Index insurance and the articulation of risk-bearing subjects

Leigh Johnson
Department of Geography, University of Zurich, Winterthurerstrasse 190, 8057 Zurich, Switzerland; e-mail: leigh.johnson@geo.uzh.ch
Received 5 December 2012; in revised form 1 August 2013

Abstract. In the last decade a growing number of efforts have been made to insure the weather-related production risks of rural agricultural households in the Global South via microinsurance contracts linked to environmental indices. Such index insurance products are increasingly championed for their ostensible capacity to decrease vulnerability, ‘crowd in’ rural credit, and increase productive risk taking. This paper presents an empirical and theoretical framework for understanding the explosion of these projects, demonstrating that the formation of financial consumer subjects who are themselves agricultural producers is an emerging and consequential process within the dynamics of (dis)articulation. Rather than being hindered by the absence of the real subsumption of land or labor to capital, the derivative nature of the index insurance form—offering only the possibility of remuneration instead of indemnification of loss—makes it especially well suited to operating in precisely such conditions on the edges of (non)market relations.

Keywords: index insurance, financial subjectivity, risk, agriculture, articulation

1 Introduction: the premises of index insurance

Despite the meteoric rise of microfinance, many of the rural poor in the Global South have remained relatively unintegrated into financial circuits, particularly for insurance. Within the last decade a growing number of development interventions have sought to insure rural agricultural households through the creation of microinsurance contracts linked to indexes such as rainfall, soil moisture, or area-based crop yields. Such ‘index insurance’ is an increasingly popular market tool that has been championed by development and relief agencies, donors, nongovernmental organizations, and global reinsurers alike. Among the many asserted promises of index insurance are its potential to decrease the vulnerability of poor rural households to climate shocks, crowd-in the provision of rural credit, and encourage more ‘productive risk-taking’ and input use by farmers. But as these extensions of formal insurance markets attempt to articulate new risk-bearing subjects into financial circuits and agricultural value chains, their success also requires disarticulating the link between weather events as recorded by the index and loss events as experienced by the farmer. This paper explores the ambivalent dynamics of such expansion-by-exclusion.

There has been an explosion of index insurance pilot projects since 2005, with roughly thirty-five underway in 2012 (Peterson, 2012) and at least five more in development, as well as numerous discontinued pilots (Hazell et al, 2010; Hess and Hazell, 2009).

(1) Reinsurance is purchased by primary insurers in order to expand their underwriting capacity and prevent massive claims payments from sending them into bankruptcy. The world’s major reinsurers underwrite more than a trillion dollars in policy limits for thousands of individual insurance companies across a multitude of policy types, regions, and scales.
Projects have been launched in East and West Africa, South and Southeast Asia, and Central and South America (Collier et al., 2009). From 2009 to 2011 donors’ enthusiasm for index insurance reached a fever pitch with new initiatives announced nearly every month, frequently in the form of public–private partnerships. Given the ascendancy of climate adaptation within the development agenda, these projects are often explicitly framed by development and aid agencies as urgent tools to address growing weather-related vulnerabilities linked to climate change.

Index insurance projects are often the first to make risk pooling through formal private insurance mechanisms available to poor rural households, whose dispersed locations and limited production volumes had never attracted providers from the traditional agricultural insurance market. The technological innovation of index insurance has been to decouple indemnity payouts from actual losses of crops or livestock, and instead link payments to changes in the proxy variable(s) deemed most likely to impact or reflect crop growth or livestock survival within a given spatial extent. These variables may be monitored through satellite observations, weather stations, or some combination of the two (Brown et al., 2011).

Still other indices are based on average crop yields for a whole valley or region. Three factors make this decoupling of the insurance payout from the policyholder’s individual loss experience especially attractive from the insurer’s perspective: it reduces the high transaction costs associated with verifying ownership and losses; it resolves the problem of ‘moral hazard’, in which insured individuals may change their risk behaviors to increase the likelihood of receiving a payout; and it resolves the problem of adverse selection, in which insurance is inordinately purchased by those exposed to greater risks than the average population.

Although these characteristics appear to stack the deck in favor of insurers, the form of index insurance also contains new possibilities for populations thus far excluded from formal risk pooling. Because the objects of index insurance contracts are environmental variables rather than observed losses, a policyholder is not required to prove ownership of any assets at the time of purchase. This is perhaps the most emancipatory possibility of index insurance: that the risk-reducing potential of insurance might be extended to the rural agricultural poor, instead of simply being used to secure the wealth of those who already have a great deal—the classic irony of which Proudhon critiqued in The Philosophy of Poverty in 1846:

“Security is a commodity purchased like any other; and as its rate of tariff falls not according to the misery of the buyer but according to the magnitude of the sum he insures, insurance proves a new privilege for the rich and a cruel irony for the poor” (np).

Similar perspectives about the classed nature of financial exclusion and environmental vulnerability—as well as more recent insistence on their gendered and racialized character—remain core assumptions within both economic geography and political ecology (see Davis, 1998, 2001; Leyshon and Thrift, 1995; Wisner et al., 2004; Wyly et al., 2006, among many). As scholars of biopolitics have demonstrated, access to technologies of insurance is one of the defining features of biopolitical differentiation between the Global North and South (Duffield, 2007; Grove, 2010). “Developed life is supported and compensated through a range of social and private insurance-based benefits and bureaucracies . . . . In contrast . . . surplus non-insured life is

(2) The largest index insurance scheme, which uses area-based yield calculations, is run by the government of India as a heavily subsidized social protection program for over a million rural smallholders (Giné et al., 2010).

(3) Such policies have also been developed to transfer weather risk at the macroscale to fund government disaster relief efforts or safety nets (see Grove, 2012; Lobo-Guerrero, 2011; Pryke, 2007; World Bank, 2011). Here I am explicitly interested in interventions targeted at households and rural credit intermediaries.

(4) For compelling critiques of the concept of moral hazard in insurance, and particularly its one-sided reference to insureds rather than insurers, see Baker (1996) and Ericson et al. (2000).
Index insurance and the articulation of risk-bearing subjects

Within the telos of development, index insurance proposes to address the problem of noninsured life—or at least its material reproduction—through clever technological means; in essence it amounts to the introduction of weather derivatives to act as insurance mechanisms for rural households. As an actuary explained to our audience at the first Research Conference on Microinsurance in 2012, regardless of the marketing and legal lexicons describing such coverage as “insurance” or the contemporary political and public disdain for derivatives, “from an accountancy and economic point of view it's very clear that weather index insurance products are not insurance, they are derivatives. In developed countries, we don’t sell derivatives to individuals. This may be the best we can do in the developing world, but it has implications for consumer protection” (Clarke, 2012, emphasis in original). Index insurance thus holds out the possibility of partial financial inclusion and the “democratization of capital” (Roy, 2010), pivoting on the ability of rural producers to successfully secure themselves through the purchase of derivatives.\(^{(5)}\) The partial nature of index insurance, which covers only the losses estimated by the index, inevitably requires farmers to bear the remaining so-called “basis risk”—the chance that their own individual experience could substantially differ from that estimated by the index on which compensation is based. This compromise (“the best we can do”) forges a unique kind of risk-bearing subject.

Using the case of index insurance, in this paper I argue that the formation of financial consumer subjects who are themselves agricultural producers is an emerging and consequential process within the dynamics of (dis)articulation. My analysis follows from Bair and Werner’s (2011) call for attention to “(dis)articulations”, those processes that “iteratively reproduce the subjects and places included within and excluded from global commodity production” (page 993). The expansion of index insurance within the development agenda demonstrates the ways in which novel financial products are being mobilized to bring smallholder farmers into scaled-up agricultural production. As development interventions, index insurance projects have often been posited as the ‘missing link’ to facilitate smallholders’ integration in agricultural value chains. By this logic, insurance policies function as a type of collateral, making policyholders more creditworthy and increasing their access to loans from rural credit intermediaries. These loans in turn facilitate the ‘productive risk-taking’—such as investing in high-yielding seed varieties—necessary to scale up production for integration into domestic, regional, or even global commodity circuits. What interests me here is less the production and circulation of agricultural products, and more the means by which financial intermediation intervenes to create the producers themselves. Agricultural producers are to be created by virtue of their status as financial consumers of risk-transfer products, underwritten by the globalized financial capital of reinsurers and often subsidized by international donor agencies. This multiscalar relationship connects disparate fractions of capital and dismantles traditional distinctions between the positions of production and consumption. As such, it brings into view the limitations of traditional commodity chain analyses with respect to both finance and the subjectivity of producers. The concept of producer as consumer underscores that the articulation of global commodity production into smallholder agriculture depends simultaneously on the creation of subjects as well as circuits of risk-bearing financial capital.

This paper presents an empirical and theoretical framework for understanding the proliferation of index insurance projects, as well as their recent difficulties. I draw on key informant interviews, participant observation at practitioner conferences, and analysis of project and policy documents and gray literature that I conducted from 2011 through 2013

\(^{(5)}\)There is already a substantial body of critical work in geography on the creation and use of weather derivatives (see, for instance, Pollard et al, 2008; Pryke, 2007; Thornes and Randalls, 2007).
2666 L Johnson

as part of an ongoing “ethnography of circulations” (Roy, 2012a) tracing the networks, institutions, and rationalities at work in the creation of new markets for index insurance risk in the Global South. During this time, I have also begun a case study that includes extended participant observation with an index insurance pilot project, but the specifics of that case are not my subject here. This paper does not provide an in-depth account of any particular individual pilot, nor does it analyze the effects of index insurance on households or communities. Instead, it approaches the current constellation of index insurance projects as a “distended policy field” (Peck and Theodore, 2012, page 24) and a set of experimental practices (Mitchell, 2005) for creating new risk-bearing objects and subjects of financialization.

2 Financialization, risk, and subjectivity

Here I use the term ‘financialization’ to refer to processes by which specific possessive relations between people and things are transformed into relations that motivate and/or require financial activities (Martin et al, 2008)—where “financial” transactions are exchanges of liquid capital “in expectation of future interest, dividends, or capital gains” (Krippner, 2005, pages 174–175).(7) In a seminal text tracing the philosophical and legal transformations of securities settlement that preceded and authorized financialization in the United States, Maurer (1999) notes the tectonic shift from “a discourse of property rights and a practice of negotiability … to a discourse of risk and practices of insurance and private justice” (page 365). These new logics of finance inscribed “a new definition of personhood and a new form of governamentality” in which ownership of securities made one a risk-bearer instead of a rights-bearer (page 366, original emphasis). I return to the figure of the risk-bearing subject below, following a brief review of literature from geography and neighboring disciplines that treats insurance and risk in relation to financial subjectivity.

The genealogy of modern insurance is intimately bound with that of probability, risk calculation, and the constitution of the population as an object of liberal governance (Ewald, 1991; Hacking, 1990; Rose, 1999). Following Foucault’s (1991) genealogy of governamentaliy, Ewald identifies the apprehension of ‘risk’ as a particularly important moment in the self-realization of the subjects of liberal government:

“To calculate a risk is to master time, to discipline the future. To conduct one’s life in the manner of an enterprise indeed begins in the eighteenth century to be a definition of morality … to provide for the future [means] mathematizing one’s commitments. Above all, it means no longer resigning oneself to the decrees of providence and the blows of fate, but instead transforming one’s relationships with nature, the world and God so that, even in misfortune, one retains responsibility for one’s affairs by possessing the means to repair its effects” (1991, page 207).

Today, efforts to create new buyers for insurance endeavor to affect precisely these sorts of transformations in individuals’ conceptualizations of the future. Meanwhile, research in the Global North (primarily the UK and US) has demonstrated that specifically neoliberal

---

(6) The present paper was authored before my case study work began. In late 2012 I began to work with the International Livestock Research Institute in Nairobi, Kenya, on a case study of the index-based livestock insurance (IBLI) product developed to insure pastoralists in northern Kenya and southern Ethiopia against drought-related livestock mortality. See Chantarat et al (2013) for description of the product, and Carter and Janzen (2012) for an early positive impact evaluation. I want to emphasize that the analysis presented in this paper should not be interpreted as referring to the IBLI project, and is specifically directed at value-chain promotion-oriented index insurance.

(7) There are numerous other meanings and definitions of ‘financialization’, many of which are not mutually exclusive [for useful overviews, see French et al (2011), Hall (2012)]. Here I focus on the process of subject-making, but this is coincident with empirical definitions of financialization that describe and periodicize the recent economic shift in the dominant pattern of accumulation (Krippner, 2005).
modalities of government depend on financializing the household and shifting the burden of planning and provisioning from socialized institutions to individual accounts (Blackburn, 2006; Martin, 2002).

The neoliberal eclipse of the welfare state has also reworked many insurance technologies quite dramatically, as individual subjects are increasingly charged with their own self-care through private market mechanisms. Recent work traces how this logic has reshaped the terrain of life insurance and annuity markets and the subjectivity of consumers themselves (Hall, 2012; Kneale and French, 2012). This transformation has resulted in the emergence of what Langley (2006) calls “investor subjects”, individuals tasked with their own household financial management who constantly evaluate the future as a set of competing value prospects that must be navigated for household survival and saving. These are also uncertain subjects who do not always possess the expertise or power to master this future—particularly in the face of stock market volatility, the bursting of the real-estate bubble, and global economic turmoil. Nevertheless, public policy and discourse has generally deemed these populations as “risk capable” agents whose failures, when they inevitably surface, are read as moral and personal faults.

A similar financial logic—with parallel deployment in the American defense doctrine of preemption—classifies populations according to whether they are ‘risk capable’ or ‘at risk’ (Martin, 2006). This imagined geography of capital and rule divides the world between “those able to avail themselves of wealth opportunities through risk taking and those who are considered ‘at risk’” (page 8). But much of microfinance blurs the boundaries between such divisions, as the same population may be alternatively articulated as both ‘risk-capable’ and ‘at risk’. As Roy points out regarding microfinance’s figuration of the entrepreneurial poor: “financialization returns responsibility to subjects at risk … [who] are now perceived as risk frontiers” (2012b, page 139). The same figuration is at work in development discourses surrounding index insurance, which frame the target subjects of insurance in three ways: as ‘at risk’ populations vulnerable to climate variability and/or climate change; as aspiring agricultural producers who should be encouraged to take prudent risks to scale up production; and as potential financial consumers who would prefer to transfer their production risks to a financial institution. Within this triangulation, the impacts of global climate change may be invoked as heralding the current or future disarticulation of smallholders from the ‘traditional’ or ‘informal’ risk-sharing and coping mechanisms on which they have historically depended—making their integration into formal risk transfer chains apparently all the more urgent.

My conceptualization of the ‘risk-bearing subject’ of index insurance borrows and expands on Maurer’s argument that financialization operates as a new form of governmentality through which individuals are redefined as risk-bearers rather than rights-holders. This formulation is particularly applicable to index insurance for two reasons. First, index insurance nullifies property ownership as a prerequisite for the purchase of an insurance contract. Second—and as a necessary consequence of the first—the technology of index insurance is structurally dependent upon the individual policyholders’ acceptance of some degree of basis risk; this is to say, making security accessible to the poor also requires them to bear some of the risks themselves. Such expansion-by-exclusion raises the question, now being debated in some circles of agricultural and development economics, whether the burden of bearing such basis risk could create situations in which farmers are on balance worse off than they would otherwise be without any insurance (Binswanger-Mkhize, 2012; Clarke, 2011). This debate brings to mind questions raised by anthropologist Jane Guyer (2009) in a reflection on the commodification of risk transfer and the construction of risk price. As she puts it, if “risk is transferred” not eliminated … we may ask some classic anthropological questions that are rooted in social and semiotic thinking: What is ‘risk’ as a transacted ‘thing’? From whom
and to whom is it transferred? Since [risk] mitigation can only ever be partial, where is the excess located in relation to a theory of ownership?” (page 215). Basis risk is precisely the sort of “excess” that Guyer insists will always accompany risk transfer. It is on these transfers and excesses of risk, and the capital organized to trade them, that the remainder of this paper focuses.

3 Finding finance within commodity circuits and value chains

Research on (dis)articulations must begin to grapple with the ways financial circuits such as insurance mediate the relation between labor, capital, and nature on the edges of (non)market relations. Financial products have not typically been analyzed using a commodity chain framework for several obvious reasons. Chief among these has been the concern to understand the creation of value and extraction of surplus in terms of the Marxian labor theory of value, which characterizes the strand of commodity chain analysis pioneered by Hopkins and Wallerstein (1977; 1986) with roots in world systems theory. In this framework, although financial transactions and innovations are not entirely ignored, finance is a sideshow to the main analytical focus on the primary circuit of commodity production: the ways in which labor and inputs crystallize in material goods such as agricultural commodities and manufactured goods. Second, within the global commodity chain and global value chain approaches (Gereffi and Korzeniewicz, 1994; Gereffi et al, 2005), discussions of finance tend to remain at the level of macrolevel lending, foreign direct investment, and firm finances. When it is addressed at all, insurance is treated as one of the many “high-end services”—akin to legal, information technology, and accounting—necessary to sustain and facilitate the smooth operation of commodity chains (Rabach and Kim, 1994).

There are pressing reasons to reconsider this neglect of household finance within commodity circuits. First, financial services are not limited to ‘high-end’ parts of commodity circuits, as the flows of migrant workers’ remittances, mobile money, and microfinance demonstrate. Second, financialization of the economy and daily life are not geographically restricted to the Global North, as evidenced by the explosion of for-profit microfinancial institutions and the proliferation of public listings of microfinance institutions on stock exchanges since 2007—part of what Roy (2010) has called the making of “poverty capital”. Third is the extremely charged political relation between financial institutions and rural livelihoods, as illustrated by the recent debtors’ repayment strike and legal restrictions on debt collection in the Indian state of Andhra Pradesh, fueled by the explosion of populist anger over coercive loan recovery practices and debtors’ suicides (Bajaj, 2011; Yunus, 2011).

Regardless of the position one takes on the prospects for the ‘democratization of capital’ in microfinance in general and microinsurance in particular, the potential for insurance to change household consumption patterns (by reducing income vulnerability to external shocks) and to increase capital inputs to agriculture could have major implications for rural relations of production and the position of peasants and small producers within global commodity circuits. This is made most evident in the index insurance projects that consciously seek to transform the position of small producers within primary circuits of production by encouraging their activity as financial consumers.

Most index insurance pilots seek to increase the resilience of rural households to weather shocks and climatic variability through consumption smoothing. Some are explicitly social protection programs, heavily subsidized by national governments and/or aid agencies, whose primary goal is to provide a safety net for households on the threshold of falling into poverty traps in which they are forced to sell critical productive assets in order to meet bare subsistence needs (Barrett et al, 2007; Chantarat et al, 2013). Although I am engaged in ongoing research with one such project, these protection-oriented index insurance programs and their potential welfare benefits (Carter and Janzen, 2012) are not the subject of this paper.
This contribution is instead concerned with index insurance projects with ‘promotion’ objectives: that is, “insurance that promotes agricultural development … [and] is linked to a value proposition that enables farmers to obtain new productivity-enhancing technologies or to participate in high-value markets that can significantly raise their expected incomes” (Hess and Hazell, 2009). These projects endeavor to fundamentally transform households’ degree of integration into market production, and are often linked to larger interventions in agricultural value chains and supply chain risk management (Hess et al, 2005; World Bank, 2011). This approach envisions insurance as a technology to support the chain, which can facilitate or consolidate the incorporation of certain places and populations into otherwise weakly articulated agricultural value chains. This extension of global risk markets mediated through finance is thought to act as a potential corrective to weakly developed physical commodity circuits. This logic proposes that good financial consumers will make better producers. Examples from development economics papers and a burgeoning gray literature of working papers demonstrate the logic linking financial consumption to agricultural production. Some goals include:

(1) To enable small farmers to abandon diversified and/or subsistence production and reduce inefficiencies arising from “risk rationing”. At issue is these households’ inability or unwillingness to take the “right kinds” of risks necessary to scale-up agricultural production (cf Giné and Yang, 2009).

(2) To make farmers more credit-worthy and decrease credit-rationing practices of rural lenders, thus allowing farmers to take out loans (cf Skees and Barnett, 2006).

(3) To directly or indirectly encourage the use of inputs, modified seed varieties, and investments in risky technologies in order to increase productivity. Evidence from early initiatives shows that insurance allows farmers to access loans with which they purchase improved seed varieties and adopt riskier cultivation strategies (cf Karlan et al, 2012; Mobarak and Rosenzweig, 2012; Skees and Collier, 2008). In this orbit, promotion-oriented index insurance projects in Africa are often explicitly or discursively linked to the Alliance for a Green Revolution in Africa, the organization backed by the Gates and Rockefeller Foundations calling for the transformation of African agriculture into a “highly productive, efficient, competitive, and sustainable system that assures food security and lifts millions out of poverty” (AGRA, 2013).

A direct connection between inputs, improved varieties, and global agribusiness is articulated in a Kenyan index insurance program run by the Foundation arm of Swiss agribusiness giant Syngenta with partial funding from the International Finance Corporation of the World Bank Group. The “Kilimo Salama” product, whose name promises “Safe Agriculture” in Swahili, first replaced farmers’ purchases of improved seeds (for instance, hybrid Duma43 maize) with new seeds in the case of unfavorable readings from weather stations during the growing season. The project uses the wildly successful M-PESA mobile payment system developed by Kenyan mobile provider Safaricom to transmit a receipt for the original insurance purchase and notify customers if the contract is triggered. Kenyan insurer UAP provides primary coverage, but a reinsurance contract then transfers the vast majority of the risk to Swiss Reinsurance (Swiss Re). First piloted in 2009, the project has since expanded to new districts and crops, now covering maize, wheat, beans, sorghum, and coffee, and has introduced a popular option to purchase insurance greater than the value of the inputs, in which payouts are also distributed through M-PESA (Goslinga, 2012). In mid-2012 the program gained media attention when it won the Financial Times/IFC award for technological innovation in finance, and by early 2013 it claimed 60 000 customers over five major agricultural regions of Kenya, and 40 000 in Rwanda. Roughly 90% of its sales are through microfinance institutions and contract farming arrangements, and the remaining 10% through agrodealers. Although the Syngenta project is currently one of a relatively small
number of insurance projects working through contract farming arrangements (another being a weather insurance product that PepsiCo has sold to its contract potato farmers in India), an unaffiliated insurance executive interviewed for this research hailed such ventures “the wave of the future in agricultural microinsurance”\(^8\). In an otherwise pessimistic analysis of the hype surrounding index insurance, development economist Binswanger-Mkhize (2012) agrees: “the most promising way forward is to tie the insurance of contracts with aggregators, such as credit providers, input suppliers or purchasers in contract farming situations. Such pilots should be the primary focus of future work” (page 198). In this respect, bundling insurance with credit or inputs demonstrates another avenue by which “value-chain agriculture represents both source and outlet for capital as credit, and a complex through which agribusiness and retailing can, respectively, source agro-industrial products and generate value through the debt relation” (McMichael, 2013, page 674).

But despite these ambitions, it is not the case that insurers and development practitioners formulate market-based microinsurance as a universally applicable “silver bullet”. As illustrated by the segmentation of the pyramid in figure 1, insurers and reinsurers readily identify the market failure layer where private insurance mechanisms alone cannot be expected to operate profitably, depicted as the base of the pyramid in which 1.4 billion people require ‘aid/government support’ in order to access microinsurance. With such support, this logic projects that even this layer might be made into a $7 billion market.

![Figure 1. The insurance pyramid (from Swiss Re, 2010).](image)

Ongoing market experimentation is attempting to establish the dividing lines between risks that are insurable through private, versus public–private, versus fully public mechanisms. These demarcations—the insurance equivalent of microcredit’s distinction between the ‘bankable’ and ‘unbankable’ poor (Roy, 2010)—underscore the contradictory nature of neoliberal development rationalities (Peck, 2010). The extension of insurance risk markets is not all encompassing, but also requires exclusion of particular perils and places. The roll-out of market-based index insurance is always accompanied by a reinscription of the responsibilities of the state as a provider of certain social protections for populations that cannot be profitably insured in the private sector, and a delegation of certain risk-sharing burdens to local social networks.

\(^8\) Interview, Zürich, December 2011.
Troublingly, these experimentations with index insurance have received little social scientific attention outside of economics. Anthropologist Nicole Peterson (2012) has recently provided what to my knowledge is the first critical social scientific analysis of an index insurance project, using household surveys in villages participating in a pilot funded by a major international NGO in northern Ethiopia. Initial results suggest that, although index insurance may “reduce current vulnerability as defined by the project team … [and] benefit some farmers”, it is likely to change the ways in which households use other adaptive coping mechanisms such as informal risk-sharing arrangements, shifting planting calendars and switching crops. She concludes that the technology of index insurance may ultimately increase households’ exposure to market risks even if it decreases their immediate vulnerability to environmental ones. On the other hand, Berhane et al (2013) find evidence that the provision of index insurance to traditional Ethiopian burial societies (iddirs) may strengthen the groups’ ability to help members cope with weather-related risks; Mobarak and Rosenzweig (2012) find parallel positive impacts of rainfall index insurance as a complement to informal caste-based risk-sharing networks in India.

Especially troubling is the possibility that the shift towards intensification and riskier cropping that accompanies the ‘promotion’ agenda will weaken the very coping strategies (such as crop diversification and substitution) that are smallholder farmers’ most critical tools for adapting to climate variability. Adding to this concern is the question of the insurance product’s continued availability and affordability. If insurance does indeed “induce cultivators to adopt more rain-sensitive crops and technologies” (Mobarak and Rosenzweig, 2012, page 12), it follows that their reliance on insurance could make them especially vulnerable to premium increases on the part of insurers or reinsurers, or to the future cancellation of policies in regions where insurers deem that losses have become unsustainable [possibilities outlined by Clarke and Graham (2012)]. I return to this issue in the conclusion and suggest a set of questions that should animate future research.

4 Insurance and emerging markets

Index insurance for smallholders is, as of yet, a relatively small part of the larger microinsurance sector, which occupies a significant position within the global (re)insurance industry’s growth strategy. As the insurance industry faces stagnating premium volumes in the industrialized world, it has formulated a strategy based on increasing all types of insurance penetration in ‘emerging markets’ and the Global South more generally (Allianz, 2010; Swiss Re, 2010). In 2011 insurers collected US $4.6 trillion globally in premiums for all lines of coverage, equivalent to over 6% of world GDP. Over 40% of these premiums were for ‘non-life’ coverage, including property and liability insurance (Swiss Re, 2013a). The vast majority of this coverage lies in the most industrialized countries; North America alone was the source of 37% of global non-life premiums in 2011, with OECD countries as a whole accounting for 84% (Swiss Re, 2012, page 31). A 2004 report pointed out the “catch-up” potential of emerging markets, which comprised 86% of the world population and 23% of global economic output but only 10% of global total premium income in 2004; this share jumped to over 15% by 2011 (Swiss Re, 2004, page 15).

The scramble for new markets is especially intense given that there seems to be an empirical upper limit on non-life insurance penetration (the total premiums collected as a
proportion of national GDP) at roughly 5% of GDP (Enz, 2000). By this metric, non-life insurance markets in the industrialized world are relatively saturated. As premium growth has stagnated—totals in industrialized countries actually shrunk from 2007 through 2009—(re)insurance pricing entered a downward spiral. This stagnation gives even greater impetus for expansion into new markets and new types of risk to ‘soak up’ more insurance capital.

Such expansion has always been a central business strategy of the insurance industry, as Ewald (1991) points out; the difference over time has been which markets and perils were considered to be ‘emerging’. Within today’s emerging markets, microinsurance—and especially life and health coverage for lower-middle-class households in India and Latin America—is the lowest-hanging fruit. As the chief executive officer of intermediary MicroEnsure explained in a Lloyds report, “There’s very little opportunity to grab a 20% [insurance] market share somewhere in the next few years—that does exist in the microinsurance market. It’s a great way of getting into a market which from an insurance perspective has a perfect risk pool: a large number of small value items” (Leftley, in Lloyd’s, 2011).

Additionally, agriculture of all sorts has been remarkably underinsured in comparison to its economic importance. While the Food and Agriculture Organization estimated the total farmgate value of gross agricultural production at $2.29 trillion in 2011, agricultural insurance premiums, including government-sponsored schemes, totaled roughly 1% of that value (Swiss Re, 2013b, page 29). Even given India’s massive agricultural insurance programs in which all farmers with government loans are required to participate, the US accounts for almost half of global agricultural insurance premiums. This absence prompted Swiss Re in 2007 to call emerging markets a “greenfield for agricultural insurance” (2007).

This is the political economic context in which index insurance must be also understood—occupying an ambivalent position as a tool ostensibly promoting the democratization of risk, as well as an experimental product with which global insurers and reinsurers are trying to access new market share at the “bottom of the pyramid” (Prahalad, 2004). Swiss Re consciously channels the pyramid metaphor to represent the possibilities for microinsurance in the image in figure 1. The conceptual form of this pyramid—and the distinctions it draws between commercially viable client populations and those requiring government support—has gained such widespread currency that some iteration or invocation of it now appears in nearly every public presentation or report published by the private sector. In this light, what I referred to above as the “most emancipatory possibility of index insurance” for the poor—the fact that one is not required to own property in order to purchase an insurance contract—is also the characteristic that makes it attractive to insurance capital, which is similarly freed from ties to physical agricultural yields and production. Much as Roy finds the circuits of capital and knowledge within microfinance engaged in “monetizing the promise of a poor woman” (2010, page 62), here they are actively experimenting with how to monetize the weather risks faced by the world’s 600 million smallholder farmers.

Whether or not this will ever become a profitable sector for insurance is the subject of considerable debate within the industry itself. At the moment, however, no insurer or reinsurer claims to be making profits from index-based microinsurance for agriculture, and in private conversations many have told me that these projects are typically far from breaking even, with companies cross-subsidizing index operations with revenue from other business lines. The shuttering of one of the largest private rainfall insurance schemes in India, which was run by microfinance giant BASIX and previously widely heralded as proof that index insurance could scale up successfully, seems to bear this out.(12) Several of my interlocutors

---

(12) BASIX products covered nearly 40000 farmers but closed at the end of 2010 amidst stagnating sales (see Miranda and Farrin, 2012, page 401). Thanks to an anonymous reviewer for pointing this out.
within the industry described index insurance as a ‘loss leader’ for large insurers seeking to develop brand recognition and positive public relations among rural farming populations, as well as a way ‘to be seen to be doing CSR’ (corporate social responsibility) by analysts, stockholders, and the public at large.

But the risk-transfer chain does not stop with insurers, and this fact means that the technology of index insurance has a necessarily different relation to financial capital and knowledge than many microfinance products. Unlike other microfinance products such as credit or life insurance products, in which defaults or losses are theoretically relatively uncorrelated, index insurance products hold the potential for large and correlated losses due to meteorological events that affect wide geographical areas. So while other microfinancial products can be deployed with small capital reserves held at the regional or national scale, index-based instruments require backing by institutions with large capital reserves and spatially diversified loss exposure. As a result, the global reinsurance industry—inordinately concentrated in Switzerland, Germany, the UK, and Bermuda—has been actively involved in the provision of index insurance since its earliest stages. Swiss Re, which is currently the world’s second largest reinsurer, has taken by far the strongest lead in underwriting index-based contracts. Although the largest global reinsurer, Munich Re, has a highly visible philanthropic presence in microinsurance through its foundation, its business arm’s underwriting activities in the sector are currently very limited.

Given reinsurers’ explicit expertise in modeling and pricing weather risks and their control of underwriting capital, they exercise significant power in shaping the design and particularly the pricing of index insurance contracts. There are three main components of the reinsurance price for index-based contracts: first, actuarial calculations that use historical data to make statistical inferences about the average annual loss, probable maximum loss, and so on; second, compensation to account for the uncertainty surrounding these estimates; and third, a ‘loading’ rate for the reinsurer to account for transaction costs and the cost of capital (see also Clarke and Graham, 2012). Despite the fact that pricing index insurance is significantly less complicated than pricing indemnity-based coverage, primary insurers in many countries of the Global South lack the actuarial expertise and technical capacity to develop their own analysis of the weather risks they are underwriting. This has direct consequences for the cost of transferring risk to reinsurers. In the highly insured economies of the Global North, it is routine for an insurer to negotiate pricing or conditions with its reinsurer, either directly or through a broker. In countries with relatively low insurance penetration and little expertise, and particularly in Africa, very little negotiation appears to occur. A client manager at a reinsurer told me bluntly, “we haven’t really negotiated prices. We quote. You can only negotiate with someone who has their own technical analysis.” Reinsurers are thus in a position of tremendous power in comparison with insurers and project partners implementing pilots on the ground. The tenuous position of the latter is compounded by the fact that reinsurance contracts are renewed on an annual basis, and their prices and terms may change following the incorporation of the previous year’s data into actuarial calculations. Prices may also be affected by cyclical pricing trends in the global reinsurance market and

---

(13) This description is generalized on the basis of the accounts of numerous actuaries over the course of my fieldwork.

(14) This is due to the fact that the likelihood of loss should be relatively easily calculable by using historical time series of the indexed variable, and then adjusting this probability to account for uncertainty. Difficulties can arise, however, when historical weather data are sparse or unreliable. More and more projects are attempting to use remotely sensed satellite data, which in some cases at least offer a historical record of several decades (Brown et al, 2011).

(15) Interview, Zürich, June 2013.
larger developments in the global economy that influence reinsurers’ cost of capital.\(^{(16)}\) If reinsurance premiums increase, the primary insurer does not simply absorb this cost; it is passed on either to policyholders or, as is more often the case for young pilot projects, to the governments and/or donors providing the premium subsidies. Hence, index insurance clients in even the most remote villages become part of a globalized financial chain of risk transfer, but one in which the expertise and power to shape the chain have so far largely resided with its Northern participants.

5 The creation of risk-bearing subjects

Focusing on this “supply chain” of index insurance, as it were, reminds us that for all of these projects’ attempts to reshape the value chains of agricultural commodities, insurance is also always a commodity in itself, which must be produced, distributed, marketed, and sold like any other. This can be far from a straightforward process, particularly for index-based products triggered by abstract variables. The work of creating the market for this commodity is both inordinately technical and intensely social, requiring a renegotiation of standard presuppositions about how and for whom insurance works. The director of the “emerging consumer” division at a major international primary insurer framed the quandary to me this way: “If you say you’re selling insurance to poor people, people think you’re trying to cheat the poor. And poor people think insurance is only a product for rich people.”\(^{(17)}\) The latter sentiment is echoed in studies that convey frustration with the reluctance of the poor to recognize insurance as a worthwhile product from which they could benefit (eg, Matul et al, 2013; Morsink, 2012; Patt et al, 2010).

Despite the proliferation of index insurance pilot projects in recent years, the target clients have often not purchased insurance coverage with same enthusiasm that development agencies, economists, and insurance companies imagined they would. Certainly the demand for index insurance does not yet remotely approach that for other microfinance products such as microcredit. Although results do differ tremendously between projects, with a few notable pilots such as the Syngenta Foundation’s Kilimo Salama scaling up by the tens of thousands, these are the exception rather than the rule. It has become an accepted truism among many economists and development practitioners that, in comparison with other forms of microinsurance, index insurance is especially plagued by low take-up rates (Binswanger-Mkhize, 2012; Giné and Yang, 2009; World Bank, 2011). Reported purchase rates typically range from the single digits to the teens, rarely exceeding 30% of the target population (Matul et al, 2013, page 1). By mid-2012 personnel in several subsidy-dependent pilots complained to me that their projects were falling on difficult times as certain donors grew frustrated with the technology’s inability to attract willing insurance buyers and ‘go to scale’ without heavy premium subsidies (see also Miranda and Farrin, 2012).

The disjuncture between the “supply-side” promotion of the index insurance concept as a scientifically elegant market-based solution, and its erstwhile less-than-enthusiastic reception by rural populations is not especially surprising. After all, insurance is not a tangible product or service rendered at the time of payment, but rather an intangible promise of future financial exchange contingent upon the occurrence of an undesirable event. As such, insurers in the Global North have always had to confront problems of trust and risk perception to create markets for their products (Baker, 1994). Nevertheless, creating willing buyers out of “the never-before-insured” (Carter et al, 2008) has proved even more difficult in rural areas of the Global South. General literacy and numeracy, to say nothing of

\(^{(16)}\) For greater detail on reinsurance pricing, particularly with respect to climate change, refer to Johnson (2010; 2014).

\(^{(17)}\) Interview, Zürich, December 2011.
financial literacy, is uneven. Project implementers often mention the clients’ abiding distrust in financial institutions and particularly in insurance, where—unlike microcredit—the risk of default is borne by the client rather than the institution (Patt et al, 2009).

This simple fact of ex-ante exchange creates two additional axes of risk bearing by clients, whose upfront cash payments for insurance expose them to the risk that the insurer may default or disappear on the one hand, and the risk that they may personally experience a loss for which the index does not trigger any payout on the other. With regard to the first axis, the actual likelihood of a primary insurer defaulting from losses on its index insurance contracts is relatively low, since heavily capitalized global reinsurers typically assume the vast majority of the underlying risk in index insurance schemes (taking between 80% and 100% of the total exposure from the primary insurer in several projects with which I am familiar). However reliable, such connections are of little reassurance to prospective clients at rural points of sale, who are likely more concerned that the company collecting their premium will be nowhere to be found as soon as the conditions that would trigger a payout appear. Even if payouts are not triggered and the company commits no wrongdoing, clients who are unaccustomed to the concept of paying a sum and receiving nothing in return in good seasons may still suspect malfeasance. Such was the case for some pastoralist purchasers of livestock insurance in a remote area of Northern Kenya, who reportedly became so distressed with the on-the-ground absence of the underwriter at that time, UAP Insurance, that they assumed the worst and dubbed the company “United Arab Pirates”. Beyond its humor, this moniker gestures towards the all-too-real fact that rural agricultural and herding populations have not infrequently found themselves disadvantaged or cheated by actors praying on their lack of education, and this risk of abuse is little different with index insurance than with other financial products.

The second axis of risk bearing is specific to index insurance, and has already been introduced: ‘basis risk’ refers to those risks that could cause a client to experience a loss, but which would not trigger an insurance payout. It is inherent in all index insurance contracts because they are by definition not indemnity-based. As discussed in section 1, environmental indices are derivatives that provide an ‘imperfect hedge’ for agricultural risk. Since crop growth or livestock survival is an outcome contingent upon a complex array of meteorological, ecological, and social factors, an insurance contract linked to one variable such as rainfall can cover only part of the universe of risks that a farmer or pastoralist will face in any given season. Clients’ own fortunes may always be worse—or better—than those that would be predicted by a reading from their nearest weather station or a satellite-based area average.

Basis risk is an artifact serving as a constant reminder that weather risk is constructed into a contract form in order to make it exchangeable; “weather risk” is not a preexisting thing in itself. The “basis” is the remainder—in Guyer’s terms, the excess—which could not be efficiently packaged into a transactable form. Its existence stems from the fact that, as Mitchell puts it, “[m]arkets would not work if people were not allowed to exclude things, to leave certain costs or claims out of the calculation, and to deny responsibility for certain consequences” (2007, page 244). In the case of the Syngenta Foundation’s rainfall index product, this exclusion is explicitly identified in the contract’s header, which lists the name and location of the weather station readings on which the contract will be settled. As the project’s technical coordinator explained, announcing the exclusion in this way is intended to ensure that “you don’t get the story at the end of the year, “my [contract’s] weather station reports something different from my farm”” (Goslinga, 2012).

Even if clients themselves can be made agreeable to the potential disjuncture between experienced versus recorded loss events, the derivative nature of coverage places index insurance in an uncertain regulatory environment. In some countries, index-based products fall in between the mandates of insurance and securities regulations and may thus go more
or less unregulated. At the other extreme, the fact that these contracts do not require the buyer to prove insurable interest has left some insurance regulators hesitant to allow their sale at all. Regulatory scrutiny has delayed the launch of one Caribbean hurricane index product with which I am familiar by nearly a year; contract designers for other projects say this is not unusual. At the root of many regulatory and consumer protection concerns is the fundamental problem of managing diverging expectations in a market shot through with asymmetries of information and power.

Insurers and their project partners are likewise engaged in a careful dance of expectation management. On the one hand, they must be upfront about the coverage that the product does and does not provide in order to avoid creating disillusioned clients whose experiences may damage the product’s reputation. On the other, they urgently need evidence that the contract ‘works’ in order to satisfy clients’ expectations and cultivate trust within the target communities (Patt et al, 2009). This has led to the paradoxical and perverse phenomenon in which project designers and implementers find themselves hoping that seasonal weather conditions deteriorate to a point severe enough to trigger payouts. One interviewee responsible for designing a drought index insurance contract in Ethiopia explained the danger of “slightly below average years” in which no payouts are triggered: “The worst years are the ones … when [the rainfall] is bad, but not bad enough to legitimate money going through Switzerland. Those are the ones you lose friendships over.” The mention of Switzerland refers to payouts made by reinsurers to the responsible insurers in pilot project countries. If weather conditions do not become severe enough to trigger the contract, clients may become embittered that they paid premiums and experienced losses without any compensation. On the other hand, if contracts are triggered, individuals who chose not to purchase insurance in the prior season may become buyers in the following contract cycle after witnessing buyers receiving payouts (Karlan et al, 2012). Thus in the short term, seasons of bad weather and expectations of more to come could propel the demand for index insurance. But of course over the longer term, an actuarially sound market-based insurance contract will never result in the overall redistribution of wealth from the insurer to the insured. A large number of payouts in the short term might thus be cause for concern that clients will begin to expect more security from insurance than it can ultimately deliver.

6 Conclusions

Index insurance demonstrates how interwoven geophysical and financial processes have become operative forces in the expansion of risk-bearing capital within global agricultural commodity circuits. Pilot projects disclose a new modality through which populations are being integrated into agricultural value chains and becoming subjects of market-based climate risk governance: expansion-by-exclusion. These products cannot be understood simply as development interventions for reducing vulnerability or increasing agricultural production, but also as techniques attempting to articulate a particular chain of social and economic relations premised on the creation of financial consumers. The emerging constellations of index insurance examined here suggest several conclusions.

First, they demonstrate the analytical importance of attending to financial products and services outside the ‘high-end’ segments of commodity chains in the Global North. Household financial products such as insurance are increasingly significant attempts to articulate links between capitalist and noncapitalist (or semisubsistence) modes of production, and in making commodity chains themselves more ‘fit’ for globalization. Financialization does not require the real subsumption of labor or land to capitalist relations. In the case of index insurance,
expansion-by-exclusion allows assemblages of development and finance to operate in precisely the spaces where agricultural production, labor, and land are not necessarily fully commodified, and often with the intent to transform this. In fact, the derivative nature of the index insurance form—offering only the possibility of remuneration instead of indemnification of loss—makes it especially well suited to operating in such conditions on the edges of (non)market relations.

Second, the index insurance field reveals a broader range of relevant actors than those typically considered in research on commodity chains. Likewise, insofar as index insurance represents a mode of financialization, the actors and institutions involved in this process are much more diverse than the ‘usual suspects’—banks, hedge funds, retirement plans, and so on—and include public and private donor agencies, aid and relief nonprofits, state disaster ministries, agricultural and development economists, and even climate scientists and agronomists reconstructing weather histories in an attempt to provide “science-based insurance” (Brown et al., 2011). To the extent that these actors succeed in creating demand and generating premium flows for insurers, their work is also immanently political: propagating norms of individuals as self-reliant risk bearers and transforming expectations about the responsibilities of society and the state as risk-sharing institutions.

Yet we should not assume that financial and insurential subjectivities are converging towards some universal ideal of the neoliberal risk-bearing individual who reads the future as a set of probabilities to be responsibly managed—an individual who, after all, does not exist in pure form in even the most financialized societies. There is anecdotal evidence that index insurance purchasers retain multiple cosmologies regarding the etiology of weather events and crop and livestock losses; some form of hybrid subjectivity with regards to risk is probably the rule rather than the exception. For instance, small farmers targeted by a major index insurance pilot in Ethiopia still report that prayer is their primary loss prevention strategy (Peterson, 2012). In my own fieldwork in Northern Kenya, sales agents claim that the rates of livestock insurance purchase in certain villages can be significantly affected by the seasonal weather predictions of respected diviners reading goat entrails.

Many questions remain to be asked about how ‘risk-bearing’ subjects are created (or not), how projects mobilize potential clients’ expectations about insurance payouts, and how this process of subjectification ramifies the agricultural commodity circuits and relations of production in which these subjects participate. It is particularly urgent to understand how target populations’ expectations of weather and climate might create further recognition of risk and identification with insurance, how projects manage these expectations, and what kinds of new dependencies and possibilities this may create. This sort of critical examination is a prerequisite for any recuperation of the promise of insurance as a technique of popular solidarity and social change.

Acknowledgements. I am extremely grateful to interlocutors within the microinsurance community who have generously shared their time and candid thoughts with me. Christian Berndt, Shaun French, Vinay Gidwani, Andrew Leyshon, Jane Pollard, René Veron, and the participants of the Economic Worlds seminar at the University of Nottingham all provided helpful comments on earlier versions of this paper. It also benefited hugely from the suggestions and challenges posed by three very thoughtful anonymous reviewers.
References
AGRA, 2013, “Alliance for a Green Revolution in Africa—AGRA’s vision and mission”, http://www.agra.org/who-we-are/about-the-alliance-for-a-green-revolution-in-africa/
Allianz, 2010, “Guest editorial. Learning to insure the poor: microinsurance report”, Allianz SE, Munich
Bair J, Werner M, 2011, “Commodity chains and the uneven geographies of global capitalism: a disarticulations perspective” Environment and Planning A 43 988–997
Bajaj V, 2011, “Luster dims for a public microlender” The New York Times 10 May
Baker T, 1994, “Constructing the insurance relationship: sales stories, claims stories, and insurance contract damages” Texas Law Review 72 1395–1433
Baker T, 1996, “On the genealogy of moral hazard” Texas Law Review 75 237–292
Barrett C, Barnett B J, Carter M, Chantarat S, Hansen J, Mude A, Osgood D, Skees J, Turvey C, Ward M N, 2007, “Poverty traps and climate risk: limitations and opportunities of index-based risk financing”, TR 07-03, International Research Institute for Climate and Society, Columbia University, New York
Berhane G, Clarke D, Dercon S, Vargas Hill R, Taffesse A, 2013, “Insuring against the weather”, RN 20, Ethiopia Strategy Support Program II, International Food Policy Research Institute, Washington, DC
Blackburn R, 2006, “Finance and the fourth dimension” New Left Review 39 39–70
Binswanger-Mkhize H P, 2012, “Is there too much hype about index-based agricultural insurance?” The Journal of Development Studies 48 187–200
Brown M E, Osgood D E, Carriquiry M A, 2011, “Science-based insurance” Nature Geoscience 4 213–214
Carter M R, Barrett C B, Boucher S, Chantarat S, Galarza F, McPeak J, Mude A, Trivelli C, 2008, “Insuring the never before insured: explaining index insurance through financial education games” BASIS Brief 2008-7
Carter M R, Janzen S A, 2012, “Coping with drought: assessing the impacts of livestock insurance in Kenya” BASIS Brief 2012-1
Chantarat S, Mude A G, Barrett C B, Carter M R, 2013, “Designing index-based livestock insurance for managing asset risk in Northern Kenya” Journal of Risk and Insurance 80 205–237
Clarke D, 2011 A Theory of Rational Demand for Index Insurance DPhil dissertation, Department of Economics, University of Oxford
Clarke D, 2012, “Can weather-index products be good products?”, paper presented at First Research Conference on Microinsurance, University of Twente, Netherlands, 11–13 April, http://siteresources.worldbank.org/EXTDISASTER/Resources/8308420-1339804074445/Daniel-Clarke-Twente-plenary-Final.pdf
Clarke D J, Grenham D, 2012, “Microinsurance and natural disasters: challenges and options” Environmental Science and Policy 27 S89–S98
Collier B, Skees J, Barnett B, 2009, “Weather index insurance and climate change: opportunities and challenges in lower income countries” The Geneva Papers on Risk and Insurance Issues and Practice 34 401–424
Davis M, 1998 Ecology of Fear: Los Angeles and the Imagination of Disaster (Metropolitan, New York)
Davis M, 2001 Late Victorian Holocausts : El Niño Famines and the Making of the Third World (Verso, London)
Duffield M, 2007 Development, Security and Unending War: Governing the World of Peoples (Polity Press, Cambridge)
Enz R, 2000, “The S-curve relation between per-capita income and insurance penetration” Geneva Papers on Risk and Insurance 25 396–406
Ericson R, Barry D, Doyle A, 2000, “The moral hazards of neo-liberalism: lessons from the private insurance industry” Economy and Society 29 532–558
Ewald F, 1991, “Insurance and risk”, in The Foucault Effect: Studies in Governmentality Eds C Gordon, G Burchell, P Miller (University of Chicago Press, Chicago) pp 197–210
Foucault M, 1991, “Governmentality”, in The Foucault Effect: Studies in Governmentality Eds C Gordon, G Burchell, P Miller (University of Chicago Press, Chicago) pp 87–104
French S, Leyshon A, Wainwright T, 2011, “Financializing space, spacing financialization” Progress in Human Geography 35 798–819
Gereffi G, Korzeniewicz M, 1994 Commodity Chains and Global Capitalism (Praeger, Oxford)
Gereffi G, Humphrey J, Sturgeon T, 2005, “The governance of global value chains” Review of International Political Economy 12 78–104
Giné X, Yang D, 2009, “Insurance, credit, and technology adoption: field experimental evidence from Malawi” Journal of Development Economics 89 1–11
Giné X, Menand L, Townsend R, Vickery J, 2010, “Microinsurance: a case study of the Indian rainfall index insurance market”, Policy Research WP 5459, World Bank, Washington, DC
Goslinga R, 2012, “Repackaging and redesigning index insurance”, paper presented at 8th International Microinsurance Conference, 6–8 November, Dar es Salaam, http://www.munichre-foundation.org/dms/MRS/Documents/Microinsurance/2012_IMC2012IMC_Presentations-and-papers/S13-MIC2012-Presentation-Goslinga/S13%20MIC2012%20Presentation%20Goslinga.pdf
Grove K J, 2010, “Insuring ‘our common future’? Dangerous climate change and the biopolitics of environmental security” Geopolitics 15 536–563
Grove K, 2012, “Preempting the next disaster: catastrophe insurance and the financialization of disaster management” Security Dialogue 43 139–155
Guyer J I, 2009, “Composites, fictions, and risk: toward an ethnography of price”, in Market and Society: The Great Transformation Today Eds K Harrt, C Hann (Cambridge University Press Cambridge) pp 203–220
Hacking I, 1990 Taming of Chance (Cambridge University Press, Cambridge)
Hall S, 2012, “Geographies of money and finance II: financialization and financial subjects” Progress in Human Geography 36 403–411
Hazell P, Anderson J, Balzer N, Hastrup Cellemensen A, Hess U, Rispoli F, 2010, “Potential for scale and sustainability in weather index insurance for agriculture and rural livelihoods”, International Fund for Agricultural Development and World Food Programme, Rome
Hess U, Hazell P, 2009, “Sustainability and scalability of index-based insurance for agriculture and rural livelihoods”, Innovations in Insuring the Poor: Focus 17, Brief 5, International Food Policy Research Institute, Washington, DC
Hess U, Skees J R, Stoppa A, Barnett B J, Nash J, 2005, “Managing agricultural production risk: innovations in developing countries”, Agriculture and Rural Development Department Report, World Bank, Washington, DC
Hopkins T K, Wallerstein I, 1977, “Patterns of development of the modern world-system” Review (Fernand Braudel Center) 111–145
Hopkins T K, Wallerstein I, 1986, “Commodity chains in the world-economy prior to 1800” Review (Fernand Braudel Center) 10 157–170
Johnson L, 2010, “Climate change and the risk industry: the multiplication of fear and value”, in Global Political Ecology Eds R Peet, P Robbins, M Watts (Routledge, London) pp 185–202
Johnson L, 2014, “Geographies of securitized catastrophe risk and the implications of climate change” Economic Geography 90 forthcoming
Karlan D, Osei R, Osei-Akoto I, Udry C, 2012, “Agricultural decisions after relaxing credit and risk constraints”, Working Paper, Department of Economics, Yale University, New Haven, CT
Kneale J, French S, 2012, “Speculating on careless lives: annuitising the biofinancial subject” Journal of Cultural Economy 5 391–406
Krippner G R, 2005, “The financialization of the American economy” Socio-Economic Review 3 173–208
Langley P, 2006, “The making of investor subjects in Anglo-American pensions” Environment and Planning D: Society and Space 24 919–934
Leyshon A, Thrift N, 1995, “Geographies of financial exclusion—financial abandonment in Britain and the United States” Transactions of the Institute of British Geographers, New Series 20 312–341
Lloyd’s, 2011, “Lloyd’s 360 news”, in Microinsurance: Spreading the Word Lloyd’s, London
Lobo-Guerrero L, 2011 Insuring Security: Biopolitics, Security and Risk (Routledge, New York)
Martin R, 2002 The Financialization of Daily Life (Temple University Press, Philadelphia, PA)
Martin R, 2006 *American War and the Financial Logic of Risk Management* (Duke University Press, Durham, NC)

Martin R, Rafferty M, Bryan D, 2008, “Financialization, risk and labour” *Competition and Change* **12** 120–132

Matul M, Dalal A, De Bock O, Gelade W, 2013, “Why people do not by microinsurance and what we can do about it”, Microinsurance Paper 20, Microinsurance Innovation Facility, International Labor Office, Geneva

Maurer B, 1999, “Forget Locke? From proprietor to risk-bearer in new logics of finance” *Public Culture* **11** 365–385

Miranda M J, Farrin K, 2012, “Index insurance for developing countries” *Applied Economic Perspectives and Policy* **34** 391–427

Mitchell T, 2005, “The work of economics: how a discipline makes its world” *European Journal of Sociology* **46** 297–320

Mitchell T, 2007, “The properties of markets”, in *Do Economists Make Markets? On the Performativity of Economics* Eds D MacKenzie, F Muniesa, L Siu (Princeton University Press, Princeton, NJ) pp 244–275

Mobarak A M, Rosenzweig M, 2012, “Selling formal insurance to the informally insured”, working paper, Department of Economics, Yale University, New Haven, CT

Morsink K, 2012 *Weathering the Storm: The Demand for and Impact of Microinsurance* PhD dissertation, Twente Centre for Studies of Technology and Sustainable Development, University of Twente

Patt A, Peterson N, Carter M, Velez M, Hess U, Suarez P, 2009, “Making index insurance attractive to farmers” *Mitigation and Adaptation Strategies for Global Change* **14** 737–753

Patt A, Suarez P, Hess U, 2010, “How do small-holder farmers understand insurance, and how much do they want it? Evidence from Africa” *Global Environmental Change* **20** 153–161

Peck J, 2010 *Constructions of Neoliberal Reason* (Oxford University Press, Oxford)

Peck J, Theodore N, 2012, “Follow the policy: a distended case approach” *Environment and Planning A* **44** 21–30

Peterson N, 2012, “Developing climate adaptation: the intersection of climate research and development programmes in index insurance” *Development and Change* **43** 557–584

Pollard J S, Oldfield J, Randalls S, Thomes J E, 2008, “Firm finances, weather derivatives and geography” *Geoforum* **39** 616–624

Prahalad C K, 2004 *The Fortune at the Bottom of the Pyramid: Eradicating Poverty Through Profits* (Wharton School of Publishing, Philadelphia, PA)

Proudhon P J, 1846 *Système des contradictions économiques ou philosophie de la misère* (Paris)

Pryke M, 2007, “Geomoney: an option on frost, going long on clouds” *Geoforum* **38** 576–588

Rabach E, Kim E M, 1994, “Where is the chain in commodity chains? The service sector nexus”, in *Commodity Chains and Global Capitalism* Ed. G Gereffi (Praeger, Oxford) pp 123–141

Rose N, 1999 *The Powers of Freedom* (Cambridge University Press, Cambridge)

Roy A, 2010 *Poverty Capital: Microfinance and the Making of Development* (Routledge, New York)

Roy A, 2012a, “Ethnographic circulations: space–time relations in the worlds of poverty management” *Environment and Planning A* **44** 31–41

Roy A, 2012b, “Subjects of risk: technologies of gender in the making of millennial modernity” *Public Culture* **24** 131–155

Sennholz B, 2009, “Briefing: helping farmers weather risks? Assessing the World Bank’s work on index insurance”, Bretton Woods Project, London

Skees J R, Barnett B J, 2006, “Enhancing microfinance using index-based risk-transfer products” *Agricultural Finance Review* **66** 235–250

Skees J R, Collier B, 2008, “The potential of weather index insurance for spurring a green revolution in Africa”, GlobalAgRisk Inc., Lexington, KY
Swiss Re, Swiss Reinsurance, Zurich
2004, “Exploiting the growth potential of emerging markets”, Sigma 5/2004
2007, “Insurance in emerging markets: sound development; greenfield for agricultural insurance”.
Sigma 1/2007
2010, “Microinsurance—risk protection for 4 billion people, Sigma 6/2010”, Sigma 1/2010
2012, “World insurance in 2011”, Sigma 3/2012
2013a, “sigma World Insurance Database”
2013b, “Partnering for food security in emerging markets”, Sigma 1/2013
Thornes J E, Randalls S, 2007, “Commodifying the atmosphere: pennies from heaven?” Geografiska Annaler: Series A, Physical Geography 89 273–285
Wisner B, Blaikie P, Cannon T, Davis I, 2004 At Risk: Natural Hazards, People’s Vulnerability and Disasters (Routledge, New York)
World Bank, 2011 Weather Index Insurance for Agriculture: Guidance for Development Practitioners (World Bank, Washington, DC)
Wyly E K, Atia M, Foxcroft H, Hamme D J, Phillips-Watts K, 2006, “American home: predatory mortgage capital and neighbourhood spaces of race and class exploitation in the United States” Geografiska Annaler: Series B, Human Geography 88 105–132
Yunus M, 2011, “Sacrificing microcredit for megaprofits” The New York Times 1 January