pi_1]\theta_0$ exceeds the marginal cost of effort in point e_0, then there is a unique interior solution $e_p^* > e_0$ (see Figure 1). Otherwise, there is a unique corner solution $e_p^* = e_0$.
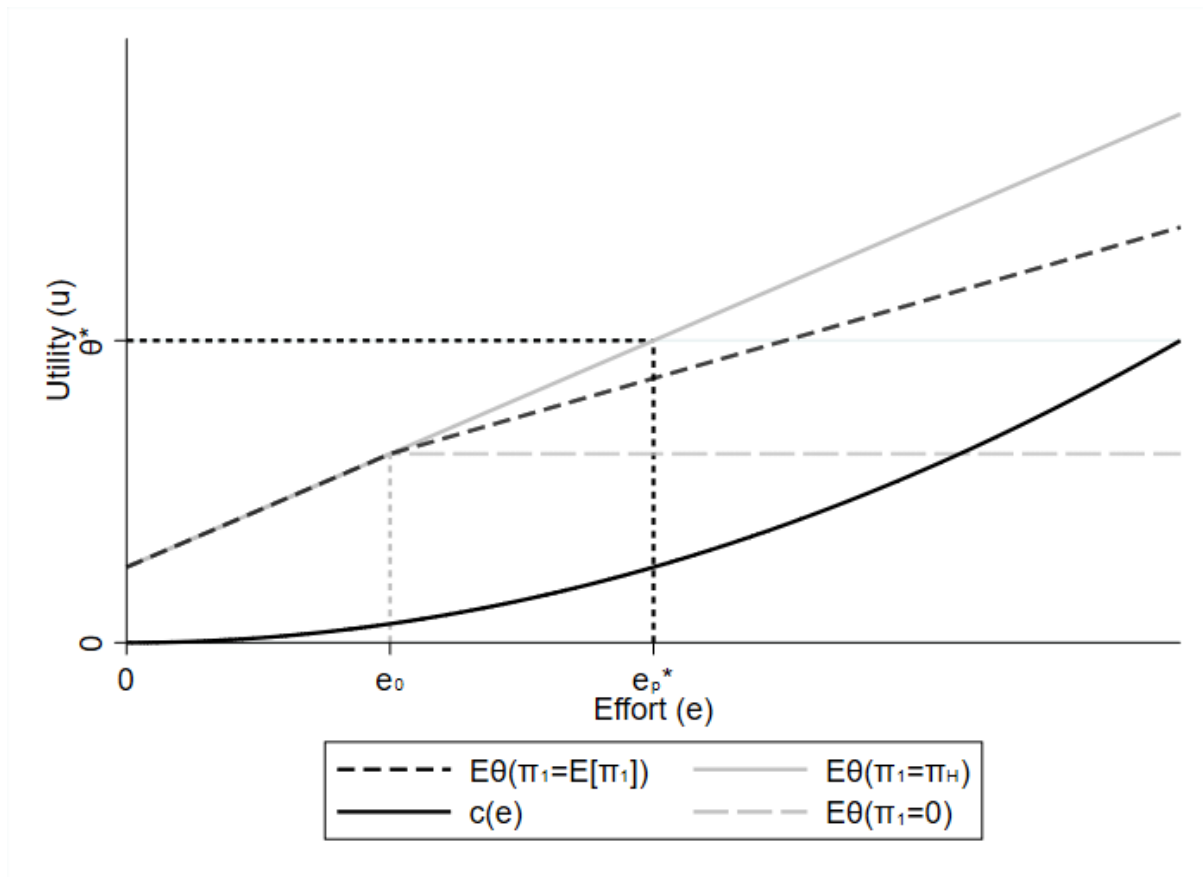
Figure 1. Maximizing expected utility, while underestimating agency.

Note: **The individual's expected agency $E[\pi_1]$ with $\pi_0 > E[\pi_1] > \pi_L = 0$ is indicated by the black dashed line, and actual agency π_1 is indicated by the grey solid line. For ease of representation, but without loss of generality, we assume in this and other figures that the basic costs of living $K = 0$. The individual maximizes her expected utility where marginal expected final wealth (the slope of the black dashed line) equals the marginal cost of effort (the slope of the black solid curve). Actual final wealth can be found by going up to the solid grey line.**

Belief-based poverty traps

Like aspirations in Dalton, Ghosal and Mani (2016), low agency beliefs can catch poor individuals in a behavioral poverty trap, in our case belief-based. We will now show how.

An external poverty trap occurs if initial wealth θ_0 is so low that final wealth is lower than initial wealth if one chooses the $e = e_a^*$:

$$\theta(e_a^*, \pi_a) < \theta_0 \tag{8}$$

$$(1 + \pi_H e_a^*)\theta_0 - K < \theta_0 \tag{9}$$

$$\theta_0 < \frac{K}{\pi_H e_a^*} \tag{10}$$

Thus, agents with low initial wealth θ_0 are caught in an external poverty trap that can be relieved only by exogenously increasing initial capital.

However, even if inequality (10) does not hold, the agent's final wealth will be lower than initial wealth given $e = e_p^*$ if:

$$\theta(e_p^*, \pi_a) < \theta_0 \tag{11}$$

$$(1 + \pi_H e_p^*)\theta_0 - K < \theta_0 \tag{12}$$

$$\theta_0 < \frac{K}{\pi_H e_p^*} \tag{13}$$

In this case, we have that a combination of low expected agency $E[\pi_1]$ and intermediate initial wealth θ_0 causes the agent to exert low effort $e_p^* < e_a^*$ and stay with low final wealth $\theta(e_p^*, \pi_a) < \theta_0$. The agent is now caught in a belief-based poverty trap, because high effort is optimal and higher expected agency $E[\pi_1]$ would lead the agent to choose high effort and reach better outcomes.

This belief-based equilibrium may be sustained by limited updating of beliefs, which may occur for a few reasons. First, as long as the agent does exert low effort, she will not observe the effects of higher effort. Second, a rational agent with sufficient available resources could sometimes try higher effort levels in order to learn about its effects, but then faces the same

challenges that caused beliefs to be distorted in the first place (see Introduction), so that learning is difficult and experimenting may not worth the risk of losing investments. Third, even if learning would be possible, previous bad experiences may lead people to stop exploring, a phenomenon that is called learned helplessness (de Quidt and Haushofer, 2016).

III. Effects of development interventions

In this section, we revert back to our basic model. We will study how development interventions affect aspirations and final wealth. We will first study the effects of material interventions that increase the initial wealth, but may decrease expected agency. We then study the effects of psychological interventions that increase expected agency. Finally, we study under what conditions a combination of both interventions combines the best of both.

We argue that development interventions can affect the agent's beliefs about her agency if the agent perceives the intervention as a signal about her agency. Such a signal might be hidden in the targeting or the nature of the intervention. Specifically, the agent may belief that she is either more or less likely to receive the intervention if she has high agency.

Material interventions

First, consider a material intervention M that increases the endowment θ_0. Such an intervention has three effects on final wealth:

1. It directly increases final wealth via θ_0 in equation (6) (the level of the solid line in the graphs).

2. It increases the marginal effect of effort via θ_0 in equation (7) (the slope of the solid line in the graphs), and thus increases effort and final wealth.

3. It may affect perceived agency, either decreasing or increasing effort and final wealth.

We discuss this third mechanism in more detail. Conditional on receiving the material intervention M, the posterior expected agency $E[\pi_1|M]$ equals:

$$E[\pi_1|M] = \pi_L + (\pi_H - \pi_L)\Pr[\pi_1 = \pi_H|M] \tag{14}$$

Following de Quidt and Haushofer (2016) and Wuepper and Lybbert (2017), we use Bayesian updating to obtain the posterior agency beliefs, and have that the posterior probability $\Pr[\pi_1 = \pi_H|M]$ equals:

$$\Pr[\pi_1 = \pi_H|M] = \frac{\Pr[M|\pi_1 = \pi_H]\Pr[\pi_1 = \pi_H]}{\Pr[M|\pi_1 = \pi_L]\Pr[\pi_1 = \pi_L] + \Pr[M|\pi_1 = \pi_H]\Pr[\pi_1 = \pi_H]} \tag{15}$$

If the individual is more likely to receive the material intervention if she has high agency than if she has low agency, i.e. $\Pr[M|\pi_1 = \pi_H] > \Pr[M|\pi_1 = \pi_L]$, then the material intervention increases her expected agency $E[\pi_1|M] > E[\pi_1]$, so that effort increases unambiguously.

If, however, the individual is more likely to receive the material intervention if she has low agency than if she has high agency, i.e. $\Pr[M|\pi_1 = \pi_L] > \Pr[M|\pi_1 = \pi_H]$, then the material intervention decreases expected agency, $E[\pi_1|M] < E[\pi_1]$.

Then, we can distinguish three cases for the net effect on effort:

A. If the increase in endowment $\Delta\theta_0$ is large relative to the decrease in expectations $E[\pi_1] - E[\pi_1|M]$, then we will have a unique interior solution $e_p^{**} > e_p^{*}$.

B. If the increase in endowment $\Delta\theta_0$ is medium relative to the decrease in expectations $E[\pi_1] - E[\pi_1|M]$, then we will have a unique interior e_p^{**} with $e_p^{*} \geq e_p^{**} > e_0$.

C. If the increase in endowment $\Delta\theta_0$ is small relative to the decrease in expectations $E[\pi_1] - E[\pi_1|M]$, then we will have a unique corner solution $e_p^{**} = e_0$ and $\theta^{**} \equiv \theta(e_p^{**}, \pi_a) = (1 + e_0)(\theta_0 + \Delta\theta_0)$.

This leads us to distinguish three cases for the total effect on final wealth:

16

I. The direct effect of the increase in endowment (1) and the net effect of the two indirect effects via effort (2 and 3) are both positive ($\Pr[M|\pi_H] > \Pr[M|\pi_L]$ or case A), so that final wealth $\theta^{**} \equiv \theta(e_p^{**}, \pi_a) > \theta^* \equiv \theta(e_p^*, \pi_a)$.

II. The direct effect of the increase in endowment (1) dominates the negative net effect of the two indirect effects via effort (2 and 3, case B or C), so that we still have that $\theta^{**} \equiv \theta(e_p^{**}, \pi_a) > \theta^* \equiv \theta(e_p^*, \pi_a)$.

III. The direct effect of the increase in endowment (1) is dominated by the negative net effect of the two indirect effects via effort (2 and 3, case B or C), so that final wealth $\theta^{**} \equiv \theta(e_p^{**}, \pi_a) < \theta^* \equiv \theta(e_p^*, \pi_a)$.

Case III is an important insight of our model: even though a material intervention M increases the initial wealth, its total effect on final wealth can be negative if the intervention undermines the agent's belief in her own agency. An example of this case is illustrated in Figure 2 with $\Delta\theta_0 \to 0$ and $\mathrm{E}[\pi_1|M] \to \pi_L = 0$. We provide an example of cases I and II with large $\Delta\theta_0$ in Figure 3.
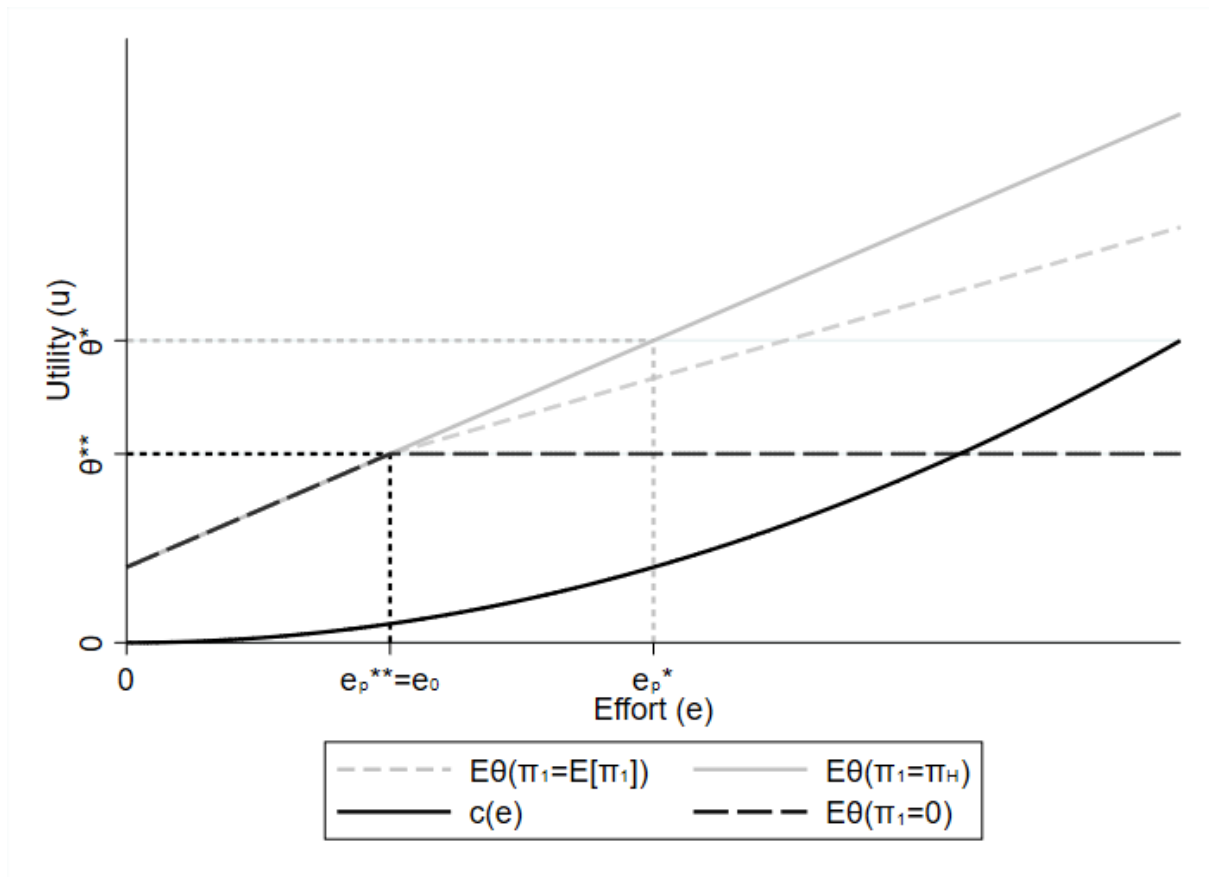
Figure 2. The effects of a negligible material intervention that undermines beliefs in agency.

Note: **Compared to the baseline situation in Figure 1, expected agency $E[\pi_1]$ has dropped to $\pi_L = 0$ (indicated by the black long-dashed line). The individual now maximizes her expected utility at the kink point e_0.**
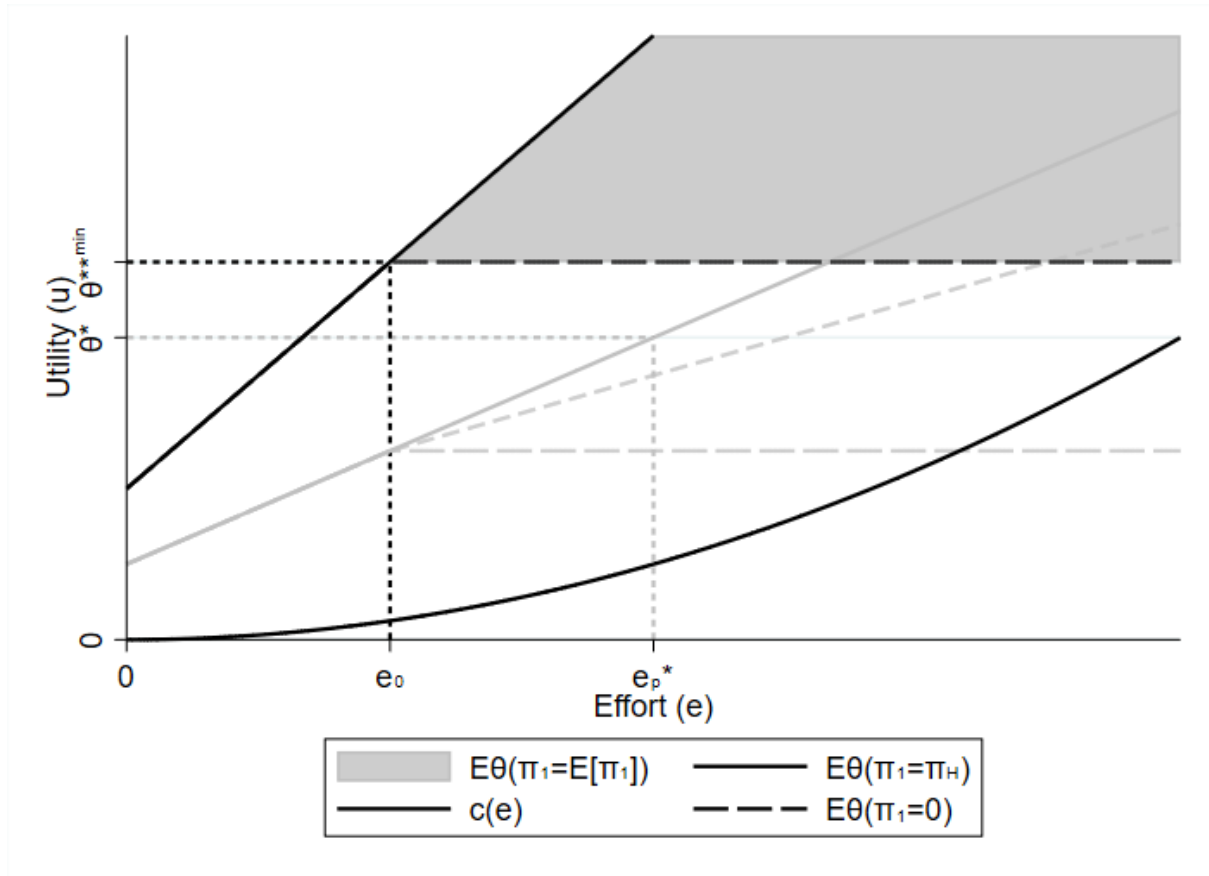
Figure 3. Effects of a sizable material intervention.

Note: **Compared to the baseline situation in Figure 1, the endowment θ_0 has increased. The increase in endowment $\Delta\theta_0$ is large, so that the actual final wealth (here indicated by the black solid line) starts at a higher level and is steeper. The expected final wealth starts in the usual kink point and lies somewhere in the grey area. For all $E[\pi_1]$, effort is at least $e^{**} \geq e_0$, so that final wealth $\theta^{**} \geq \theta^{**min} \equiv (1 + e_0)(\theta_0 + \Delta\theta_0) > \theta^{*}$.**

Psychological interventions

Now, consider a psychological intervention or signal P that does not increase the endowment θ_0, but does affect the expected agency of an agent positively.

A psychological intervention P can be directed at those that underestimated their agency, such that, like before, conditional on receiving the psychological intervention P, the posterior expected agency $E[\pi_1|P]$ equals:

$$E[\pi_1|P] = \pi_L + (\pi_H - \pi_L)P[\pi_1 = \pi_H|P] \tag{16}$$

Using Bayesian updating, we have that the posterior probability $\Pr[\pi_1 = \pi_H|P]$ equals:

$$\Pr[\pi_1 = \pi_H|P] = \frac{\Pr[P|\pi_1 = \pi_H]\Pr[\pi_1 = \pi_H]}{\Pr[P|\pi_1 = \pi_L]\Pr[\pi_1 = \pi_L] + \Pr[P|\pi_1 = \pi_H]\Pr[\pi_1 = \pi_H]} \tag{17}$$

If the individual is more likely to receive the psychological intervention or signal if she has high agency than if she has low agency, i.e. $\Pr[P|\pi_1 = \pi_H] > \Pr[P|\pi_1 = \pi_L]$, then the psychological intervention increases her expected agency, $E[\pi_1|P] > E[\pi_1]$, so that effort increases unambiguously (see Figure 4).
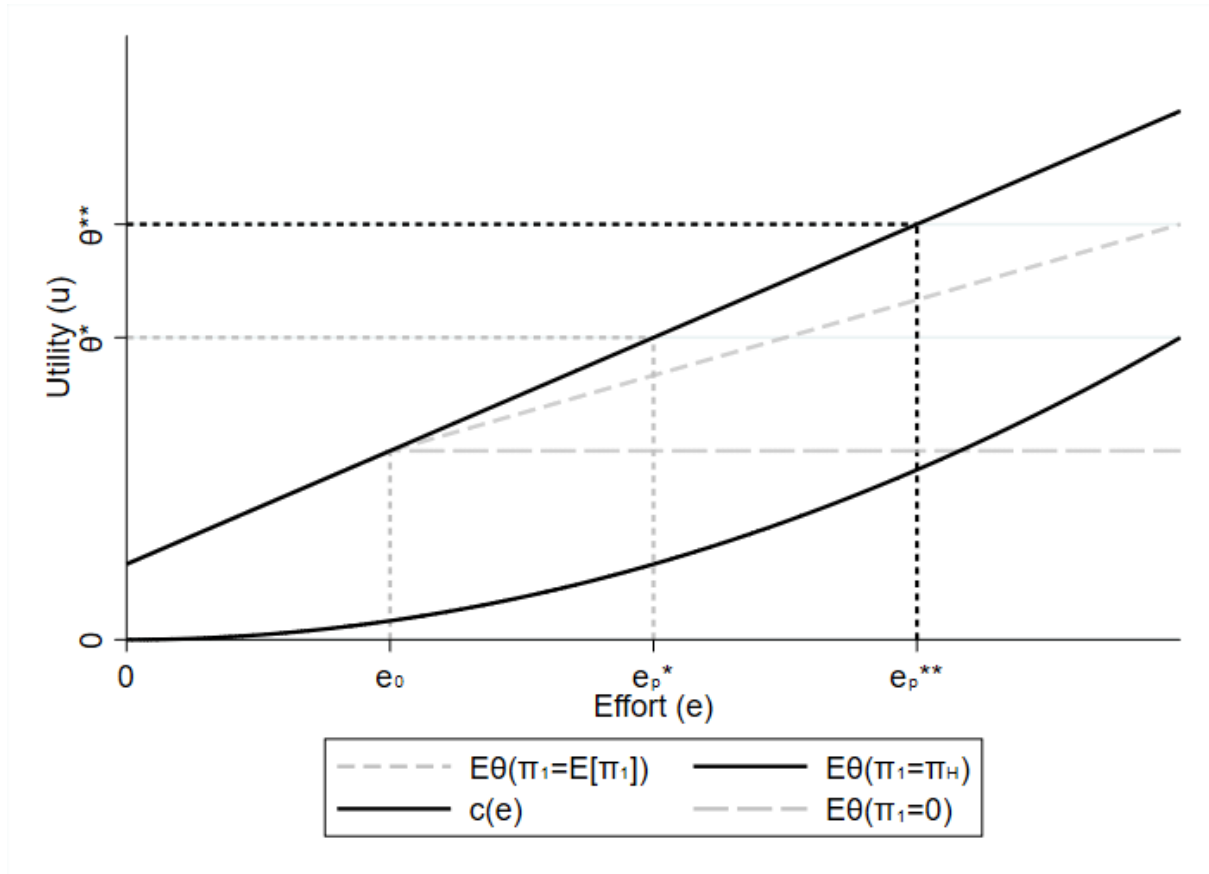
Figure 4. Effects of a psychological intervention that strengthens beliefs in agency.

Note: **Compared to the baseline situation in Figure 1, expected agency $E[\pi_1]$ has increased to π_H (here indicated by the black solid line). The individual maximizes her expected utility where the marginal final wealth (the slope of the black solid line) equals marginal cost of effort (the slope of the black solid curve).**

Combining material and psychological interventions

Ideally, development interventions lift both material and psychological constraints. We argue that a combination of a material intervention and a psychological intervention may do so. Specifically, we would need to combine a material intervention M with a psychological intervention P that gives a strong or even perfect signal about the agent's agency. The psychological intervention P can then turn a potentially negative signal of the material intervention M into a positive combined signal. We will now formalize this idea.

21

Conditional on receiving both a material intervention M and a psychological intervention P, the posterior expected agency $E[\pi_1|M \cap P]$ equals:

$$E[\pi_1|M \cap P] = \pi_L + (\pi_H - \pi_L)\Pr[\pi_1 = \pi_H|M \cap P] \tag{18}$$

Using Bayesian updating, we have that the posterior probability $\Pr(\pi_H|P)$ equals:

$$\Pr[\pi_1 = \pi_H|M \cap P] = \frac{\Pr[M \cap P|\pi_1 = \pi_H]\Pr[\pi_1 = \pi_H]}{\Pr[M \cap P|\pi_1 = \pi_L]\Pr[\pi_1 = \pi_L] + \Pr[M \cap P|\pi_1 = \pi_H]\Pr[\pi_1 = \pi_H]} \tag{19}$$

The psychological intervention increases her belief about her agency $E[\pi_1|M \cap P] > E[\pi_1]$ if the individual is more likely to receive the combination of interventions or signals if she has high agency than if she has low agency:

$$\Pr[M \cap P|\pi_1 = \pi_H] > \Pr[M \cap P|\pi_1 = \pi_L] \tag{20}$$

$$\Pr[M|\pi_1 = \pi_H]\Pr[P|\pi_1 = \pi_H \cap M] > \Pr[M|\pi_1 = \pi_L]\Pr[P|\pi_1 = \pi_L \cap M] \tag{21}$$

$$\frac{\Pr[P|\pi_1 = \pi_H \cap M]}{\Pr[P|\pi_1 = \pi_L \cap M]} > \frac{\Pr[M|\pi_1 = \pi_L]}{\Pr[M|\pi_1 = \pi_H]} \tag{22}$$

This means that for a combination of a material intervention M and a psychological intervention P to increase expected agency, the overinvolvement ratio of high types of the psychological intervention should exceed the inverse of the overinvolvement ratio of the material intervention. Or, said differently, if a material intervention is more likely to be given to people with low agency, then the psychological intervention should be given at least equally more likely to people with high agency.

Finally, we note that what matters is not the actual targeting, but what agents belief about which types receive which interventions. However, if donors aim to improve the outcomes for the poorest people, it make sense expect that donors will prioritize material resources for those that have low actual agency and therefore cannot improve outcomes by just increasing effort. And

since psychological interventions can improve outcomes specifically if psychological constraints are binding, it seems logical to belief that such interventions will primarily be given to agents with high actual agency.

IV. Discussion

In this paper, we have shown how low agency beliefs can catch people in a behavioral poverty trap. We have subsequently studied the impact of development interventions. We have shown that material development interventions may undermine agency beliefs, and thus sustain or even create such a poverty trap. This may help to explain why many material interventions do not realize their intended effects. We have further shown that by turning negative agency signals into positive ones, complementary psychological interventions can undo the negative effects of material interventions, and thus help to unambiguously improve economic outcomes.

While this paper focused on a situation where the agent underestimates her true agency, we note that the agent can also overestimate her actual agency. Where the first will induce below-optimal effort and final wealth, the latter will induce above-optimal costs of effort. The challenge for development interventions is thus to help people learning about their actual agency.

We finally note that pessimism about agency should not be confused with laziness. In fact, if effort represents the choice of education level, low agency beliefs can cause agents to stay in an equilibrium of heavy physical work for low returns.

References

Addison, Tony, Oliver Morrissey, and Fin Tarp. (2017). The Macroeconomics of Aid: Overview. *Journal of Development Studies.* 53(7): 987-997.

Aguinaga, Paulina, Alessandra Cassar, Jennifer Graham, Lauren Skora, and Bruce Wydick. (2019). Raising achievement among microentrepreneurs: An experimental test of goals, incentives, and support groups in Medellin, Colombia. *Journal of Economic Behavior & Organization*, 161(5): 79-97.

Aker, Jenny C., Christopher Ksoll, and Travis J. Lybbert. (2012). Can Mobile Phones Improve Learning? Evidence from a Field Experiment in Niger. *American Economic Journal: Applied Economics*, 4(4): 94-120.

Appadurai, Arjun (2004). The Capacity to Aspire: Culture and the Terms of Recognition. In Vijayendra Rao and Michael Walton (Eds.), *Culture and Public Action, The International Bank for Reconstruction and Development* (pp. 59–84). Washington, DC: The World Bank.

Arndt, Channing, Sam Jones, and Finn Tarp. (2010). Aid, Growth and Development: Have We Come Full Circle? *Journal of Globalization and Development*, 1(2): 5.

Bandura, Albert (1997). *Self-efficacy: The exercise of control*. New York: Freeman.

Bandura, Albert, and Edwin A. Locke (2003). Negative self-efficacy and goal effects revisited. *The Journal of Applied Psychology*, 88(1): 87–99.

Banerjee, Abhijit V., and Andrew F. Newman. (1991). Risk-Bearing and the Theory of Income Distribution. *The Review of Economic Studies*, 58(2): 211-235.

Banerjee, Abhijit V., and Andrew F. Newman. (1993). Occupational Choice and the Process of Development. *Journal of Political Economy*, 101(2): 274-298.

Banerjee, Abhijit V., and Sendhil Mullainathan. (2010). The Shape of Temptation: Implications for the Economic Lives of the Poor. *NBER working paper 15973*. Cambridge, MA.

Bardhan, P. (1997). Corruption and Development: A Review of Issues. *Journal of Economic Literature*, 35(3): 1320-1346.

Barham, Vicky, Robin Boadway, Maurice Marchand, Pierre Pestieau. (1995). Education and the poverty trap. *European Economic Review*, 39(7): 1257-1275.

Barrett, Christopher B., Michael R. Carter, and Jean- Paul Chavas (Eds.). (2019). *The Economics of Poverty Traps*. Chicago: University of Chicago Press.

Bernard, Tanguy, Alain de Janvry, Samba Mbaye, and Elisabeth Sadoulet. (2017). Expected Product Market Reforms and Technology Adoption by Senegalese Onion Producers. *American Journal of Agricultural Economics*, 99: 1096-1115.

Bernard, Tanguy, Stefan Dercon, Kate Orkin, and Alemayehu Taffesse. (2014). The Future in Mind: Aspirations and Forward-Looking Behaviour in Rural Ethiopia. CSAE Working Paper Series No. 2014-16.

Bernheim, B. Douglas, Debrai Ray, and Sevin Yeltekin (2015). Poverty and Self-Control. *Econometrica*, 83(5): 1877-1911.

Blattman, Christopher, Nathan Fiala, Sebastian Martinez. (2014). Generating Skilled Self-Employment in Developing Countries: Experimental Evidence from Uganda. *The Quarterly Journal of Economics*, 129(2): 697-752.

Bryan, Ghared, Shyamal Chowdhury, and Ahmed M. Mobarak. (2014). Underinvestment in a Profitable Technology: The Case of Seasonal Migration in Bangladesh. *Econometrica*, 82(5): 1671-1748.

Chetty, Raj, and Emmanuel Saez. (2013). Teaching the Tax Code: Earnings Responses to an Experiment with EITC Recipients. *American Economic Journal: Applied Economics*, 5(1): 1-31.

Dalton, Patricio S., Sayantan Ghosal, and Anandi Mani. (2016). Poverty and Aspirations Failure. *The Economic Journal*, 126(590): 165-188.

Darolia, Rajeev, and Bruce Wydick. (2011). The Economics of Parenting, Self-esteem and Academic Performance: Theory and a Test. *Economica*, 78: 215-239.

Dasgupta, Partha, and Debraj Ray. (1986). Inequality as a Determinant of Malnutrition and Unemployment: Theory. *The Economic Journal*, 96(384): 1011-1034.

de Mel, Suresh, David J. McKenzie, Christopher Woodruff. (2009). Measuring microenterprise profits: Must we ask how the sausage is made? *Journal of Development Economics*, 88(1): 19-31.

de Quidt, Jonathan, and Johannes Haushofer. (2016). Depression for Economists. NBER Working Paper no. 22973, Cambridge, MA.

de Quidt, Jonathan, and Johannes Haushofer. (2019). Depression through the Lens of Economics. In: Christopher B. Barrett, Michael R. Carter, and Jean- Paul Chavas (Eds.), *The Economics of Poverty Traps* (pp. 127-152). Chicago: University of Chicago Press.

Development Initiatives (2021). *Poverty trends: global, regional and national: factsheet.* November 2021. Downloadable from https://devinit.org/documents/1100/Poverty_trends_-_global_regional_and_national_-_November_2021.pdf

Dizon-Ross, Rebecca. (2019). Parents' Beliefs about Their Children's Academic Ability: Implications for Educational Investments. *American Economic Review*, 109(8): 2728–2765.

Djankov, Simeon, Jose G. Montalvo, and Marta Reynal-Que (2008). The curse of aid. *Journal of Economic Growth.* 13: 169-194.

Doucouliagos, Hristos, and Martin Paldam. (2009). The aid effectiveness literature: The sad results of 40 years of research. *Journal of Economic Surveys*, 23(3): 433-461.

Duflo, Esther. (2012). Women Empowerment and Economic Development. *Journal of Economic Literature*, 50(4): 1051-1079. doi:10.1257/jel.50.4.1051

Duflo, Esther. (2013). *Hope, Aspirations and the Design of the Fight Against Poverty.* Stanford, CA: Stanford University Center for Ethics in Society.

Dupas, Pascaline. (2011). Do Teenagers Respond to HIV Risk Information? Evidence from a Field Experiment in Kenya. *American Economic Journal: Applied Economics*, 3(1): 1-34.

Easterly, William. (2009). Can the West Save Africa? *Journal of Economic Literature*, 47(2): 373-447.

Galiani, Sebastian, Stephen Knack, Lixin Colin Xu, and Ben Zou. (2016). The effect of aid on growth: evidence from a Quasi-experiment. *Journal of Economic Growth*, 22(1): 1-33.

Galor, Oded, and Joseph Zeira. (1993). Income Distribution and Macroeconomics. *The Review of Economic Studies,* 60(1): 35-52.

Genicot, Garance, and Debraj Ray. (2017). Aspirations and Inequality. *Econometrica*, 85(2): 489-519.

Ghosal, Sayantan, Smarajit Jana, Anandi Mani, Sandip Mitra, and Sanchari Roy. (2022). Sex Workers, Stigma, and Self-Image: Evidence from Kolkata Brothels. *The Review of Economics and Statistics*, forthcoming.

Hall, Crystal C., Jiaying Zhao, and Eldar Shafir. (2014). Self-Affirmation Among the Poor: Cognitive and Behavioral Implications. *Psychological Science*, 25(2): 619-625.

Hanna, Rema, Sendhil Mullainathan, and Joshua Schwartzstein. (2014). Learning Through Noticing: Theory and Evidence from a Field Experiment. *The Quarterly Journal of Economics*, 129(3): 1311-1353.

Jalan, Jyotsna, and Martin Ravallion (2002). Geographic Poverty Traps? A Micro Model of Consumption Growth in Rural China. *Journal of Applied Econometrics,* 17(4): 329-346.

Jalan, Jyotsna, and Eswaran Somanathan. (2008). The importance of being informed: Experimental evidence on demand for environmental quality. *Journal of Development Economics*, 87(1): 14-28.

Jensen, Robert. (2010). The (Perceived) Returns to Education and the Demand for Schooling. *The Quarterly Journal of Economics*, 125(2): 515-548.

Kraay, Aart, and David McKenzie. (2014). Do Poverty Traps Exist? Assessing the Evidence. *Journal of Economic Perspectives*, 28 (3): 127-148.

La Ferrara, Eliane. (2019). Presidential Address: Aspirations, Social Norms and Development. *Journal of the European Economic Association ,* 17(6): 1687–1722

Lobell, David B., Wolfram Schlenker, and Justin Costa-Roberts. (2011). Climate Trends and Global Crop Production Since 1980. *Science*, 333(6042): 616-620.

Lubega, Patrick, Frances Nakakawa, Gaia Narciso, Carol Newman, Archileo N. Kaaya, Cissy Kityo, and Gaston A. Tumuhimbise. (2021). Body and mind: Experimental evidence from women living with HIV. *Journal of Development Economics*, 150: 102613.

Lybbert, Travis J., and Bruce Wydick. (2018). Poverty, Aspirations, and the Economics of Hope. *Economic Development and Cultural Change*, 66(4): 709-753.

Magruder, Jeremy R. (2018). An Assessment of Experimental Evidence on Agricultural Technology Adoption in Developing Countries. *Annual Review of Resource Economics*, 10: 299-316.

McKelway, Madeline. (2021). Women's employment in India: Intra-household and intra-personal constraints. Working Paper.

McKenzie, David, Aakash Mohpal, and Dean Yang. (2022). Aspirations and Financial Decisions: Experimental Evidence from the Philippines. *Journal of Development Economics*, 156: 102846.

Moav, Omer, and Zvika Neeman. (2012). Saving Rates and Poverty: The Role of Conspicuous Consumption and Human Capital. *The Economic Journal,* 122 (563): 933-956.

Munro, Alistair, Ben d'Excelle and Arjan Verschoor. (2019). Investment behaviour when agents' influence on the success probability is hard to detect: An experiment. GRIPS Discussion Paper 19-11.

Qian, Nancy. (2015). Making Progress on Foreign Aid. *Annual Review of Economics* 7(1): 277-308.

Rajan, Raghuram G., and Arvind Subramanian. (2008). Aid and Growth: What Does the Cross-Country Evidence Really Show? *The Review of Economics and Statistics*, 90(4): 643-665.

Ravallion, Martin. (2016). *The Economics of Poverty: History, Measurement and Policy*. Oxford: Oxford University Press.

Ray, Debraj. (2006). Aspirations, Poverty and Economic Change. In Abhijit V. Banerjee, Roland Benabou and Dilip Mookherjee (Eds.), *Understanding Poverty* (pp. 409-422). Oxford: Oxford University Press.

Riley, Emma. (2022). Role Models in Movies: The Impact of Queen of Katwe on Students' Educational Attainment. *The Review of Economics and Statistics*, forthcoming.

Rojas Valdes, Ruben Irvin, Bruce Wydick, and Travis J. Lybbert. (2022). Can hope elevate microfinance? Evidence from Oaxaca, Mexico. *Oxford Economic Papers*, 74(1): 236-264.

Sachs, Jeffrey D. (2005). The End of Poverty: Economic Possibilities for Our Time. New York: Penguin Press.

Sandstrom, Gillian M., Toni Schmader, Alyssa Croft, and Navio Kwok. (2019). A social identity threat perspective on being the target of generosity from a higher status other. *Journal of Experimental Social Psychology*, 82: 98-114.

Snyder, Charles R. (Ed.). (2000). *Handbook of hope: Theory, measures, and applications*. Academic press.

Snyder, Charles R. (2002). Hope Theory: Rainbows in the Mind. *Psychological Inquiry, 13*(4): 249-275.

Thomas, Catherine C., Nicholas G. Otis, Justin R. Abraham, Hazel Rose Markus, and Gregory M. Walton. (2020). Toward a Science of Delivering Aid with Dignity: Experimental Evidence and Local Forecasts from Kenya. *Proceedings of the National Academy of Sciences*, 117(27): 15546-15553.

Tjernström, Emilia, Travis J. Lybbert, Rachel Frattarola Hernández, and Juan Sebastian Correa. (2021). Learning by (Virtually) Doing: Experimentation and Belief Updating in Smallholder Agriculture. *Journal of Economic Behavior & Organization*, 189: 28-50.

O'Toole, Thomas P., Jose J. Arbelaez, and Robert S. Lawrence. (2004). Medical Debt and Aggressive Debt Restitution Practices: Predatory Billing Among the Urban Poor. *Journal of General Internal Medicine*, 19: 772-778.

Wiswall, Matthew, and Basit Zafar. (2015). How Do College Students Respond to Public Information about Earnings? *Journal of Human Capital*, 9(2): 117-169.

Wuepper, David, and Travis J. Lybbert. (2017). Perceived Self-Efficacy, Poverty, and Economic Development. *Annual Review of Resource Economics*, 9: 383-404.

Wydick, Bruce, Elizabeth Katz, Flor Calvo, Felipe Gutierrez, Brendan Janet. (2018). Shoeing the Children: The Impact of the TOMS Shoe Donation Program in Rural El Salvador. *The World Bank Economic Review*, 32(3): 727–751.

List of research reports

17001-EEF: Trinks, A., B. Scholtens, M. Mulder, and L. Dam, Divesting Fossil Fuels: The Implications for Investment Portfolios

17002-EEF: Angelini, V., and J.O. Mierau, Late-life Health Effects of Teenage Motherhood

17003-EEF: Jong-A-Pin, R., M. Laméris, and H. Garretsen, Political Preferences of (Un)happy Voters: Evidence Based on New Ideological Measures

17004-EEF: Jiang, X., N. Hermes, and A. Meesters, Financial Liberalization, the Institutional Environment and Bank Efficiency

17005-EEF: Kwaak, C. van der, Financial Fragility and Unconventional Central Bank Lending Operations

17006-EEF: Postelnicu, L. and N. Hermes, The Economic Value of Social Capital

17007-EEF: Ommeren, B.J.F. van, M.A. Allers, and M.H. Vellekoop, Choosing the Optimal Moment to Arrange a Loan

17008-EEF: Bekker, P.A., and K.E. Bouwman, A Unified Approach to Dynamic Mean-Variance Analysis in Discrete and Continuous Time

17009-EEF: Bekker, P.A., Interpretable Parsimonious Arbitrage-free Modeling of the Yield Curve

17010-GEM: Schasfoort, J., A. Godin, D. Bezemer, A. Caiani, and S. Kinsella, Monetary Policy Transmission in a Macroeconomic Agent-Based Model

17011-I&O: Bogt, H. ter, Accountability, Transparency and Control of Outsourced Public Sector Activities

17012-GEM: Bezemer, D., A. Samarina, and L. Zhang, The Shift in Bank Credit Allocation: New Data and New Findings

17013-EEF: Boer, W.I.J. de, R.H. Koning, and J.O. Mierau, Ex-ante and Ex-post Willingness-to-pay for Hosting a Major Cycling Event

17014-OPERA: Laan, N. van der, W. Romeijnders, and M.H. van der Vlerk, Higher-order Total Variation Bounds for Expectations of Periodic Functions and Simple Integer Recourse Approximations

17015-GEM: Oosterhaven, J., Key Sector Analysis: A Note on the Other Side of the Coin

17016-EEF: Romensen, G.J., A.R. Soetevent: Tailored Feedback and Worker Green Behavior: Field Evidence from Bus Drivers

17017-EEF: Trinks, A., G. Ibikunle, M. Mulder, and B. Scholtens, Greenhouse Gas Emissions Intensity and the Cost of Capital

17018-GEM: Qian, X. and A. Steiner, The Reinforcement Effect of International Reserves for Financial Stability

17019-GEM/EEF: Klasing, M.J. and P. Milionis, The International Epidemiological Transition and the Education Gender Gap

2018001-EEF: Keller, J.T., G.H. Kuper, and M. Mulder, Mergers of Gas Markets Areas and Competition amongst Transmission System Operators: Evidence on Booking Behaviour in the German Markets

2018002-EEF: Soetevent, A.R. and S. Adikyan, The Impact of Short-Term Goals on Long-Term Objectives: Evidence from Running Data

2018003-MARK: Gijsenberg, M.J. and P.C. Verhoef, Moving Forward: The Role of Marketing in Fostering Public Transport Usage

2018004-MARK: Gijsenberg, M.J. and V.R. Nijs, Advertising Timing: In-Phase or Out-of-Phase with Competitors?

2018005-EEF: Hulshof, D., C. Jepma, and M. Mulder, Performance of Markets for European Renewable Energy Certificates

2018006-EEF: Fosgaard, T.R., and A.R. Soetevent, Promises Undone: How Committed Pledges Impact Donations to Charity

2018007-EEF: Durán, N. and J.P. Elhorst, A Spatio-temporal-similarity and Common Factor Approach of Individual Housing Prices: The Impact of Many Small Earthquakes in the North of Netherlands

2018008-EEF: Hermes, N., and M. Hudon, Determinants of the Performance of Microfinance Institutions: A Systematic Review

2018009-EEF: Katz, M., and C. van der Kwaak, The Macroeconomic Effectiveness of Bank Bail-ins

2018010-OPERA: Prak, D., R.H. Teunter, M.Z. Babai, A.A. Syntetos, and J.E. Boylan, Forecasting and Inventory Control with Compound Poisson Demand Using Periodic Demand Data

2018011-EEF: Brock, B. de, Converting a Non-trivial Use Case into an SSD: An Exercise

2018012-EEF: Harvey, L.A., J.O. Mierau, and J. Rockey, Inequality in an Equal Society

2018013-OPERA: Romeijnders, W., and N. van der Laan, Inexact cutting planes for two-stage mixed-integer stochastic programs

2018014-EEF: Green, C.P., and S. Homroy, Bringing Connections Onboard: The Value of Political Influence

2018015-OPERA: Laan, N. van der, and W. Romeijnders, Generalized aplha-approximations for two-stage mixed-integer recourse models

2018016-GEM: Rozite, K., Financial and Real Integration between Mexico and the United States

2019001-EEF: Lugalla, I.M., J. Jacobs, and W. Westerman, Drivers of Women Entrepreneurs in Tourism in Tanzania: Capital, Goal Setting and Business Growth

2019002-EEF: Brock, E.O. de, On Incremental and Agile Development of (Information) Systems

2019003-OPERA: Laan, N. van der, R.H. Teunter, W. Romeijnders, and O.A. Kilic, The Data-driven Newsvendor Problem: Achieving On-target Service Levels.

2019004-EEF: Dijk, H., and J. Mierau, Mental Health over the Life Course: Evidence for a U-Shape?

2019005-EEF: Freriks, R.D., and J.O. Mierau, Heterogeneous Effects of School Resources on Child Mental Health Development: Evidence from the Netherlands.

2019006-OPERA: Broek, M.A.J. uit het, R.H. Teunter, B. de Jonge, J. Veldman, Joint Condition-based Maintenance and Condition-based Production Optimization.

2019007-OPERA: Broek, M.A.J. uit het, R.H. Teunter, B. de Jonge, J. Veldman, Joint Condition-based Maintenance and Load-sharing Optimization for Multi-unit Systems with Economic Dependency

2019008-EEF: Keller, J.T. G.H. Kuper, and M. Mulder, Competition under Regulation: Do Regulated Gas Transmission System Operators in Merged Markets Compete on Network Tariffs?

2019009-EEF: Hulshof, D. and M. Mulder, Renewable Energy Use as Environmental CSR Behavior and the Impact on Firm Profit

2019010-EEF: Boot, T., Confidence Regions for Averaging Estimators
2020001-OPERA: Foreest, N.D. van, and J. Wijngaard. On Proportionally Fair Solutions for the Divorced-Parents Problem

2020002-EEF: Niccodemi, G., R. Alessie, V. Angelini, J. Mierau, and T. Wansbeek. Refining Clustered Standard Errors with Few Clusters

2020003-I&O: Bogt, H. ter, Performance and other Accounting Information in the Public Sector: A Prominent Role in the Politicians' Control Tasks?

2020004-I&O: Fisch, C., M. Wyrwich, T.L. Nguyen, and J.H. Block, Historical Institutional Differences and Entrepreneurship: The Case of Socialist Legacy in Vietnam

2020005-I&O: Fritsch, M. and M. Wyrwich. Is Innovation (Increasingly) Concentrated in Large Cities? An Internatinal Comparison

2020006-GEM: Oosterhaven, J., Decomposing Economic Growth Decompositions.

2020007-I&O: Fritsch, M., M. Obschonka, F. Wahl, and M. Wyrwich. The Deep Imprint of Roman Sandals: Evidence of Long-lasting Effects of Roman Rule on Personality, Economic Performance, and Well-Being in Germany

2020008-EEF: Heijnen, P., On the Computation of Equilibrium in Discontinuous Economic Games

2020009-EEF: Romensen, G.J. and A.R. Soetevent, Improving Worker Productivity Through Tailored Performance Feedback: Field Experimental Evidence from Bus Drivers

2020010-EEF: Rao, Z., M. Groneck, and R. Alessie, Should I Stay or Should I Go? Intergenerational Transfers and Residential Choice. Evidence from China

2020011-EEF: Kwaak, C. van der, Unintended Consequences of Central Bank Lending in Financial Crises

2020012-EEF: Soetevent, A.R., Determinants choice set variation in demand estimation – with an application to the electric vehicle public charging market

2020013-EEF: Kwaak, C. van der, Old-Keynesianism in the New Keynesian model

2020014-EEF: Plaat, m. van der, Loan Sales and the Tyranny of Distance in U.S. Residential Mortgage Lending

2020015-I&O: Fritsch, M., and M. Wyrwich, Initial Conditions and Regional Performance in the Aftermath of Disruptive Shocks: The Case of East Germany after Socialism

2020016-OPERA: Laan, N. van der, and W. Romeijnders, A Converging Benders' Decomposition Algorithm for Two-stage Mixed-integer Recourse Models

2021001-OPERA: Baardman, L., K.J. Roodbergen, H.J. Carlo, and A.H. Schrotenboer, A Special Case of the Multiple Traveling Salesmen Problem in End-of-aisle Picking Systems

2021002-EEF: Wiese, R., and S. Eriksen, Willingness to Pay for Improved Public Education and Public Health Systems: The Role of Income Mobility Prospects.

2021003-EEF: Keller, J.T., G.H. Kuper, and M. Mulder, Challenging Natural Monopolies: Assessing Market Power of Gas Transmission System Operators for Cross-Border Capacity

2021004-EEF: Li, X., and M. Mulder, Value of Power-to-Gas as a Flexibililty Option in Integrated Electricity and Hydrogen Markets
2021005-GEM: Rozite, K., J.P.A.M. Jacobs, and D.J. Bezemer, Investor Sentiment and Business Investment

2021006-EEF: Spierdijk, L., and T. Wansbeek, Differencing as a Consistency Test for the Within Estimator

2021007-EEF: Katz, M., and C. van der Kwaak, To Bail-in or to Bailout: that's the (Macro) Question

2021008-EEF: Haan, M.A., N.E. Stoffers, and G.T.J. Zwart, Choosing Your Battles: Endogenous Multihoming and Platform Competition

2021009-I&O: Greve, M., M. Fritsch, and M. Wyrwich, Long-Term Decline of Regions and the Rise of Populism: The Case of Germany

2021010-MARK: Hirche, C.F., T.H.A. Bijmolt, and M.J. Gijsenberg, When Offline Stores Reduce Online Returns

2021011-MARK: Hirche, C.F., M.J. Gijsenberg, and T.H.A. Bijmolt, Promoting Product Returns: Effects of Price Reductions on Customer Return Behavior

2021012-MARK: Hirche, C.F., M.J. Gijsenberg, and T.H.A. Bijmolt, Asking Less, Getting More? The Influence of Fixed-Fee and Threshold-Based Free Shipping on Online Orders and Returns

2021013-I&O: Sorgner, A., and M. Wyrwich, Calling Baumol: What Telephones Can Tell Us about the Allocation of Entrepreneurial Talent in the Face of Radical Institutional Changes

2021014-I&O: Slavtchev, V., and M. Wywich, TV and Entrepreneurship

2021015-EEF: Kate, F. ten, M.J. Klasing, and P. Milionis, Diversity, Identity and Tax Morale

2021016-EEF: Bergemann, A., and R.T. Riphahn, Maternal Employment Effects of Paid Parental Leave

2021017-GEM: Abolhassani, M., Productivity Spillovers of Multinational Enterprises through Worker Mobility: New Evidence for the Netherlands

2021018-GEM: Abolhassani, M., Productivity Spillovers of Superior Firms through Worker Mobility

2022001-GEM: Oosterhaven, J., A Price Reinterpretation of the Leontief Quantity Model

2022002-EEF: Ghaemi, S, X. Li, and M. Mulder, Economic Value of Flexibility Provided by Power to gas Conversion Systems in Low-voltage Distribution Grids

2022003-OB: Meer, P.H. van der, Are All Self-employed Happy?

2022004-EEF: Perey, P., and M. Mulder, International Competitiveness of Low-carbon Hydrogen Supply to the North-west European Market

2022005-OPERA: Kasper, A., M. Land, and R. Teunter, University of Groningen, Faculty of Economics and Business, Department of Operations.

2022006-I&O: Fritsch, M., and M. Wyrwich, Entrepreneurship in the Long-run: Empirical Evidence and Historical Mechanisms.

2022006-EEF: Treurniet, M., and R. Lensink, Belief-based Poverty Traps and the Effects of Material and Psychological Development Interventions.