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Livelihood Environmentalism to Tunnel a Psychological Environmental Kuznets Curve

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Abstract

In the Global South, livelihood environmentalism of the poor contrasts with alleged absence of environmental concern in the emerging middle classes. We present survey evidence from India suggesting that individuals abandoning farming and advancing to middle income still retain influence of past farming, or nature experience. Income and trait heterogeneity of impact on environmental concern then cause 'tunneling' of a preference-driven Environmental Kuznets Curve.

Keywords: Environmental Kuznets Curve; Tunneling; Environmentalism of the Poor; Nature Experience

Highlights:

- Demonstration of existence of an Environmental Kuznets Curve of preferences
- Suggestion of bridging potential of such a curve by past environmentalism of the poor
- Model of moderation of the influence of nature experience on environmental concern by psychological traits relevant in the Global South

1. Introduction

The Environmental Kuznets Curve (EKC) hypothesis claims that environmental conditions deteriorate with economic development first, before they eventually improve again (Dinda 2004). Empirical support to date remains mixed, but the decisive carbon dioxide emissions might even be deteriorating infinitely in economic growth (Stern 2004). In the years to come, billions of poor are yet to embark on a path of development. Examining chances of bypassing maximum pollution or at least restraining the coupling of income and greenhouse gas emissions seem overdue. Such "tunneling" potential has been documented already for a variety of processes (Munasinghe 1999).

We study determinants of tunneling within individual preferences for environmental protection. They would drive the "original" EKC through mirroring it by an upright U-shape, such that tunneling is converted into "bridging" (Kollmuss & Agyeman 2010). Then, we reiterate that *environmental concern* is in fact already deeply engrained in many cultures of the Global South (Nagendra 2018). Dependence on nature for livelihood sustenance is still widespread and causes an often spiritual, affective attitude of environmental concern ("*environmentalism of the poor*": Martinez-Alier 2002). So why should "indigenous" environmentalism first disappear completely and cause the minimum of the preference EKC (Upadhya 2009), as countries like India become rich (Amel et al. 2017)? Why should we have to rely on slow reemergence of environmentalism from entirely new sources within emergent middle

classes (Mawdsley 2004)? We contribute to the literature by tracing environmentalism of the poor across the income distribution. And in aiming to thus explain one kind of bridging, we study the mechanisms determining its persistence.

To do so, we survey 1200 household heads at the rural-urban interface of Bangalore / India. Therein, we first show that a micro-level EKC of preferences as measured by the New Environmental Paradigm (NEP, Dunlap et al. 2000) would indeed obtain when bridging was absent (Roca 2003, Fairbrother 2013). Then, we adopt a life course perspective to allow for direct pathways between different points on the income distribution: With the speed of Indian growth, many individuals have likely abandoned agriculture and transitioned toward the right of the income distribution as a consequence (Diao et al. 2017). Local, psychological roots of bridging become evident within this framework from persistent influence of EP for the group that 'switched' out of agriculture, and from particularly pronounced influence at (otherwise) minimum EC in the middle of the EKC.

Theoretically, we thereby conceptualize environmentalism of the poor as *nature experience*. This allows for modeling the effect for environmental concern required for bridging as deviation from an already established link (Chawla 1998). These deviations are formalized in our model through moderated mediation terms (Hayes 2015). And as they exploit the heterogeneity of our rural-urban sample to reveal conditions of persistence of indigenous environmentalism, they lastly also contribute to the literature unprecedented but potentially decisive detail regarding the nature experience – concern relationship.

Section 2 develops the theoretical approach, section 3 introduces our models and survey, section 4 discusses results and section 5 concludes with suggestions for future research.

2. Theoretical Background

2.1 An EKC of Environmental Concern

While the "original" EKC hypothesis about an inverse U-shape between income and pollution remains subject to fierce discussion (see above), we enquire into the much-less researched micro-level version of the curve. Like in case of the original, cross-country version, specific sectors have provided empirical support for the existence of such a curve between a cross-section of individuals (e.g. Plassmann & Khanna 2016). In highly heterogeneous countries of the Global South like India, such a cross-section might point toward growth trajectories over time: Stages of economic development are often spread out in space side by side here (Lewis 1954). This would allow for much more accurate prediction of developments particular to the Global South. At micro level, the original inverse U-shape could then be driven simply by decreasing marginal utility from pollution (with income). But it could also result from actual changes in underlying preferences (Roca 2003). Such a "preference" EKC would then mirror the original one by a U-shape of environmental concern and convert tunneling into "bridging".

This shape has already received partial support from the literature in general, as much as for the case of India: Dependence on natural resources for sustaining livelihoods at the lower end of the income distribution often leads to spiritual attitudes of concern about the environment, or "environmentalism of the poor" (Guha & Gadgil 2000, Martinez-Alier 2002). With increasing income, education, openness to experience or long-term orientation has then separately been shown to cause value-based, "middle-class environmentalism" even in the Global South (Mawdsley 2004, Lange et al. 2009). These two, specific varieties of environmental attitude are known to exhibit common features measurable as environmental concern (Corral-Verdugo & Armendariz 2000). Despite the known attitude-behavior gap, they should hence be capable of explaining actual pollution to some degree (Kollmuss & Agyeman 2010).

Qualitative evidence then suggests that environmentalism of the poor can lead to middle class environmentalism directly, implying a monotonic increase of the curve throughout and hence bridging (Dwivedy 2016). But at the same time, an empirical "split" between the two is observed in many cases: Individuals abuse streams as dumping grounds, as soon as they acquire income sources beyond (irrigated) agriculture (Upadhya 2009). Such a split would equally be supported by the positive income-concern relationship turning negative in some developing country samples: They could be lacking observations with higher income (Gifford & Nilsson 2014). However, even heterogeneous samples have so far assumed a linear relationship (Fairbrother 2013). Joint modeling of all three phenomena, or differentiation of a U-shape from bridging is hence absent from extant literature.

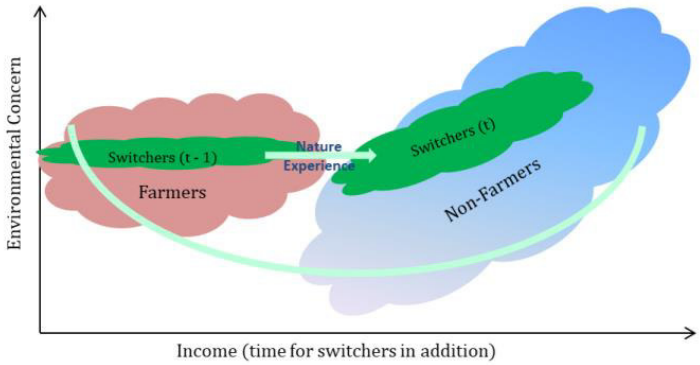
2.2 Conceptual Framework

We argue that some causes of bridging can be understood better, within the pattern of environmental concern outlined, by modeling them as heterogeneity of an already established effect. To derive this theoretical link, this section formalizes a possible, idealized understanding of bridging first. We show how the concept emerges from certain theoretical assumptions, and delimit it from other types of preference bridging. But we also allow for empirical departures from these, under which we still consider it meaningful to then analyze influence of past environmentalism of the poor on such bridging.

For one thing, we assume that environmentalism of the poor is limited to farmers, because livelihood dependence on nature applies to them chiefly (Angelsen et al. 2011). It follows that farmers will always exhibit higher concern than non-farmers: Concern monotonically increases in income for both groups because of education-induced values, but farmers always benefit from dependence on nature in addition. The 'split' generating a potential minimum of concern at middle income then becomes possible only if farmers stop dominating aggregate concern for higher income. Non-farmers would then take over, with their initially lower concern due to absence of both types of environmentalism. This is ensured by the second assumption: According to recent confirmation of dual development theory, farmers cluster toward the left and non-farmers at the right of the income distribution (Fig, 1, Diao et al. 2017). For bridging, we are hence interested in those non-farmers clustering directly at the potential drop, at any one point in time.

Since the minimum is generated in our understanding by absence of both kinds of environmentalism,

Fig. 1: The Tunneling Hypothesis in an EKC of Preferences



there are two straightforward options to generate bridging: One consists in middle-class concern becoming effective early enough, before environmentalism of the poor loses influence. But a second

option will be considered henceforth, as it appears more interesting in terms of local roots of environmentalism: Bridging will also be determined by the degree to which environmentalism of the poor endures, until middle class concern gains momentum.

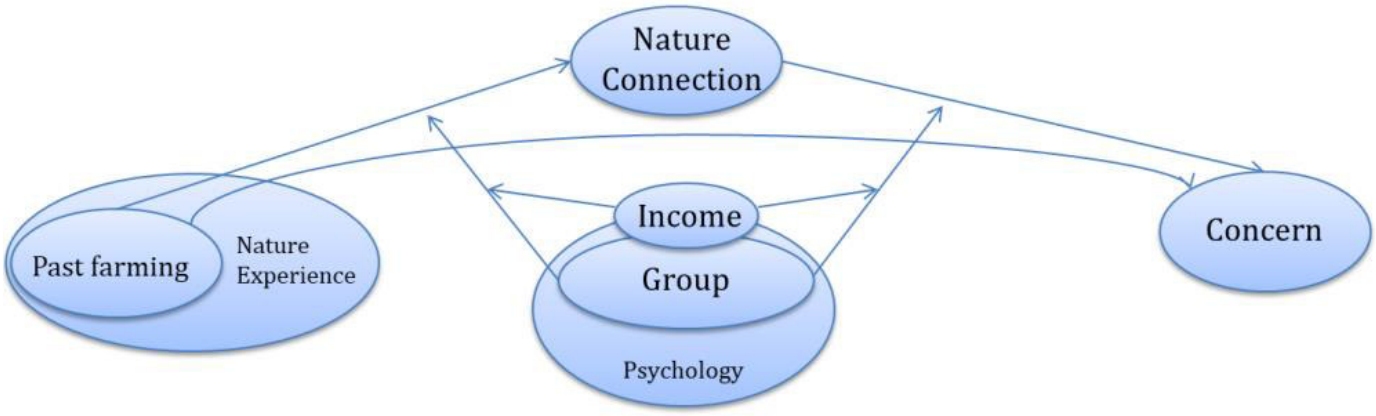
We propose to study such endurance within individuals' life courses. Given current Indian growth dynamics, many of the non-farmers at the potential drop will likely have transitioned from the left to at least the middle of the income distribution within these life courses (World Bank 2016). Because of dual development, such individuals are at the same time likely to have abandoned agriculture during that process. That is, they constitute a third that we might call "switchers". Depending on the effect of earlier environmentalism of the poor from agriculture, this group may contribute to a split pattern just like other non-farmers, or to bridging.

One obvious way of explaining bridging would thus derive from the conditions under which past farming still affects otherwise minimum concern, at middle income. But the aggregate degree of bridging, i.e. environmental concern at critical income, could result from different types of bridging as well: Farmers might be present there for example, and their environmental concern could equally be affected by (past) environmentalism of the poor. The environmental concern for which we analyze the influence of past farming, at middle income, may hence in addition differ by group. In sum, we will thus aim to *explain our understanding of bridging, by the mechanisms determining persistent influence of past farming on environmental concern at middle income, but for switchers only*.

Note however that elements of this idealized framework may be relaxed in reality, while still allowing for such an explanation to be meaningful: In principle, all that we require for this type of bridging are some switchers at middle income, that positively influence aggregate environmental concern (*assumption I*: strong ordering w.r.t. concern). Furthermore, we can only speak about persistence of past environmentalism of the poor, if increased income for non-farmers hints at dynamics (*assumption II*: mild ordering w.r.t. to income), and if (poor) farmers exhibit some environmental concern (*assumption III*). But already a U-shape without the influence of past farming for switchers would correspond only to a literal understanding of bridging. We would consider conditions of lifting intermediate, but monotonically increasing environmental concern an equally valuable subject of enquiry.

2.3 Environmentalism of the Poor as Nature Experience

Fig. 2: Theoretical Pathmodel



Note: Some presumed relationships omitted for demonstration purpose. No causal structure assumed between income, group and psychology.

Why should we theoretically expect EP to exert persistent influence on switchers' EC when they enter the income section critical for bridging? In general, such a relationship is predicted by nature experience theory (Chawla 1998). We argue that it is applicable here, because farming can be considered as a form of nature experience: EP is always rooted in direct, instrumental contact with nature (Angelsen et al. 2011). Then, positive influence on EC is predicted by applying relationship theory to a context of environmental learning theories (Davis et al. 2009; Mayer & Frantz 2004): People in frequent contact with nature become emotionally attached to it (**path 1** in figure 2**,** Tam et al. 2013). Such an *affective connection to nature* can then lead people to care about it later on in life (**path 2**), either via concern for one's own well-being (egoistic investment, Kaiser et al. 2011), or via altruistic empathy (Schultz 2000). These mechanisms have been replicated separately in both non-western and farmers' samples (Corral-Verdugo et al. 2008, Tam et al. 2013). Bridging would then occur, if the overall experience-concern relationship replicated i) for the group of switchers better than for others, and ii) in particular so at middle income. In short, this would require switchers to be high on anxious attachment, altruism, time horizon and knowledge – and this even at reduced, middle income, that is expected to deflate all these traits (with unclear effects of abstract thinking).

We expect moderation of the experience-concern link by i) **group** within a nature experience framework because of psychological differences between groups. Farmers that are already closer to the traits of non-farmers are expected to select into switching (Shrapnel & Davie 2008). *Attachment style* is often regarded as the most important predictor of individual difference (Shaver & Brennan 1992), in relationships but also beyond (Scannel & Gifford 2013). An *anxiously* attached group would facilitate bridging, because we hypothesize it to form relationships particularly easily (path 1), and be highly invested in such a relationship (path 2). The opposite would be true for *avoidant* attachment style on both paths (Mikulincer & Shaver 2003). *Abstract thinking* is also a likely moderator of both paths, albeit without clear requirements for bridging: Becoming attached is a form of conditioning (path1, Giusti et al. 2014), and that is prevented by abstraction (Barr & McConaghy 1972). However, path 2 requires conversion of affective attitudes into more general ones, which is facilitated by abstraction (Zajonc 1980). For bridging to emerge from reinforcement of path 2, switchers should in addition be high in altruism (see above), be patient (have a long time horizon) and knowledgeable about the environment (Gifford & Nilsson 2014).

Possibly in addition to, or even instead of the group moderation, bridging conditions are determined by the degree to which the overall relationship replicates ii) at middle **income**. Our framework allows for modeling this type of heterogeneity too, because income may affect the psychological constructs depicted further[1]. This becomes evident when observing relationships of both nature experience and income to risk behavior: Risk aversion is related to avoidant attachment (Yagoobi et al. 2016), but relationship investment is risky (Mikulincer & Shaver 2003). At the same time, risk aversion is known to decrease in income (Fafchamps 1999). Middle income could therefore be already low enough to prevent bridging by reinforcing avoidance. Path 2 would furthermore be negatively affected by low income through a still shortened time horizon (Carvalho 2010), through diminished altruism (Andreoni 1990) and through inhibited abstract thinking (Mani et al. 2013). The latter could on the other hand explain existence of bridging, if working mainly through path 1 (see above).

[1] Note that at the same time, income is affected by group according to dual development.

3. Empirical Approach

3.1 Statistical Approach

Our empirical strategy is a combination of graphical analysis and path modeling. Before explaining a particular type of bridging, we derive support for *existence* of both a psychological EKC and bridging thereof from graphical verification of the assumptions behind our theoretical framework. This approach is facilitated by plotting locally weighted regression functions fitted to scatterplots of environmental concern over income[2]. Compared to a fully parametric approach, it allows for much more nuanced evaluation of hypotheses (see also Plassmann & Khanna 2016). With the aggregate curve, we evaluate overall presence of bridging (monotonic increase of concern in income), compared to an EKC pattern (U-shape). We then proceed by decomposing the graph by group to demonstrate how the type of bridging explained below contributes to any aggregate leveling of a potential U shape: Verification of the clustering assumption with regard to income (and concern) is provided by groupwise scatterplots. Groupwise weighted regression curves facilitate verification of the hypothesis that farmers and non-farmers jointly exhibit an inverse U. If switchers' concern was elevated compared to these as well as to aggregate concern at critical income, this would point to added value from explaining their curve there. Influence of past farming would be suggested by differences especially to non-farmers.[3]

However as a second step, more in-depth inferential analysis is required to *understand why* switchers' concern-income relationship does exhibit the observed bridging potential – and if it indeed does so because of past environmentalism of the poor. To this end, we translate our theoretical approach, as outlined in the previous section, into a structural equations model. To each of the two implied paths of mediation, we introduce a 3-way interaction (Hayes 2015, Dawson et al. 2006). They make explicit the influence of past environmentalism of the poor, on current environmental concern, at the critical income section, and for the group of switchers:

$$\begin{aligned}\text{I: Environmental Concern} = {} & \beta_{11} \cdot \text{Nature connection} + \beta_{12} \cdot \text{ Income} + \beta_{13} \cdot \text{ Group} \\ & + \gamma_{11} \cdot \text{ Nature connection * Income} + \gamma_{12} \cdot \text{ Nature connection * Group} \\ & + \delta_{11} \cdot \text{ Nature connect * Income * Group} \\ \text{II: Nature Connection} = {} & \beta_{21} \cdot \text{Past farming} + \beta_{22} \cdot \text{ Income} + \beta_{23} \cdot \text{ Group} \\ & + \gamma_{21} \cdot \text{ Past farming * Income} + \gamma_{22} \cdot \text{ Past farming * Group} \\ & + \delta_{21} \cdot \text{ Past farming * Income * Group}\end{aligned}$$

To explain these effects of income and group further, mediation of the two moderators by the hypothesized psychological constructs is then tested for in addition. Similarly, Nature connection could be mediated by other types of nature experience. In each case, we decide about inclusion of further equations based on path analysis techniques, as well as feasibility in view of endogeneity issues: We will consider including a model to explain group by psychological constructs, because temporal antecedence seems plausible there. But we will model the influence of income on these constructs only as additional moderation of the group effect, because the relationships to psychology and group are explicitly two-way (see above).[4] Theoretical identification of the main model is however ensured ex ante because of temporal antecedence of nature experience to both nature connection and environmental

[2] For interpretation we focus on the interval of 1 standard deviation around the median of the standardized data, because of known issues with weighted regression functions at the tails of the distribution.

[3] As grouping cannot be assumed exogenous and non-farmers hence do not constitute the appropriate counterfactual, this should not be interpreted as an actual impact. For the same reason, estimation of the contribution of switchers' bridging toward total bridging does not constitute the focus of this study.

[4] The direction of causality between different types of nature experience must be concluded from empirical mediation.

concern, and because the literature assumes one-way causality from nature connection to being concerned about it. Logically, moderators can become effective therein only if they pertain to the assumed directions of causality too.[5]

As a final step, we aggregate impact of Nature connection across all paths, for the case of switchers, and as a function of income. This serves as a check of the relevance of the mechanisms studied, if total impact coincides with descriptively observed bridging, both on the income and concern axes. With switchers coded as 1 (see below), in the simplest case without any further mediation we have:

$$\begin{aligned}&\text{Environmental Concern (Income} \mid \text{Group} = \text{Switchers}) = \\ &\quad (\beta_{21} + (\beta_{23} + \gamma_{22}) \cdot 1 + (\beta_{22} + \gamma_{21} + \delta_{21} * 1) * \text{Income}) \\ &\quad * (\beta_{11} + (\beta_{23} + \gamma_{22}) \cdot 1 + (\beta_{12} + \gamma_{11} + \delta_{11} * 1) * \text{Income})\end{aligned}$$

3.2 Measurement

We obtain our data from a standardized questionnaire that was implemented as part of a larger survey. While this provided a host of manifest controls, it required us to systematically condense extant scales to very few items for measurement of latent variables (Raubenheimer 2004). To still ensure measurement validity in such a culturally heterogeneous sample, we moreover followed standard protocols consisting of independent (re-)translation, reinforced by group discussions with local scientists and thinking aloud in a pretest sample (Van de Vijver & Tanzer 2004; see robustness for how we are able to address further sources of bias).

Our measure of EC is a shortened version of the popular NEP scale (Dunlap et al. 2000). Cross-cultural validity even in low-income samples from the Global South suggests applicability to environmentalism of the poor (Hawcroft & Milfont 2010, Corral-Verdugo & Armendariz 2000). In case of India, a modified 4-factor structure has to be accounted for (Khan et al. 2012, Schultz et al. 2016), and reports of high overall reliability lead us to select 1 item each. For our baseline results, we however refrain to a narrowed, face-valid measure of environmental concern, which only consists of the items for Eco-Crisis and Balance of Nature. Only here do we obtain at least satisfactory split-half reliability (0.55) and measurement invariance across samples (the latter by construction). The latter thereby ensures applicability of our measure also to environmentalism of (poorer) farmers. Comparable item statistics for the full, 4-factor scale are only obtained after correcting for interviewer bias by imputation of 22% of the observations based on paradata (Blackwell et a. 2017, Supplementary Information). We test for generalization of our results to that sample as a robustness check.[6]

Next, we employ extant decompositions of nature experience in the Global North to operationalize past environmentalism of the poor (Bögeholz 2006): An instrumental dimension seems most relevant, but conversion of it into aesthetic, recreational and educational/protective experiences too. Of particular theoretical importance to environmentalism of the poor is also a spiritual dimension (Underwood & Teresi 2002). Known psychometric properties again allow for collapsing to one frequency item each (Pohl & Schrenk 2005), especially since we assume experience to be quasi-manifest. The mediator 'affective connection to nature' has been shown to be measurable by several constructs at equal validity across cultures (Tam et al. 2013). We argue that a single item from the unidimensional scale of Perkins

[5] Our main results could be harmed if the two moderators were in fact mediators and i) in addition affected by reverse causality or ii) correlated to the same unobservables as the dependent variable. However, i) is unlikely given the sign of empirical coefficients (see results), and the potential for ii) is minimized by controlling all known covariates of environmental concern.

[6] Note in addition mixed convergent validity of both scales (see results), which could however be explained by altered motivations for EC in the Global South: They correlate as expected to altruism, income, education, age, status (caste) and being female, but not to agreeableness, openness, knowledge, abstract thinking and time preference.

(2010) represents the emotional connotation in our theoretical framework well. In all these cases, predictive validity as the only test of psychometric properties available is largely given (see results).
Our first moderator, the group variable, derives from the respective nature experience: For example, switching would be indicated by no instrumental contact with animals and plants currently, but at least some in the past. For analytical convenience, we propose treating this variable as ordered, with farmers coded lowest and non-farmers highest. This may be justified based on the expectation that switchers will exhibit intermediate levels for most constructs of interest (see above). Further, deviation from farmers' mechanisms seems more interesting than from non-farmers', where there is no influence of past farming at all. Each time however, we will additionally verify effects against dummy results from subgroup regressions of switchers against the other two groups separately. We operationalize the second moderator, income by the asset index "NEW SEC" (MRSI 2011). True income measures are difficult to obtain in the Global South because of subsistence activities. But this index has been calibrated for the case of India to proxy not only for total asset ownership, but various income measures in addition (Howe et al. 2012, Subramanian et al. 2005).
The main psychological driver of such moderation, attachment style, is proxied here by a shortened version of the Big Five Inventory (Gosling et al. 2003). The varieties of insecure attachment, avoidant and anxious style, are known correlates of low agreeableness and high neuroticism, respectively (Noftle & Shaver 2005). While the constraints imposed by overall survey logistics were the main reason behind choosing this measurement instrument, it benefits from well-established cross-cultural validity (Lodhi et al. 2002). As is common (see above), we further include numeracy questions to proxy abstract thinking, the other overarching psychological moderator.[7]
Note in addition that these moderators are correlated to the most important potential sources of respondent bias (Podsakoff et al. 2003), such that they are not controlled for separately: Social desirability should reinforce correlations between any two latent variables, and is proxied here by agreeableness. Understanding of item content should decrease such correlations, and is proxied by abstract thinking.

3.3 Data

We randomly sampled 1200 individuals from two rural-urban transect in Bangalore / India. The rural-urban interface of this mega city can be expected to represent the stages of development spread out in space in the Global South: It is known to exhibit high heterogeneity both in terms of economic structure and social norms (Kraas & Mertins 2014, Simon 2008). By stratifying for urbanization at village cluster level, we thus ensure representativeness with regard to the desired variation (Hoffmann et al. 2017). As a consequence, however, we introduce household-level weights as an additional robustness check to correct for potential underrepresentation of densely-populated modern districts and resulting overrepresentation of agrarian mechanisms (Solon et al. 2013).[8] Within households we sample at simple random from decision-makers as the most relevant unit for pro-environmental behavior in Indian society.

[7] Manifest measures are also available for moderators of path 2 only, for knowledge about environmental issues, time preference (Frederick 2003) and altruism (Murphy & Ackermann 2012). Village fixed effects are employed to control for proximity to environmental problems.
[8] On the other hand, if groups are spread over the rural-urban gradient as hypothesized, than group-wise mechanisms should not be biased in means but only lack internal heterogeneity for farmers.

4. Results

4.1 Graphical and Descriptive Analysis

By verifying the theoretical assumptions behind our framework graphically and through mean comparisons, we now demonstrate support for both the existence of a modified psychological EKC, and for the added value from further analyzing our type of bridging to understand aggregate environmental concern. See further below for interpretation of further descriptive statistics and verification of more involved, statistical assumptions.

As measured by assets, we first observe increased mean income of non-farmers compared to farmers (Tab. 1). This confirms our *assumption II* about dual development (mild ordering w.r.t. income), and thus facilitates influence of past environmentalism of the poor on switchers under upward income dynamics. Compared to both, switchers exhibit highest income. This could result from pull-urbanization in Bangalore, where agriculture is consciously abandoned by particularly resourceful farmers, rather than out of necessity by particularly poor ones (Sridhar et al. 2010). But as indicated by their comparatively high income heterogeneity, switchers may still be influential at critical income.

Graphical results confirm existence of such bridging: First, aggregate environmental concern monotonically increases throughout the income distribution, despite intermediate mean environmental concern for switchers as the group with highest income (Fig. 3). This confirms linear effects from the literature (see above): Given that our sample spans the whole range of possible incomes in such a diverse country as India, simple failure to capture the left part of the curve is not a plausible explanation. But in addition, we find that the aggregate pattern is caused by bridging at the sub-group level: Decomposition of the curve by group reveals elevated environmental concern of switchers compared to both other groups, and aggregate concern at critical intermediate income (*assumption I*: strong ordering of concern). Without switchers' still substantial representation there as indicated also by the scatterplot, aggregate concern would likely be lower at critical income. We thus regard understanding the drivers behind switchers' curve as decisive for predicting aggregate bridging.

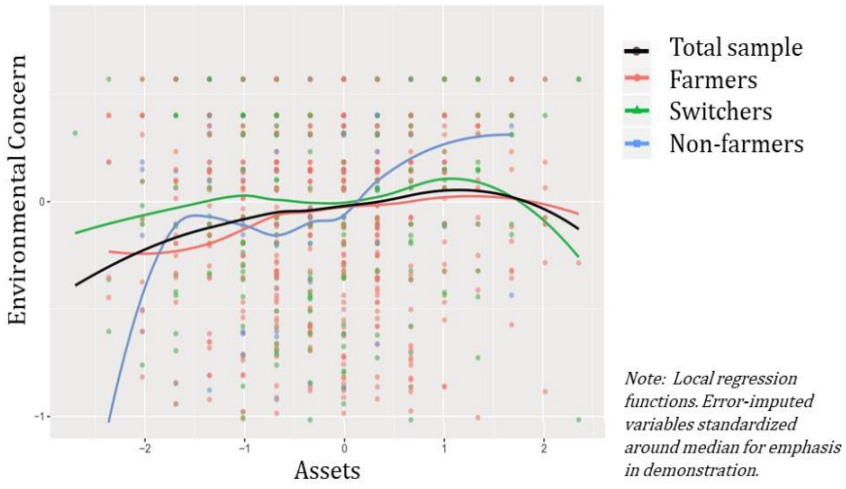
Tab. 1: Normalized + weighted group means (raw data)

group size (weighted)	Farmers N=754 (491)	Switchers N=359 (567)	Nonfarmers N=97 (152)
New Environmental Paradigm	0.738 (0.013)	0.775 (0.011)	0.796 (0.024)
Past farming	0.822 (0.024)	0.911 (0.015)	0.000 (0.000)
Nature connection	0.785 (0.018)	0.809 (0.022)	0.726 (0.063)
Religious nature experience	0.565 (0.032)	0.619 (0.026)	0.643 (0.113)
Recreational nature experience	0.636 (0.029)	0.706 (0.037)	0.419 (0.089)
Aesthetic nature experience	0.561 (0.040)	0.639 (0.030)	0.317 (0.064)
Educational nature experience	0.343 (0.037)	0.479 (0.054)	0.308 (0.051)
Knowledge	0.297 (0.042)	0.219 (0.058)	0.262 (0.087)
Abstraction	0.199 (0.026)	0.098 (0.030)	0.110 (0.050)
Agreeableness	0.367 (0.020)	0.350 (0.020)	0.308 (0.045)
Intraversion	0.624 (0.034)	0.634 (0.027)	0.664 (0.085)
Openness	0.407 (0.028)	0.433 (0.029)	0.490 (0.060)
Conscientousness	0.625 (0.027)	0.575 (0.032)	0.497 (0.047)
Neuroticism	0.413 (0.025)	0.395 (0.045)	0.471 (0.060)
Social Value Orientation	0.261 (0.029)	0.157 (0.035)	0.220 (0.068)
Time preference (impatient = 0)	0.355 (0.019)	0.313 (0.023)	0.428 (0.023)
Age	0.497 (0.009)	0.436 (0.025)	0.425 (0.028)
Gender (female = 0)	0.767 (0.032)	0.566 (0.039)	0.598 (0.069)
Caste (highest = 0)	0.203 (0.018)	0.190 (0.017)	0.203 (0.036)
Education	0.127 (0.012)	0.189 (0.027)	0.166 (0.030)
Assets	0.518 (0.014)	0.611 (0.057)	0.573 (0.078)

Note: Group means of normalized variables (between 0 and 1), standard errors in parentheses, observations weighted by sampling probability (stratification for urbanization, clustering at village level). Green shading indicates above-average value for switchers, yellow intermediate and red below-average values respectively.

As opposed to this, we find some concern for farmers at low income, but not enough to cause a maximum there. As it is not inexistent however, we still consider famers' concern sufficient to interpret influence of past farming for switchers as persistence of environmentalism of the poor (*assumption III*). In particular this is because in addition, low values for farmers could equally be explained by mere failure of the NEP scale to capture environmentalism of the poor despite all efforts, or below-average effects of nature experience for this group.

Fig. 3: Environmental Concern by Group and Income



Beyond these minimum assumptions for meaningful analysis of our type of bridging, we also find evidence for a modified U-shape. It arises due to considerable within-group income heterogeneity, rather than due to income clustering of groups: Non-farmers are found to exhibit a maximum not only at high, but also at low income – generating a gap in between. This was expected from education effects in case of higher income, and could be caused by remaining dependence on nature toward the left. In any case, non-farmers by themselves would indeed cause receding environmental concern at intermediate income. This already hints at confirmation of our main hypothesis, given absence of past farming experience for non-farmers. For now, we consider justified an interpretation of the contribution of switchers at middle income explained by our model as literal bridging.

While finally farmers' pattern does not help establishing an EKC pattern in Bangalore, it contributes to an additional, straightforward bridge across non-farmers U-shape: Like the other two groups but in addition to current nature experience compared to non-farmers, farmers exhibit monotonic increases of concern in income as hypothesized due to education induced values. But like the other two, farmers also turn out to be highly heterogeneous internally with regard to income. The type of bridging analyzed in this study might be the decisive one in samples where people abandon farming when still poor. But under pull-urbanization in Bangalore, it is complemented by already relatively wealthy farmers who benefit from both education and current nature experience. This justifies examination of group-specific influence when analyzing our type of bridging below.

4.2 Path Model

The large influence of past nature experience in explaining the lifting of switchers' environmental concern then emerges from the inferential path model: Aggregating over all paths from Nature

connection to concern for switchers as a function of income, we find positive influence of earlier environmentalism of the poor particularly at low income, but still at the middle of the distribution (see also black line, Fig. 4):

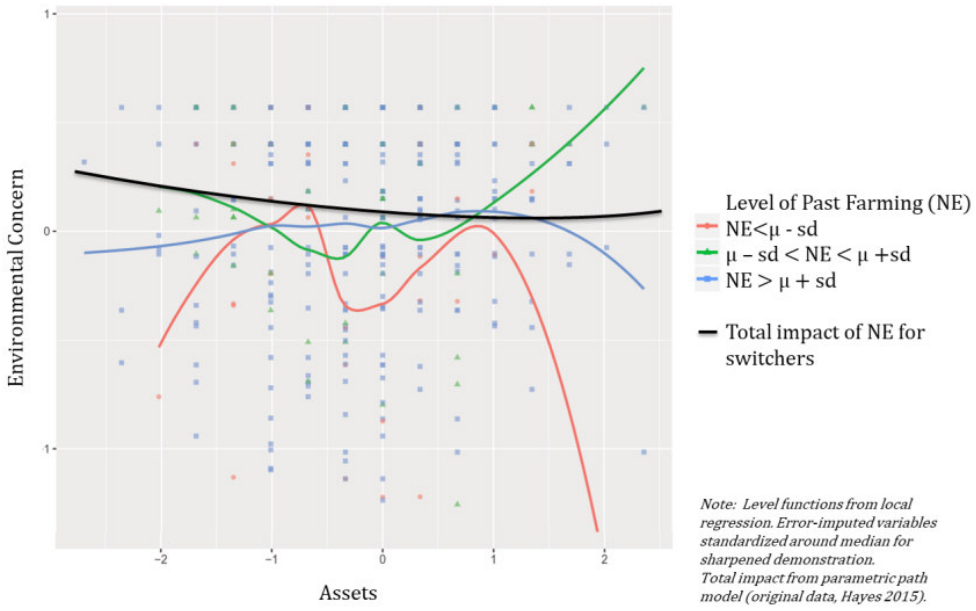
$$\text{Environmental concern (assets | group=switch)} = 0.009 \times \text{assets}^2 - 0.019 \times \text{assets} + 0.085$$

Graphically, it can be shown how absence of such past nature experience generates a similar pattern as the one obtained for non-farmers in Fig. 3 above; that is, how that group comes close to mimicking a counterfactual with regard to the impact of switchers' past nature experience, despite no truly exogenous grouping:

Note here the substantial explanatory power of our framework for the degree of bridging present in our data: Just 1 unit of aggregate Nature connection lifts switchers' concern around 0.1 units at critical income (Fig. 4). This roughly corresponds to switchers' elevation above aggregate concern at non-farmers minimum in Fig. 3. Simplifying a little, we could hence call Nature connection the driver of their 'contribution' to aggregate bridging.

The model generates this effect, for one thing, because switchers benefit from above-average levels of Nature connection: Our data confirm the overall applicability of our theoretical approach by allowing for replication of a positive relationship between past nature experience and environmental concern (Fig. 5). Previous findings are also confirmed with regard to mediation of this relationship by nature connection.

Fig. 4: Environmental Concern for Switchers by Level of Past Farming



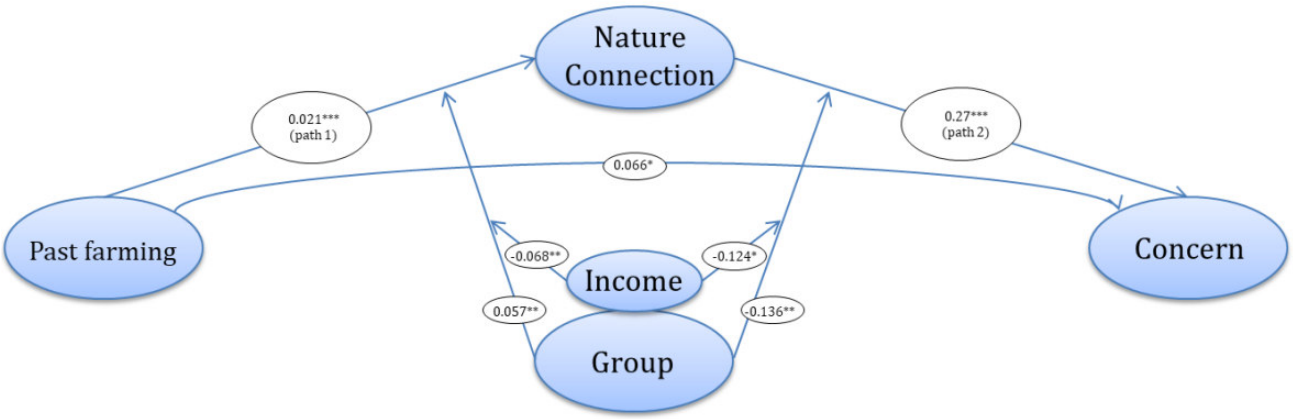
But on top of this, switchers also benefit from underproportional conversion of nature connection into concern (path 2), but dominant overproportional conversion of past nature experience into nature connection (path 1).

At equation level (Tab. 2), our results back these findings by a first attempt at moderation analysis of nature experiences' influence on environmental concern: In case of path 2, a negative and quite sizeable 3-way interaction between Nature connection, group and income (-0.124) indicates that switchers' impact of nature connection onto concern is in fact below average, but less so at lower income (Fig. 5).[9]

[9] Interpretation of 3-way interactions is only feasible from 2-way ones (Dawson 2006). Again, 'sizeable' refers to maximum group difference at median income of about 0.2 (Fig. 3).

Assuming that our proxies capture psychological constructs behind these two moderators to some degree, we find indication for confirmation of hypotheses regarding what drives the negative group moderation (see robustness for how these results emerge as valid simplifications from dummy regression): It is explained by the group model through comparatively low levels of agreeableness (increased avoidance) and abstract thinking for switchers (with non-farmers even lower), and lowest scores for switchers on knowledge and time preference (Tab. 2). I.e., switchers convert nature connection into concern underproportionally, because they invest little in the 'relationship', lack knowledge and abstract thinking to make the intellectual connection, or discount the future too strongly. Note however that mentioned 3-way interaction also mediates the negative 2-way one between nature connection and income: First, this indicates that group moderation is indeed required in addition to individuals' location on the income distribution to explain the empirical degree of bridging[10]. But secondly, it also leads us to reject hypotheses regarding reinforcement of psychological differences through lower income. A possible alternative explanation of the augmented path coefficient toward environmental concern at lower income could be remaining livelihood dependence on nature.
In contrast, path 1 explains bridging also by above-average benefits from past environmentalism of the

Fig. 5: Environmental Concern caused by past Nature Experience



RMSEA = 0.073, SRMR = 0.043

Note: Coefficient estimates and significance level selected from latent variable model with raw data and reduced dependent (moderated mediation: Tab. 2). Paths aggregated for path 1 (Hayes 2015). Causal structure is theoretical.

poor in case of switchers: Nature connection only translates into nature connection positively for switchers (positive group moderation), and even more so at lower income (negative 3-way interaction in Tab. 2). This effect is reinforced by several mediations through other types of nature experience, which results in an aggregate group coefficient of +0.057 on path 1 (Fig. 5): Only switchers convert Nature connection into aesthetic and spiritual nature experiences. While decreased income does reinforce group moderation and is hence in line with theory (negative moderation of group-farming interaction), our proxies for the psychological mechanisms behind the positive group moderation only partially point toward confirmation of hypotheses: Switchers benefit from low abstract thinking, which seems to indeed favor becoming conditioned to nature. But counterintuitively, positive moderation is also driven by (switchers') increased avoidant attachment. Perhaps nature is different from social relationships, and suppressed needs of avoidant individuals surface. At least they would be particularly susceptible to counter-depressive effects of nature experience (Bratman et al. 2015).

[10] Full mediation additionally means that income moderation indeed operates through the same (psychological) mechanisms as group.

Tab. 2: Structural Equation Regressions (incl. Robustness)	**Raw data, Latent Variable Model, reduced dependent**, N=1203			**Error imputation**, Latent Variable Model, N=1210			Raw data, **parceled dependent**, N=1203, **population weights**			Raw data, Latent Variable Model, N=1106, **group = Switchers (vs Farmers)**			Raw data, Latent Variable Model, N=450, **group = Switchers (vs Non-Farmers)**		
Path 2: environmental concern (NEP) ~															
past farming	0.066	(0.027)	*	0.029	(0.008)	***	0.084	(0.044)	.	0.082	(0.035)	*			
group	0.125	(0.038)	**	0.013	(0.009)		0.196	(0.058)	**	0.084	(0.025)	**	-0.029	(0.041)	
nature connection * group	-0.136	(0.040)	**	-0.026	(0.009)	**	-0.094	(0.053)	.	-0.317	(0.072)	***	-0.266	(0.064)	***
nature connection	0.270	(0.037)	***	0.031	(0.009)	**	0.246	(0.055)	***	0.330	(0.041)	***	0.299	(0.053)	***
nature connection * assets	-0.001	(0.051)		-0.021	(0.010)	*	0.137	(0.104)							
nature connection * assets * group	-0.124	(0.051)	*	0.035	(0.012)	**	-0.168	(0.072)	*	-0.173	(0.079)	*	-0.142		*
assets * group	0.027	(0.041)		-0.008	(0.010)		0.005	(0.051)							
religious nature experience	-0.009	(0.037)		-0.003	(0.009)		0.062	(0.043)		-0.037	(0.041)		0.076	(0.059)	
recreational nature experience	0.029	(0.025)		0.016	(0.006)	*	0.030	(0.030)		0.028	(0.027)		-0.009	(0.035)	
aesthetic nature experience	0.023	(0.022)		0.014	(0.006)	*	-0.014	(0.027)		0.030	(0.024)		0.014	(0.033)	
educational nature experience	0.019	(0.031)		-0.010	(0.011)		0.016	(0.042)		0.016	(0.033)		0.075	(0.046)	
abstract thinking	-0.014	(0.025)		-0.008	(0.006)		0.008	(0.043)		-0.010	(0.027)		0.044	(0.039)	
time preference	-0.013	(0.024)		-0.005	(0.006)		0.024	(0.032)		-0.023	(0.026)		0.014	(0.038)	
knowledge	-0.091	(0.026)	***	-0.042	(0.010)	***	-0.151	(0.050)	**	-0.105	(0.029)	***	-0.032	(0.038)	
altruism	0.058	(0.022)	*	0.006	(0.005)		0.063	(0.029)	*	0.060	(0.025)	*	0.054	(0.033)	
extraversion (inverted)	-0.010	(0.026)		0.028	(0.008)	***	-0.027	(0.038)		-0.004	(0.029)		-0.008	(0.037)	
agreeableness	-0.055	(0.030)	.	-0.014	(0.007)	.	-0.110	(0.060)	.	-0.053	(0.033)		-0.050	(0.044)	
conscientousness	0.005	(0.025)		0.015	(0.006)	*	-0.015	(0.028)		0.008	(0.027)		0.012	(0.036)	
openness	-0.091	(0.024)	***	0.008	(0.006)		-0.103	(0.026)	***	-0.104	(0.026)	***	-0.117	(0.034)	**
neuroticism	0.013	(0.023)		0.017	(0.006)	**	0.041	(0.033)		0.009	(0.025)		0.048	(0.033)	
age	0.039	(0.029)		0.006	(0.007)		0.046	(0.036)		0.044	(0.031)		0.026	(0.043)	
sex	-0.090	(0.027)	**	-0.017	(0.007)	*	-0.013	(0.027)		-0.101	(0.029)	**	-0.016	(0.037)	
caste (inverted)	0.018	(0.027)		-0.008	(0.007)		0.050	(0.036)		0.002	(0.030)		-0.060	(0.040)	
education	0.131	(0.049)	**	0.038	(0.014)	**	0.071	(0.067)		0.136	(0.053)	*	0.079	(0.078)	
assets	-0.030	(0.044)		-0.007	(0.010)		-0.023	(0.069)		-0.012	(0.047)		-0.091	(0.123)	
village + religious FE	ON			ON			OFF			(only rel)			(only rel)		
Path 1: nature connection ~															
past farming	0.002	(0.021)		-0.047	(0.025)	.	-0.001	(0.035)		-0.009	(0.026)				
group	-0.033	(0.030)		-0.027	(0.035)		-0.030	(0.066)		-0.007	(0.019)				
past farming * group	0.045	(0.016)	**	0.092	(0.019)	***	0.041	(0.033)		0.251	(0.101)	*			
religious nature experience * group	0.064	(0.035)	.	0.155	(0.042)	***	0.125	(0.052)	*	-0.071	(0.055)				
past farming * assets	0.028	(0.028)		-0.011	(0.034)		0.027	(0.042)		-0.002	(0.026)				
past farming * assets * group	-0.068	(0.023)	**	-0.045	(0.028)	.	-0.053	(0.029)	.	-0.055	(0.028)	*			
recreational nature experience	0.086	(0.019)	***	0.094	(0.023)	***	0.079	(0.035)	*	0.095	(0.020)	***			
Path 1.3: recreational nature experience ~															
religious nature experience	-0.057	(0.044)		-0.016	(0.043)		-0.037	(0.082)		-0.044	(0.046)				
past farming	0.296	(0.029)	***	0.287	(0.029)	***	0.287	(0.051)	***	0.308	(0.036)	***			
aesthetic nature experience	0.030	(0.026)		0.073	(0.025)	**	-0.028	(0.044)		0.034	(0.027)				
aesthetic nature experience * group	0.062	(0.025)	*	0.026	(0.025)		0.083	(0.045)	.	0.018	(0.044)				
Path 1.2: aesthetic nature experience ~															
past farming	0.247	(0.032)	***	0.253	(0.033)	***	0.312	(0.077)	***	0.193	(0.040)	***			
religious nature experience	0.494	(0.047)	**	0.390	(0.049)	***	0.565	(0.068)	***	0.519	(0.050)	***			
religious nature experience * assets	-0.153	(0.051)	**	-0.095	(0.051)	.	-0.115	(0.095)		-0.157	(0.054)	**			
Path 1.1: religious nature experience ~															
past farming	0.151	(0.019)	***	0.150	(0.019)	***	0.066	(0.057)		0.196	(0.023)	***			
group ~															
abstract thinking	-0.037	(0.019)	*	-0.033	(0.019)	.				-0.016	(0.031)		0.074	(0.046)	
time preference	-0.062	(0.018)	**	-0.056	(0.018)	**				-0.118	(0.030)	***	-0.027	(0.046)	
agreeableness	-0.073	(0.023)	**	-0.083	(0.022)	***				-0.089	(0.038)	*	0.065	(0.053)	
knowledge	0.050	(0.019)	*	0.050	(0.019)	*				0.027	(0.032)		-0.093	(0.046)	*
education	0.068	(0.027)	*	0.069	(0.027)	*				0.183	(0.044)	***	0.111	(0.063)	.
*nature connection * assets * group ~*															
nature connection * assets	0.640	(0.024)	***	0.571	(0.024)	***	0.922	(0.050)	***						
RMSEA	*0.073*			*0.069*			*0.092*			*0.204*			*0.141*		
SRMR	*0.043*			*0.045*			*0.037*			*0.042*			*0.054*		

Note: For demonstration purpose only theoretically meaningful controls included. Non-meaningful model parts omitted from subgroup estimation (last 2 columns.)
*Coefficients from standardized variables. Standard errors in parentheses, sign. codes: '***' < 0.001 '**' < 0.01 '*' < 0.05 '.' < 0.1.*
RMSEA and SRMR < 0.08 required for acceptable fit, where SRMR does not penalize additional variables (Hooper et al. 2008).
Sample size varies with outlier correction (after imputation).

4.3 Robustness

By and large, we regard our results as quite robust despite the many obstacles psychometric survey research is faced with in the Global South.[11]

First of all, this is true for measurement of the dependent variable: Our main results generalize to error-imputation data, and then to regressing on the full NEP in addition. Both path 1 and path 2 even exhibit more main effects, and added value from heterogeneity is equally retained. The 3-way interaction in path 2 changes sign, which points towards confirmation of an alternative hypothesis regarding individual mechanisms (decreased investment for avoidantly attached especially under risk). Total group effects are however not put into question by this: For switchers, they still decrease in income, while remaining larger than farmers' throughout the bridging section of income.[12]

Whereas this also indicates robustness to controlling interviewer bias, in case of respondent bias we ultimately have to rely on standard precautions that were taken when constructing the questionnaire. In case of path 2, social desirability could bias results by artificially increasing correlations: It is known to increase in agreeableness, and that had been found to positively moderate correlations here. Affirmative bias resulting in artificially high correlations could additionally result from lack of understanding. Again, understanding should increase in abstract thinking, and that had been found to positively moderate path 2. Path 1 would not be subject to these biases, once one is willing to assume that past NE is manifest and as such not affected. Beyond actual measurement error biasing results, path 1 could be explained by nostalgic bias instead of the psychological mechanisms modeled (Morewedge 2013): The more time has passed since the experience, the more switchers would remember only positive nature experience. Affect for nature then comes easy, while actual consequences like worrying are not required in their everyday lives anymore.

In addition, replication of the most important effects does obtain under weighting by population size. If urbanization in India does represent stages of modernization in a cross-section, then our results generalize to economic development. Note however that convergence is conditional upon parceling the NEP scale, and that the group model does not replicate at all. One possible explanation could be added noise because of strong upscaling of the group of non-farmers: Psychological heterogeneity is known to increase with economic development (Markus & Kitayama 1991).

Finally, we are also able to demonstrate that our ordered group variable can be interpreted as a just simplification of dummy effects: With the exception of additional mediation of path 1 by switchers, both signs and significances of the most important effects replicate in both sub-samples alike; that is, when comparing switchers to both farmers and non-farmers. This seems intuitive in case of path 1: Here the baseline already compares to farmers only effectively, as non-farmers do not exhibit any influence of Nature connection. In case of path 2, it becomes straightforward given minimum altruism, time horizon and abstract thinking means of switchers compared to the other two groups (Tab. 1). Technically, the baseline coefficient thus represents a conservative estimate on switchers' moderation compared to farmers', since it is additionally mitigated by non-farmers' one. As opposed to all these, avoidant attachment does exhibit the hypothesized ordering. But since the comparison between non-farmers and switchers would contradict the ordering, we again interpret the group coefficient as the effect of switchers compared to farmers only.

[11] Note that this also justifies interpretation of various data sources interchangeably in figures and descriptive statistics.

[12] Switchers concern function becomes $-0.002y^2$ - 0.019y + 0.076, which intersects with farmers linear impact at y=1.78 (y=income). Similar analysis is possible for population weights and subsample / dummy regressions.

5. Conclusion

Our results are good news for the climate change mitigation required in the years to come: At least in terms of environmental preferences, economic development is likely to entail only monotonic improvements in circumstances like the ones studied here. What is more, we are able to contribute to an understanding of how memories of past environmentalism of the poor drive this at least in part. Policies may want to focus on preservation of 'indigenous' environmental concern on top of importing 'Northern' values. In particular, this demonstration has allowed for a first attempt at documenting how the nature experience – concern relationship varies with psychological traits: Because the link is particularly forceful for those abandoning farming at low income, the type of bridging documented here acts as a temporary substitute for education-induced values.

But our research also suggests several promising areas for future research: To complement the internal picture, we first consider a comparison to other (psychological) causes of bridging to be of interest. More systematic approaches to controlling endogeneity could allow for quantifying the relative contribution of each to total bridging. Such an exploration could then be broadened to entail a comparison of attitudes to actual behaviors. Addressing the apparent gap between our results and the reality of many countries of the Global South of today seems particularly relevant. Comparison could moreover extend to different samples and thus enlarge external validity of our findings: One could imagine situations of push rather than pull modernization, where switching happens out of necessity, income dynamics diverge and memory of past NE is not as positive. New contexts could then also afford opportunities to examine a more thorough set of psychological moderators.

Last but not least and like all other constructs employed, such a set would also benefit from more profound explorations of measurement issues in Southern contexts: We conveyed the psychological constructs modeled to the best of our knowledge. But what construct really describes best how farming translates into environmentalism in a given culture? Toward (re-)discovering the diverse potential of the Global South for sustainable human-environment relations (Nagendra 2018), this study hopes to have made a preliminary attempt.

Supplementary Information: Item statistics for full NEP (error-imputed data)

reliability (omega-t): 0.55

	full sample	farmers	switchers	non-farmers
eco-crisis	0.79	0.80	0.71	0.71
balance of nature	0.82	0.84	0.79	0.76
limits to growth	0.30	0.24	0.33	0.68
anti-anthropocentrism	0.34	0.37	0.40	

Note: Loadings from confirmatory, principal axis factoring, using varimax rotation. Loadings < 0.2 omitted from representation. Groupwise analysis proves configural measurement invariance.

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References

Amel, E., Manning, C., Scott, B., & Koger, S. (2017). Beyond the roots of human inaction: Fostering collective effort toward ecosystem conservation. *Science*, *356*, 275–279.

Andreoni, J. (1990). Impure Altruism and Donations to Public Goods: A Theory of Warm-Glow Giving. *The Economic Journal, 100* (401), 464-477.

Angelsen, A., Larsen, H. O., Lund, J. F., Smith-Hall, C., & Wunder, S. (Eds.). (2011). *Measuring Livelihoods and Environmental Dependence: Methods for Research and Fieldwork*: Routledge.

Barr, R.F., & McConaghy, N. (1972). Conditioning in Relation to Conceptual Thinking. *The British Journal of Psychiatry*, *121*(562), 299–310.

Blackwell, M., Honaker, J., & King, G. (2015). A Unified Approach to Measurement Error and Missing Data: Overview and Applications. *Sociological Methods & Research*, *46*(3), 303–341.

Bögeholz, S. (2006). Nature experience and its importance for environmental knowledge, values and action: Recent German empirical contributions. *Environmental Education Research*, *12*(1), 65–84.

Bratman, G. N., Hamilton, J. P., Hahn, K. S., Daily, G. C., & Gross, J. J. (2015). Nature experience reduces rumination and subgenual prefrontal cortex activation. *Proceedings of the National Academy of Sciences of the United States of America*, *112*(28), 8567–8572.

Carvalho, L. S. (2010). Poverty and Time Preference. *RAND Working Paper Series*. (WR 759).

Chawla, L. (1998). Significant Life Experiences Revisited: A review of research on sources of environmental sensitivity. *Environmental Education Research*, *4*(4), 369–382.

Corral-Verdugo, V., & Armendáriz, L. I. (2000). The "New Environmental Paradigm" in a Mexican Community. *The Journal of Environmental Education*, *31*(3), 25–31.

Corral-Verdugo, V., Carrus, G., Bonnes, M., Moser, G., & Sinha, J. B. P. (2008). Environmental Beliefs and Endorsement of Sustainable Development Principles in Water Conservation. *Environment and Behavior*, *40*(5), 703–725.

Davis, J. L., Green, J. D., & Reed, A. (2009). Interdependence with the environment: Commitment, interconnectedness, and environmental behavior. *Journal of Environmental Psychology*, *29*(2), 173–180.

Dawson, J. F., & Richter, A. W. (2006). Probing three-way interactions in moderated multiple regression: Development and application of a slope difference test. *Journal of Applied Psychology*, *91*(4), 917–926

Diao, X., McMillan, M., & Rodrik, D. (2017). The Recent Growth Boom in Developing Economies: A Structural Change Perspective. Advance online publication.

Dinda, S. (2004). Environmental Kuznets Curve Hypothesis: A Survey. *Ecological Economics*, *49*(4), 431–455.

Dunlap, R. E., van Liere, K. D., Mertig, A. G., & Jones, R. E. (2000). Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale. *Journal of Social Issues*, *56*(3), 425–442.

Dwivedi, R. (2016). Environmental Movements in the Global South. *International Sociology*, *16*(1), 11–31.

Fafchamps, M. (1999). *Rural Poverty, Risk and Development.* Report submitted to the Food and Agriculture Organization.

Fairbrother, M. (2013). Rich People, Poor People, and Environmental Concern: Evidence across Nations and Time. *European Sociological Review*, *29*(5), 910–922.

Frederick, S. (2003). Time preference and personal identity. In: Loewenstein, G., Read, D. and Baumeister, R.F. (eds), *Time and Decision: Economic and Psychological Perspectives on Intertemporal Choice* (pp. 89–113). New York, USA: Russell Sage Foundation.

Gifford, R., & Nilsson, A. (2014). Personal and social factors that influence pro-environmental concern and behaviour: A review. *International journal of psychology : Journal international de psychologie*, *49*(3), 141–157.

Giusti, M., Barthel, S., & Marcus, L. (2014). Nature Routines and Affinity with the Biosphere: A Case Study of Preschool Children in Stockholm. *Children, Youth and Environments*, *24*(3), 16.

Gosling, S. D., Rentfrow, P. J., & Swann, W. B. (2003). A very brief measure of the Big-Five personality domains. *Journal of Research in Personality*, *37*(6), 504–528.

Guha, R., & Gadgil, M. (2000). *The use and abuse of nature*. New Delhi: Oxford University Press.

Hawcroft, L. J., & Milfont, T. L. (2010). The use (and abuse) of the new environmental paradigm scale over the last 30 years: A meta-analysis. *Journal of Environmental Psychology*, *30*(2), 143–158.

Hayes, A. F. (2015). An Index and Test of Linear Moderated Mediation. *Multivariate Behavioral Research*, *50*(1), 1–22.

Hoffmann, E., Jose, M., Nölke, N., & Möckel, T. Construction and use of a simple index of 3 urbanisation in the rural-urban interface of 4 Bangalore, India. *Sustainability*, *Under review*.

Howe, L. D., Galobardes, B., Matijasevich, A., Gordon, D., Johnston, D., Onwujekwe, O.,. Hargreaves, J. R. (2012). Measuring socio-economic position for epidemiological studies in low- and middle-income countries: A methods of measurement in epidemiology paper. *International journal of epidemiology*, *41*(3), 871–886.

Kaiser, F. G., Hartig, T., Brügger, A., & Duvier, C. (2011). Environmental Protection and Nature as Distinct Attitudinal Objects. *Environment and Behavior*, *45*(3), 369–398.

Khan, A., Khan, M. N., & Adil, M. (2012). Exploring the New Ecological Paradigm (NEP) Scale in India: Item Analysis, Factor Structure and Refinement. *Asia-Pacific Journal of Management Research and Innovation*, *8*(4), 389–397.

Kraas, F. & Mertins, G. (2014). Megacities and global change. In: Kraas, F. et al. (eds.), *Megacities: Our Global Urban Future*. International Year of Planet Earth.

Lange, H., Meier. L., & Anuradha, N. S. (2009). Highly Qualified Employees in Bangalore, India: Consumerist Predators? In H. Lange & L. Meier (Eds.), *The New Middle Classes* (pp. 281–298). Berlin, Heidelberg: Springer.

Lewis, W. A. (1954). Economic Development with Unlimited Supplies of Labour. *The Manchester School*, 22(2), 139–191.

Lodhi, P.H.; Deo, S.; Belhekar, V.M. (2002). The Five-Factor model of personality in Indian context: measurement and correlates. In McCrae, R.R. & Allik, J. (eds.). *The Five-Factor model of personality across cultures*. NY: Kluwer Academic Publisher.

Mani, A., Mullainathan, S., Shafir, E., & Zhao, J. (2013). Poverty Impedes Cognitive Function. *Science*, *341*(6149), 976.

Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. Psychological review, 98(2), 224-253.

Martinez-Alier, J. (2002). *The Environmentalism of the Poor*: Edward Elgar Publishing.

Mawdsley, E. (2004). India's Middle Classes and the Environment. *Development and Change*, *35*(1), 79–103.

Mayer, F.S., & Frantz, C. M. (2004). The connectedness to nature scale: A measure of individuals' feeling in community with nature. *Journal of Environmental Psychology*, *24*(4), 503–515.

Mikulincer, M., & Shaver, P. R. (2003). The attachment behavioral system in adulthood: Activation, psychodynamics, and interpersonal processes. *Advances in experimental and social psychology*, *35*, 53–152.

Morewedge, C. K. (2013). It Was a Most Unusual Time: How Memory Bias Engenders Nostalgic Preferences. *Journal of Behavioral Decision Making*, *26*(4), 319–326.

Munasinghe, M. (1999). Is environmental degradation an inevitable consequence of economic growth: Tunneling through the environmental Kuznets curve. *Ecological Economics*, *29*(1), 89–109.

Murphy, R.O. & Ackermann, K.A. (2012). A review of measurement methods for social preferences. *SSRN Working Paper Series.*

Nagendra, H. (2018). The global south is rich in sustainability lessons that students deserve to hear. *Nature*, *557*(7706), 485–488.

Noftle, E. E., & Shaver, P. R. (2006). Attachment dimensions and the big five personality traits: Associations and comparative ability to predict relationship quality. *Journal of Research in Personality*, *40*(2), 179–208.

Perkins, H. E. (2010). Measuring love and care for nature. *Journal of Environmental Psychology*, *30*(4), 455–463.

Plassmann, F., & Khanna, N. (2016). Household Income and Pollution. *The Journal of Environment & Development*, *15*(1), 22–41.

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *The Journal of applied psychology*, *88*(5), 879–903.

Pohl, D. & Schrenk, M. (2005). Naturerfahrungen und Naturzugänge von Kindern. In M. Schrenk & W. Holl-Giese (Eds.), *Bildung für nachhaltige Entwicklung—Ergebnisse empirischer Untersuchungen* (pp. 33–46). Hamburg: Dr. Kovac.

Rammstedt, B., Kemper, C. J., Klein, M. C., Beierlein, C., & Kovaleva, A. (2017). A Short Scale for Assessing the Big Five Dimensions of Personality: 10 Item Big Five Inventory (BFI-10). Advance online publication.

Raubenheimer, J. (2004). An item selection procedure to maximise scale reliability and validity. *SA Journal of Industrial Psychology*, *30*(4).

Roca, J. (2003). Do individual preferences explain the Environmental Kuznets curve? *Ecological Economics*, *45*(1), 3–10.

Scannel, L., & Gifford, R. (2013). Comparing the Theories of Interpersonal and Place Attachment. In L. C. Manzo & P. Devine-Wright (Eds.), *Place Attachment. Advances in Theory, Methods and Applications.* Taylor & Francis.

Schultz, P. W. (2000). Empathizing With Nature: The Effects of Perspective Taking on Concern for Environmental Issues. *Journal of Social Issues*, *56*(3), 391–406.

Schultz, P. W., Gouveia, V. V., Cameron, L. D., Tankha, G., Schmuck, P., & Franěk, M. (2016). Values and their Relationship to Environmental Concern and Conservation Behavior. *Journal of Cross-Cultural Psychology*, *36*(4), 457–475.

Shaver, P. R., & Brennan, K. A. (1992). Attachment Styles and the "Big Five" Personality Traits: Their Connections With Each Other and With Romantic Relationship Outcomes. *Personality and Social Psychology Bulletin*, *18*(5), 536–545.

Simon, D. (2008). Urban Environments. Issues on the Peri-Urban Fringe. *Annual Review of Environment and Resources,* 33, 167-85.

Shrapnel, M., & Davie, J. (2001). The influence of personality in determining farmer responsiveness to risk. *The Journal of Agricultural Education and Extension*, *7*(3), 167–178.

Solon, G., Haider, S., & Wooldridge, J. (2013). *What Are We Weighting For?* Cambridge, MA: National Bureau of Economic Research.

Sridhar, K.S., Reddy, A.V. and Srinath, P. (2010). Is it Push or Pull? Recent Evidence from Migration in India.

Stern, D. I. (2004). The Rise and Fall of the Environmental Kuznets Curve. *World Development*, *32*(8), 1419–1439.

Subramanian, S. V., Nandy, S., Irving, M., Gordon, D., & Davey Smith, G. (2005). Role of socioeconomic markers and state prohibition policy in predicting alcohol consumption among men and women in India: A multilevel statistical analysis. *Bulletin of the World Health Organization*, *83*(11), 829–836.

MRSI, Market Research Society of India (2011). Socio-Economic Classification 2011. The SEC System. Available at: http://imrbint.com/research/The-New-SEC-system -3rdMarch2011.pdf

Tam, K.-P. (2013). Concepts and measures related to connection to nature: Similarities and differences. *Journal of Environmental Psychology*, *34*, 64–78.

Underwood, L. G., & Teresi, J. A. (2002). The daily spiritual experience scale: development, theoretical description, reliability, exploratory factor analysis, and preliminary construct validity using health-related data. *Annals of Behavioral Medicine*, *24*(1), 22–33.

Upadhya, C. (2009). India's 'new Middle Class' and the Globalising City: Software Professionals in Bangalore, India. In H. Lange & L. Meier (Eds.), *The New Middle Classes* (pp. 253–269). Berlin, Heidelberg: Springer.

van de Vijver, F., & Tanzer, N. K. (2004). Bias and equivalence in cross-cultural assessment: An overview. *Revue Européenne de Psychologie Appliquée/European Review of Applied Psychology*, *54*(2), 119–135.

World Bank. GDP per capita, PPP (current international $): India (1990-2016). Retrieved from https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD?end=2016&locations=IN&start=1990&view=chart

Yaghoobi, A., Mohammadzade, S., Chegini, A. A., Yarmohammadi Vasel, M., & Zoghi Paidar, M. R. (2016). The Relationship Between Attachment Styles, Self-Monitoring and Cybercrime in Social Network Users. *International journal of high risk behaviors & addiction*, *5*(3), e27785.

Zajonc, R. B. (1980). Feeling and Thinking: Preferences need no Inferences. *American Psychologist*, *35*(2), 151-175.