

Insurability in Microinsurance Markets: An Analysis of Problems and Potential Solutions

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Insurability in Microinsurance Markets:

An Analysis of Problems and Potential Solutions

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Abstract: This paper provides a comprehensive analysis of the insurability of risks in microinsurance markets. The aim of this study is to enhance the understanding of impediments to and facilitators of microinsurance from an economic perspective and outline potential solutions. The motivation for conducting this analysis arises from two important issues. (1) Despite strong growth in this field in recent years, more than 90 per cent of the poor population in developing countries continues to have limited or no access to insurance. (2) Industry practitioners frequently highlight problems in the insurability of risks that hinder the development of microinsurance. We review 131 papers and find that the most severe problems stem from insufficient resources for risk evaluation, small size of insurance groups, information asymmetries, and the size of the insurance premium. Based on the analysis, we discuss a number of potential solutions such as, e.g., a cooperative microinsurance architecture.

Keywords: Microinsurance; Insurability; Moral Hazard; Adverse Selection

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1 Introduction

The aim of this paper is to conduct a systematic analysis of the insurability of risks in microinsurance markets, point out critical aspects that hinder their development, and outline potential solutions to problems in these markets. Microinsurance is commonly defined as a financial arrangement intended to protect low-income people against specific perils in exchange for regular premium payments proportionate to the likelihood and cost of the risk involved.¹ The microinsurance industry has seen strong growth in recent years, with average annual growth rates of approximately 10 per cent.² Industry practitioners, however, estimate that only 5 per cent of the potential market is covered, and that there is a high degree of variability in terms of risk and geographical coverage, leaving large segments of the world's poor population with limited or no access to insurance.³

Providing insurance in developing countries is subject to a large array of problems, many of which are frequently addressed in practitioner studies.⁴ These studies reveal numerous problems with insurability, including moral hazard, adverse selection, correlated risks, high transaction costs, and lack of data, making microinsurance challenging from an economic perspective. Whereas insurability is relevant in all insurance markets, the crucial question in the case of microinsurance is why these issues lead to the low market coverage and market failures that we often observe. In other words, which characteristics of the risks, the markets, and the society obstruct the provision of financial arrangements to transfer risks through insurance mechanisms?

Despite the growing public interest in microinsurance, limited academic attention has been focused on this market to date. Churchill *et al.* provide an introduction to the relevance of

¹ See Churchill (2007). There exist two widespread definitions of microinsurance. Churchill (2007) refers to microinsurance as insurance for low income people. Dror and Jacquier (1999) define microinsurance as financially autonomous schemes operating at the local level. Throughout this paper, we refer to the definition by Churchill (2007), but also integrate the aspect that microinsurance is typically operated in small locally focused insurance schemes.

² See Lloyd's and Microinsurance Centre (2009).

³ See Roth *et al.* (2007).

⁴ See Levin and Reinhard (2007); Radermacher *et al.* (2009).

compliance with insurability criteria, but do not indicate whether the required conditions are met for microinsurance.⁵ Vaté and Dror define the concept of insurability as a way of differentiating between health risks that can be insured and those that cannot.⁶ Indeed, none of the existing studies provides a systematic analysis of the fundamental problems in microinsurance markets. In this paper, we address this issue by systematically analyzing a comprehensive set of studies on microinsurance with the aim of identifying problems in the insurability of risks from an insurance economics perspective. For this purpose, we utilize a set of nine fundamental insurability criteria proposed by Berliner.⁷ The idea is to synthesize current knowledge on insurability in microinsurance markets in a structured process, identify the most significant problems, and relate these to traditional and nontraditional solutions discussed in the academic literature and in the context of microinsurance. The key contribution of this paper is thus to enhance the transparency of problems, outline potential solutions, and provide guidance to policymakers, regulators, microinsurance practitioners, and development organizations in this developing field.

Our results show significant differences in the relevance of the nine insurability criteria. The most severe insurability problems stem from the stochasticity and quantification of risks, moral hazard and adverse selection issues, and the size of the insurance premium. There seem to be insufficient resources to control for problems arising from information asymmetries⁸, as well as those due to a lack of data⁹, undersized risk pools¹⁰, and excessive transaction costs¹¹. Health and agricultural insurance are the two types most affected by insurability problems. Many solutions, including index-based insurance¹², the use of self-control mechanisms¹³, in-

⁵ See Churchill *et al.* (2003).

⁶ See Vaté and Dror (2002).

⁷ See Berliner (1982).

⁸ See Churchill (2007).

⁹ See Levin and Reinhard (2007).

¹⁰ See Jütting (2004).

¹¹ See Linnerooth-Bayer *et al.* (2009).

¹² See Linnerooth-Bayer *et al.* (2009).

¹³ See Dror and Jacquier (1999).

novation in technology¹⁴, and reinsurance¹⁵ are discussed in the literature, but have yet to be proven successful. For example, a cooperative microinsurance architecture might combine the advantages of local arrangements with the capacity of a larger parent organization.

The remainder of this article is structured as follows. Section 2 provides a brief overview of microinsurance markets, including lines of business, organizational forms, and distribution channels. In Section 3, we introduce the insurability criteria that we use in Section 4 to analyze pervasive problems in microinsurance markets. A discussion of potential solutions is presented in Section 5. Section 6 concludes and outlines options for future research.

2 Microinsurance

Microinsurance is typically defined as a financial arrangement intended to protect low-income people against specific perils in exchange for regular premium payments proportionate to the likelihood and cost of the risk involved.¹⁶ As this definition implies, microinsurance is based on the same principles as regular insurance. Despite similar risk coverage, insurance product specifics and relevance are often significantly different between customers in regular insurance markets and the much lower income clientele of microinsurance markets. Simply downsizing regular insurance products is not an efficient way of approaching this low-income environment, which is what many first-movers in the marketplace did. It is far more effective, as confirmed by both practitioners and academics, to design specific products for this market based on a deep understanding of microinsurance markets and the particular needs of potential customers in these markets.¹⁷

Microinsurers underwrite a wide range of risks, including most lines of traditional insurance. The relative importance of these products is, however, quite different in microinsurance markets. We also find a huge gap between the demand and supply sides of this market. Death and

¹⁴ See Lloyd's and Microinsurance Centre (2009).

¹⁵ See Bonnevey *et al.* (2002); Morduch (2006).

¹⁶ See Churchill (2007).

¹⁷ See, e.g., Churchill (2007); Dror *et al.* (2007).

illness are the most frequently identified risks for which people demand coverage.¹⁸ The impact of health risks on economic activity is especially severe and a major reason for persisting poverty in developing countries.¹⁹ Agricultural and catastrophe coverage are the most important non-life insurance products in this market. This is not surprising given that agriculture is the foundation of the greatest amount of economic activity in most developing countries²⁰ and that risks resulting in high agricultural losses contribute a great deal to the problem of persistent poverty in developing countries²¹. But although the demand for life, health, and agricultural insurance products is high, the supply side faces several constraints, accounting for the small size of the market. Aggregate statistics show that health insurance in particular plays a minor role in microinsurance markets and is available for only approximately 3 per cent of the population in the poorest countries.²² Life insurance, on the other hand, is much more widely available. Overall, 40 per cent of the total policies in microinsurance are related to life insurance, only 20 per cent each to health, disability, and property insurance.²³ The high percentage for life insurance is mainly driven by credit life insurance policies, which are often sold as a bundle with microcredit products.

3 Insurability of risks

Berliner introduces nine criteria for differentiating between insurable and uninsurable risks.²⁴ Due to its simple, but stringent and comprehensive approach, Berliner's set of insurability criteria is quite popular in the literature. Many authors utilize these or similar insurability criteria to analyze insurance markets and products.²⁵ Especially notable in this context are more

¹⁸ See, e.g., Cohen and Sebstad (2005).

¹⁹ See Asfaw and Jütting (2007).

²⁰ See Levin and Reinhard (2007); Mills (2005).

²¹ See Linnerooth-Bayer *et al.* (2009).

²² See Roth *et al.* (2007).

²³ See Roth *et al.* (2007).

²⁴ See Berliner (1982).

²⁵ See, e.g., Doherty (1991); Jaffee and Russell (1997); Janssen (2000); Karten (1997); Miranda and Glauber (1997); Nierhaus (1986); Schmit (1986); Vermaat (1995).

recent studies analyzing emerging risks such as terror or climate risks.²⁶ The nine criteria are sorted into three broad categories that classify risks in terms of actuarial, market, and societal conditions (see Table 1).

To be insurable in actuarial terms, loss exposures must be independent and loss probabilities must be estimable reliably, the maximum possible loss per event must be manageable in terms of insurer solvency, the average loss amount per event must be moderate, loss exposure must be sufficiently large, and the potential problems resulting from information asymmetry cannot be excessive. The actuarial criteria include, among others, the most important principle in insurance economics—the law of large numbers. This law implies that the larger the number of mutually independent risks in a risk pool, the lower the variance of mean losses.

Table 1 Insurability criteria and related requirements according to Berliner²⁷

<i>Insurability criteria</i>		<i>Requirements</i>
<i>Actuarial</i>	(1) Randomness of loss occurrence	Independence and predictability of loss exposures
	(2) Maximum possible loss	Manageable
	(3) Average loss per event	Moderate
	(4) Loss exposure	Loss exposure must be large
	(5) Information asymmetry	Moral hazard and adverse selection not excessive
<i>Market</i>	(6) Insurance premium	Cost recovery and affordable
	(7) Cover limits	Acceptable
<i>Societal</i>	(8) Public policy	Consistent with societal values and availability of services
	(9) Legal restrictions	Allow the coverage

²⁶ See Charpentier (2008); Herweijer *et al.* (2009); Kunreuther and Michel-Kerjan (2004).

²⁷ We adapt the existing criteria catalogue to better fit microinsurance markets. We use a different definition of Criterion 4 (*loss exposure*). Berliner (1982) defines as a necessary condition for insurability that the expected loss frequency needs to be high for a risk to be insurable, not necessarily that there be a large number of risks in a portfolio. In contrast, we argue that it is the size of the risk pool (*loss exposure*) that is a necessary precondition for insurability, since the probability of loss for any given exposure is not affected by the actual experience of loss to another if we assume independence. Furthermore, high frequency losses generally are not easily insurable because the transaction costs of adjusting and paying those losses end up making the premium greater than the benefit in return. This is one reason to have deductibles in policies for very high frequency events, such as small automobile accidents. The original requirement by Berliner (1982) for Criterion 6 (*insurance premium*) is that a sufficient return on capital should be provided. However, sufficient return on capital does not indicate the need to maximize insurer returns. Instead, coverage of all relevant costs (claims costs, administrative costs, and capital costs) is desirable to maintain the risk of insolvency at a reasonable level. See Vaté and Dror (2002) for a detailed discussion. One aspect that is not addressed by Berliner (1982) is the availability of insured services to the target population, which is of particular relevance in microinsurance markets. Insuring risks for which services are not available (e.g., health services) would not be in line with the *public policy* criterion. We added this aspect to Criterion 8 (*public policy*).

The insurability conditions for the state of the insurance market are satisfied if the insurance premium is adequate to provide cost recovery for the insurer, is affordable by the target population, and the policy's cover limits are acceptable for the target population. An appropriate insurance premium includes the pure risk premium (to cover expected losses), safety loadings for process (to account for fluctuations of expected losses) and parameter risk (to account for the uncertainty in the estimation), and an expense loading. Cover limits are important since the insurer needs to achieve a certain security level and, at the same time, provide a valuable product.

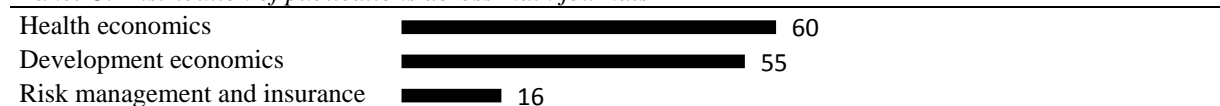
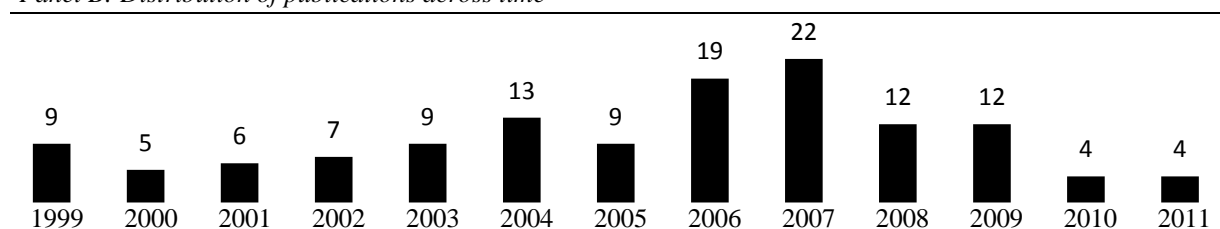
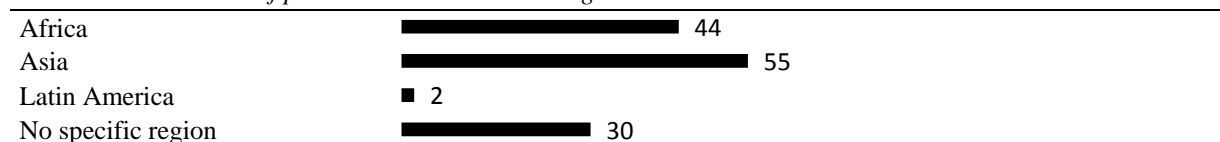
With regard to the necessary societal conditions, coverage must be consistent with public policy and societal values and with the legal restrictions governing coverage. Compliance with the public policy criterion includes restraints on offering insurance for trivial risks or risks for which no need for insurance exists and setting incentives for criminal actions. Legal restrictions include limits on the activities an insurance company is permitted to engage in and prohibitions against insuring certain risks. Stability in the legal framework of a particular country is another condition that must be met.²⁸

4 Insurability in microinsurance markets

We review a broad set of studies on microinsurance covering the period from 1999 to early 2011 in order to identify all relevant references to insurability issues. To capture all relevant literature and references and to assure that only studies meeting academic quality standards are included in the survey, we follow a strict search and selection strategy based on a list of relevant academic journals, keywords, and authors (a detailed description of the search strategy is available upon request). This strategy resulted in a review of 131 journal articles, 89 of

²⁸ It is necessary to question this set of criteria in light of microinsurance markets, since the criteria were developed for traditional insurance markets. In particular, the insurability criteria can be enhanced to better meet the special environment in which microinsurance operates. Establishing a completely new set of criteria is, however, beyond the scope of this paper. We, thus, utilize the nine insurability criteria in this paper, but highlight aspects that need to be considered more closely in the case of microinsurance. An example is that aspects, such as education and infrastructure, are not sufficiently covered by the traditional insurability criteria.

which discuss problems in the insurability of risks in microinsurance markets (note that only articles from peer-reviewed journals are included in this review).

Table 2 Distribution of publications and relevance of insurability criteria

Insurability criteria addressed		in % of all studies	no. of studies
Actuarial	(1) Randomness of loss occurrence	16%	21
	(2) Maximum possible loss	5%	7
	(3) Average loss per event	0%	0
	(4) Loss exposure	13%	17
	(5) Information asymmetry	41%	54
Market	(6) Insurance premium	38%	50
	(7) Cover limits	11%	15
Societal	(8) Public policy	21%	27
	(9) Legal restrictions	13%	17



In Panel D of Table 2, we aggregate the findings so as to draw generalized conclusions as to the most significant problems of insurability.²⁹ The results show significant differences in the relevance of the nine criteria. The major impediments to insurability of risks stem from *information asymmetry* and the *insurance premium*. Less dominant but nevertheless essential in the provision of microinsurance are *public policy*, *randomness of loss occurrence*, *loss exposure*, and *legal restrictions*. *Maximum possible loss* and *cover limits* are referred to less frequently. We find no study addressing *average loss per event*. Panel E sets out the decomposition of the findings as to the primary lines of business affected by insurability problems: health insurance, life insurance, non-life insurance, and a category that includes studies that did not specify a particular line of business. The health insurance and non-life insurance lines are more often the subject of discussions about insurability problems.

Finding solutions to the problems arising in these lines of business could be of enormous benefit in designing sustainable business models, for economic development,³⁰ and for addressing persistent poverty.³¹ Although life insurance products have by far the largest market share in developing countries,³² there are only four studies discussing problems in the insurability of life risks. This result might suggest that this type of insurance is relatively easy to provide, underlining the relevance of complying with fundamentals of insurability. This finding may also indicate an opportunity to transfer successful approaches from life microinsurance to other lines of business. The provision of life microinsurance products is often tied to existing distribution channels of microfinance institutions. Selling these products together is a way to reduce transaction costs and the problems of adverse selection, and to reach a large audience,

²⁹ The derivation of the significance of specific problems is based on the number of articles providing evidence of problems with respect to the insurability criteria and lines of business. A limitation of this approach is that issues raised in published articles primarily reflect prevailing knowledge; this might not necessarily correspond with the most significant problems. However, an advantage of this approach is that it provides an objective basis to derive problems relevant to the industry. Furthermore, we include a wide variety of articles from different fields to provide insights from a variety of perspectives.

³⁰ See Arena (2008) for a discussion of the link between insurance market development and economic growth.

³¹ See, e.g., Asfaw and Jütting (2007) for health risks and Linnerooth-Bayer *et al.* (2009) for catastrophe risk.

³² See Roth *et al.* (2007).

making the line easier to sell and thus achieve economies of scale. As such, linking insurance to activities of microfinance institutions can be attractive for other lines of business. Joint product distribution of health insurance through microfinance institutions has already proven successful and indicates that the industry is able to provide innovative solutions.³³

We next discuss each of the insurability criteria and provide key findings for each line of business. A more detailed list of all studies and their assignment to criteria and lines of business are provided in the Appendix.

(1) Randomness of loss occurrence

A large array of problems in insuring risks in developing countries stems from violation of requirements intrinsic to the entire concept of insurance, i.e., independence of risks and the quantification of loss probabilities. Problems frequently addressed relate to data availability, covariant risks, and increasing variability in loss frequency and/or loss severity, among others. The findings for **health** insurance chiefly involve two essential domains: data availability and covariant risks. Data availability remains a serious issue for health insurers in developing countries; they are often reported as lacking even the most basic data on their business.³⁴ Cohen and Sebstad address the issue of the unpredictability of health risks in developing countries, especially those involving long-term illness such as HIV/AIDS.³⁵ Dror *et al.* illustrate that sufficient data on health cost in India is not available.³⁶ The increasing penetration of these risks, as well as their unpredictability due to lack of reliable data, makes calculating an actuarially fair premium a challenging task. Premium loadings that account for uncertainty in the underlying risk are thus high, and cover limits are exceptionally low, making the coverage expensive and of questionable value. Covariant health risks, particularly epidemic-like diseases-

³³ The self-employed women association (SEWA) and UpLift India utilize the integration of microfinance and microinsurance activities in India (Acharya and Ranson, 2005; Dror *et al.*, 2009a).

³⁴ See McCord (2007).

³⁵ See Cohen and Sebstad (2005).

³⁶ See Dror *et al.* (2008).

es such as malaria or natural disasters, have a strong impact on micro health insurance schemes that are typically small, regional, and relatively homogeneous.³⁷

Life insurance products are generally believed to be easy to provide relative to other lines of insurance. There are, however, factors that can impact the insurability of risk. Cohen and Sebstad and Dercon *et al.* note that increasingly high HIV/AIDS rates in African countries and the related increase in mortality rates, especially in younger cohorts, cause serious problems.³⁸ Particularly for burial societies and community-based insurance schemes, increasing mortality rates may dilute their financial stability and solvency, since many are small and poorly diversified.

The **non-life** insurance business is subject to many problems related to randomness requirements, especially regarding agricultural insurance. Many of these problems originate in a lack of data, covariant risks, and increasing variability in loss frequency and intensity. Francisco points out that the provision of coverage against risks resulting from climate change, such as droughts, storms, or rising sea level, is constrained due to limited information on the underlying risks and contribute to insurance market failure in developing countries.³⁹ This is also true for developed insurance markets, but it is, however, an even more critical issue in developing countries. Complicating the problem of lack of historical data is the increasing variability in frequency and severity of catastrophic events⁴⁰, both of which result in high premium loadings for this type of insurance, if it is even available at all.⁴¹ Highly covariant risks are present in the non-life insurance business in developing countries and are a major cause of market failure.⁴² Those risks include droughts and floods that affect large areas at the same time, and quickly lead to crop loss and, consequently, hunger and deterioration of health.⁴³ Covering

³⁷ See Carrin *et al.* (2005); Dror and Jacquier (1999); Wiesmann and Jütting (2000).

³⁸ See Cohen and Sebstad (2005); Dercon *et al.* (2006).

³⁹ See Dlugolecki (2008); Francisco (2008); Linnerooth-Bayer and Mechler (2006); Smolka (2006).

⁴⁰ See Dlugolecki (2008); Francisco (2008); Linnerooth-Bayer *et al.* (2009); Linnerooth-Bayer *et al.* (2005).

⁴¹ See Barnett and Mahul (2007).

⁴² See Barnett *et al.* (2008).

⁴³ See, e.g., Cohen and Sebstad (2005).

covariant risks is problematic because the joint probabilities of incurring loss, especially for small entities, are high, thus requiring high premium loadings.⁴⁴

(2) Maximum possible loss

The maximum loss that could occur from a certain risk does not receive much coverage in the set of studies we analyze and is primarily discussed in the non-life context. Risks exhibiting maximum losses that exceed the capacity of a microinsurance scheme in terms of capital are considered uninsurable. These risks typically involve agriculture such as crop and livestock.

For **health** microinsurance, Hamid *et al.* state that micro health insurance schemes in Bangladesh have limited scope to cover large losses.⁴⁵ A serious problem for the **non-life** business is insufficient financial capacity paired with low-frequency, high-severity risks, a combination that is even more devastating in microinsurance markets than it is in regular insurance markets.⁴⁶ Highly skewed loss distributions are a significant risk to insurers' solvency, especially for local schemes.⁴⁷ Linnerooth-Bayer and Mechler and Meze-Hausken *et al.* call for wider risk-sharing arrangements in the provision of insurance coverage against risks posed by increased climatic variability, such as floods, droughts, and other weather-related perils.⁴⁸ The underlying argument is that an insurer's risk of insolvency in the case of low-frequency, high-severity events is high and demands further diversification of risks.

(3) Average loss per event and (4) loss exposure

Average loss per event and *loss exposure* are closely related and are thus discussed jointly. The two criteria significantly determine whether insurance is an appropriate strategy for specific risks. According to our review, microinsurance markets are not affected by problems resulting from exceeding average losses; however, it is possible that this finding does not hold across all lines of business as data limitations inhibit the in-depth study of this issue. High

⁴⁴ See Linnerooth-Bayer *et al.* (2005).

⁴⁵ See Hamid *et al.* (2011).

⁴⁶ Per capita costs of natural disasters in relation to GDP are more than 20 times higher in developing countries; see Linnerooth-Bayer and Amendola (2000).

⁴⁷ See Chantarat *et al.* (2007); Giné *et al.* (2007).

⁴⁸ See Linnerooth-Bayer and Mechler (2006); Meze-Hausken *et al.* (2009).

expenses due to cost escalation in the health insurance market indicate that average benefits relative to premiums are too high to make insurance coverage a viable proposition.⁴⁹ *Average loss per event* could thus be a relevant issue in the provision of **health** insurance in developing countries. However, the issue at hand may as well indicate that insurance products are not appropriately tailored to the needs and willingness to pay of the target population.

Loss exposure has been the subject of much more work, especially in the area of **health** insurance. Several studies note that risk pooling remains limited due to the small size of many microinsurance schemes and the consequent limited applicability of the law of large numbers. Dror and Armstrong explicitly show the effect of risk pool size on insurance premiums for micro health insurance schemes in a simulation study. The authors find that as scheme size decreases, exponentially increasing capital loadings are necessary to assure solvency.⁵⁰ Msuya, Jütting, and Asfaw find adverse selection resulting from small risk pools.⁵¹ The financial instability and insolvency of small microinsurance schemes are frequently reported.⁵² Even though scheme size is strongly related to financial stability, there is a tradeoff between size and decentralization. Increasing size and/or centralization may put at risk much of the cost efficiency and avoidance of information asymmetries that are great advantages of operating locally in terms of contract design, enforcement, and delivery.⁵³

For **life** insurance, Dercon *et al.* report that funeral insurance risk pools in Ethiopia and Tanzania are usually small and local in nature such that risk pooling remains limited.⁵⁴ As found for health insurance, there is a tradeoff between size and the mitigation of information asym-

⁴⁹ See, e.g., Desmet *et al.* (1999); Devadasan *et al.* (2006); Ekman (2004); Poletti *et al.* (2007).

⁵⁰ See Dror and Armstrong (2006).

⁵¹ See Msuya *et al.* (2007).

⁵² See Drechsler and Jütting (2007); Msuya *et al.* (2007); Obermann *et al.* (2006); Wagstaff and Lindelow (2008).

⁵³ See Biener and Eling (2011); Obermann *et al.* (2006).

⁵⁴ See Dercon *et al.* (2006).

metries in the life insurance business due to enforcement and information problems that arise in larger anonymous insurance schemes.⁵⁵

Non-life insurance is affected by two major problems: low-frequency, high-severity risks and small risk pools. Chantararat *et al.* illustrate for weather-related catastrophes in Kenya that local insurance schemes are highly vulnerable to losses from low-frequency, high-severity events.⁵⁶ Giné *et al.* note for the Indian rainfall insurance market that the small market size and subsequently small risk pools lead to sparse supply and high insurance premiums.⁵⁷

(5) Information asymmetry

Problems associated with *information asymmetry* are common to the insurance industry in general; however, they appear to be especially problematic for microinsurance. Accordingly, we find many studies addressing these problems for all lines of business. The largest share of studies addressing information asymmetries investigates this problem for **health** insurance, providing evidence of adverse selection, moral hazard, and fraud. Adverse selection is a fundamental problem in health insurance as especially individuals with high future health care needs (e.g., chronically ill people, old people) are prone to purchase health insurance.⁵⁸ For example, Zhang *et al.* report that age is positively related to willingness to join a health insurance scheme in China.⁵⁹ Criel and Waelkens find that women joined a health insurance scheme in West Africa precisely because they are regularly ill.⁶⁰ Pregnant women or women of childbearing age are found to have a higher probability of joining a health insurance scheme in Africa.⁶¹ The value of health insurance to an individual primarily results from risk reduction, which is complemented by the option of obtaining access to medical services.⁶² It is this complementary value that provides the rationale for an important differentiation of in-

⁵⁵ See Obermann *et al.* (2006).

⁵⁶ See Chantararat *et al.* (2007).

⁵⁷ See Giné *et al.* (2007).

⁵⁸ See, e.g., Criel *et al.* (1999); Devadasan *et al.* (2004b); Wang *et al.* (2006).

⁵⁹ See Zhang *et al.* (2006).

⁶⁰ See Criel and Waelkens (2003).

⁶¹ See Criel *et al.* (1999).

⁶² See Nyman (1999).

creasing utilization rates accompanied by moral hazard in the context of health insurance in developing countries. The higher probability of using medical services when one has health insurance may be ascribed to (1) taking care of health needs that are not affordable in the absence of health insurance or (2) an overuse of not strictly necessary medical services. The first rationale is especially relevant for developing countries since unmet health needs tend to be substantial.⁶³ In this regard, Dror *et al.* find that increased utilization rates with insured are not due to adverse selection and that microinsurance can alleviate the underutilization of health care.⁶⁴ The different reasons for increased utilization rates are, however, not trivial. Our review reveals numerous issues related to overuse of medical services rather than satisfaction of necessary health needs, constituting a serious threat to the financial stability of insurance schemes.⁶⁵ This phenomenon is not restricted only to policyholders, but also extends to providers of medical services. Sepehri *et al.* illustrate incentives for the excessive provision of services such as long hospital stays and overuse of diagnostics and drugs adjunct to health insurance in Vietnam.⁶⁶ Similar observations are made for other regions.⁶⁷ In addition to adverse selection and moral hazard, health insurance schemes face problems resulting from fraudulent behavior by insured. For instance, McCord and Osinde find that 30–40 per cent of health care costs are related to fraud for a health insurance scheme in Africa.⁶⁸ Other studies find smaller but still significant values for fraud.⁶⁹

In the case of **life** insurance, we find evidence of information asymmetries for funeral insurance and term life insurance. Here, Bryant and Prohmno and Dercon *et al.* find adverse selection as well as fraud for funeral insurance schemes in Asia and Africa.⁷⁰ Giesbert *et al.* find

⁶³ See Jowett *et al.* (2004).

⁶⁴ See Dror *et al.* (2005, 2009a).

⁶⁵ See Cohen and Sebstad (2005).

⁶⁶ See Sepehri *et al.* (2006).

⁶⁷ See, e.g., Acharya and Ranson (2005); Sapelli and Vial (2003); Wagstaff *et al.* (2009); Wiesmann and Jütting (2000).

⁶⁸ See McCord and Osinde (2005).

⁶⁹ See, e.g., Drechsler and Jütting (2007); Obermann *et al.* (2006).

⁷⁰ See Bryant and Prohmno (2002); Dercon *et al.* (2006).

evidence for adverse selection in term life insurance schemes in Ghana.⁷¹ Life insurance coverage is, however, not prey to moral hazard, which is not surprising as the event that triggers coverage—death—is a fairly transparent and completely inevitable occurrence, meaning that the beneficiary of the insurance contract has no informational advantage over the insurer.

Evidence of severe information asymmetries in **non-life** lines of business is reported for agricultural and property insurance. Barnett *et al.* emphasize that information asymmetries are persistent in the U.S. agricultural insurance market but tend to be more severe in developing countries.⁷² In addition, the costs of strategies for addressing adverse selection, moral hazard, and fraud relative to the small sums insured are higher in microinsurance markets, limiting the range of potential coping strategies. Crop and catastrophe insurance both exhibit patterns of information asymmetries, resulting in adverse selection, moral hazard, and fraud.⁷³ Furthermore, we find reference indicating that there is a high level of moral hazard in insuring against theft or fire of property that seriously restricts the provision of property insurance.⁷⁴

(6) Insurance premium

The *insurance premium* must be adequate to provide cost recovery for the insurer and be affordable by the target population. However, for all lines of business, we find that premiums either are not sufficient to assure cost recovery or that they are not affordable by the target population, or both. Some of the problems in the provision of insurance coverage in developing countries are interrelated with this dilemma, such as premium loadings resulting from violations of insurability criteria, e.g., limited historical data and covariant risks.

Most studies addressing *insurance premiums* as a challenge to the insurability of risks deal with **health** insurance. In this context, the high cost of insurance premiums is due to high transaction costs, on the one hand, and cost escalation in the health sector, on the other. Load-

⁷¹ See Giesbert *et al.* (2011).

⁷² See Barnett *et al.* (2008).

⁷³ See, e.g., Francisco (2008); Linnerooth-Bayer *et al.* (2009); see also Miranda and Glauber (1997).

⁷⁴ See Cohen and Sebstad (2005).

ings due to fluctuations of expected benefits and uncertainty in the estimation that we observe with regard to the criterion *randomness of loss occurrence* amplify this effect. Many authors find that high transaction costs, increasing health care costs, and a higher than expected utilization of health services are characteristic of microinsurance schemes, leading to increasing pure risk premiums and contributing to private health insurance market failure in developing countries.⁷⁵ As to the demand side of the market, many studies investigating insurance premiums confirm that such are not affordable by the target population⁷⁶; however, Dong *et al.* find that affordability in terms of willingness to pay is in line with the costs of providing health insurance when government subsidies in a community-based health insurance scheme are considered.⁷⁷ Even more challenging from a policy perspective are results finding that premiums are both insufficient to cover costs and unaffordable for the customers.⁷⁸

Only four studies in our literature review relate to **life** insurance, two of which consider insurance premiums as an impediment to funeral insurance provision. Cohen and Sebstad argue that life insurance products remain unaffordable for large parts of the very poor population.⁷⁹ The small number of studies addressing pricing issues for life insurance is somewhat surprising as life insurance has by far the largest market share.⁸⁰ The relative absence of work on this topic indicates that pricing life insurance products may not be much of a problem in the microinsurance industry.

Non-life insurance, on the contrary, receives substantial coverage in the literature. Transaction and financing costs are found to be the primary drivers of high insurance premiums, causing market failures. Dlugolecki explicitly states that transaction costs are the major reason for

⁷⁵ See, e.g., Acharya and Ranson (2005); Atim (1999); Carrin *et al.* (2005); Drechsler and Jütting (2007); Ensor (1999); Jütting (2004); McCord (2007); Pauly *et al.* (2006); Wiesmann and Jütting (2001).

⁷⁶ See, e.g., Carrin *et al.* (2005); Chankova *et al.* (2008); Cohen and Sebstad (2005); Criel and Waelkens (2003); Devadasan *et al.* (2004b); Dror and Armstrong (2006); Ranson *et al.* (2007); Wang *et al.* (2006).

⁷⁷ See Dong *et al.* (2004).

⁷⁸ See, e.g., Ekman (2004).

⁷⁹ See Bryant and Prohmno (2002); Cohen and Sebstad (2005).

⁸⁰ See Roth *et al.* (2007).

the failure of insurance markets covering climate risks.⁸¹ Many authors support this notion, indicating that insurance premiums are significantly larger than expected losses due to the high transaction and financing costs of microinsurance programs.⁸² The concurrence of high transaction costs and high risk-based premiums for catastrophe insurance coverage is taken as the major reason for unaffordable premiums and market failure in developing countries.⁸³

(7) Cover limits

The analysis of *cover limits* addresses an important issue in the provision of insurance in developing countries that have little experience with professional insurance mechanisms. Discussion of this issue sheds light on the relationship between insurer and insured by revealing their different levels of acceptance of coverage limits in insurance contracts. Divergence between the perceptions of cover limits may reveal an underlying misconception between the contracting parties that needs to be addressed. The insurer needs to achieve a certain level of protection when setting cover limits and, simultaneously, provide a valuable product. Cover limits encompass a large array of regulations necessary to protect the insurer from such issues as high frequencies of small losses and indemnities higher than incurred losses. These cover limits are challenging, if clients find those unacceptable or do not understand them.

The **health** systems of many developing countries are characterized by low-quality care, substandard infrastructure, high costs, and a far from comprehensive coverage of the population. With respect to *cover limits*, we find exclusions of benefits from coverage by policy terms. These exclusions create a high level of financial risk for the insured because they may drop even farther below the poverty line due to treatment costs that are not covered, high deductibles, and low ceilings.⁸⁴ This leaves the insured with a small band of covered health services

⁸¹ See Dlugolecki (2008).

⁸² See, e.g., Giné *et al.* (2007); Linnerooth-Bayer *et al.* (2009); Patt *et al.* (2010).

⁸³ See Linnerooth-Bayer *et al.* (2009).

⁸⁴ See, e.g., Atim (1999); Bennett (2004); Chankova *et al.* (2008); Devadasan *et al.* (2007); Drechsler and Jütting (2007); Polonsky *et al.* (2009); Schneider and Hanson (2006); Sepehri *et al.* (2006); Wagstaff *et al.* (2009).

and exposure to a high level of financial risk. Furthermore, high deductibles may lead to increased inequity, because the poorest segments cannot access health services.⁸⁵

Our review reveals that the level of benefits provided by microinsurance schemes is too low to provide financial protection against health risks to the low-income population. This conclusion, however, must be viewed with some caution. Some studies report that cover limits are generally not accepted by the target population due to a lack of understanding regarding risk management strategies.⁸⁶ For example, if some insurers exclude chronic illnesses from coverage, most people will not see this exclusion as justifiable, especially if they are suffering from a chronic illness.⁸⁷ A challenge for microinsurance programs is thus to develop products that provide protection for the insurer through cover limits that are both understood and accepted by the target population. Education and the involvement of the target population in product design will be key to this endeavor.⁸⁸

(8) Public policy

Meeting the *public policy* criterion requires that risk coverage is consistent with societal values. This means, among other things, not insuring trivial risks and not providing any incentives for engaging in criminal acts (e.g., policies must state definitely that fire loss will not be covered if the fire was purposely set to receive insurance proceeds). Collective fairness should be preserved by avoiding cross-subsidization between lines of business. A further aspect unaddressed in the seminal work of Berliner, but of particular relevance in microinsurance markets, is the availability of insured services to the insured. Insuring risks for which services are not available (e.g., health services) would not be in line with the *public policy* criterion.

⁸⁵ See, e.g., Dror *et al.* (2009a); Sinha *et al.* (2006).

⁸⁶ See, e.g., Cohen *et al.* (2005).

⁸⁷ In many industrialized countries, including Germany and Switzerland, the problems of adverse selection are avoided by making health insurance compulsory for both good and bad risks in health insurance systems. This implies that the insurer has the obligation to enter into a contract with all types of risks and all insured have to purchase the insurance. Chronic illnesses are fully covered.

⁸⁸ See, e.g., Dror *et al.* (2007) for a discussion of the involvement of the target population in the design of micro health insurance products.

The findings for **health** insurance show that issues of *public policy* are of high importance in this area. In particular, we find systematic medical cost inflation, as well as an absence of an insurance culture. In many regions, providing health insurance leads directly to provider-induced price increases for medical services. The emergence of insurance schemes encourages the overprovision of high-tech and medically unnecessary care, leading to significantly higher costs of treatment for insured patients.⁸⁹ The absence of an insurance culture manifests in low levels of demand due to conflicts of interest between microinsurers and public goals, such as coverage of chronic illnesses,⁹⁰ reluctance to engage in risk pooling that goes beyond traditional boundaries such as families, villages, or ethnic groups,⁹¹ and a low degree of risk aversion and/or a misperception of risks.⁹² All these problems imply that addressing health risks using traditional insurance mechanisms may be at odds with societal values in some developing countries. Microinsurance schemes need to carefully review and address these issues in light of the country's societal and political values.⁹³ A critical aspect in insuring health risks is the availability and quality of health services in microinsurance markets. In many countries, we find that people are reluctant to insure against health risks due to a lack of infrastructure (e.g., health care facilities are not available, costs to reach them are too high, or the quality of treatment is low).⁹⁴

Providing **non-life** insurance in developing countries may actually encourage criminal acts, for example, theft of insured property.⁹⁵ It may lead to a crowding out or less humanitarian aid after a disaster⁹⁶ and can decrease motivation for investing in precautionary measures.⁹⁷

⁸⁹ See Desmet *et al.* (1999); Devadasan *et al.* (2004a); Ekman (2007); Wagstaff and Lindelow (2008).

⁹⁰ See Devadasan *et al.* (2006).

⁹¹ See Carrin (2002); Criel and Waelkens (2003).

⁹² See Dong *et al.* (1999); Kiwara (2007); Pauly *et al.* (2006); Wiesmann and Jütting (2000).

⁹³ See Obermann *et al.* (2006).

⁹⁴ See Allegri *et al.* (2006); Carrin *et al.* (2005); Cohen and Sebstad (2005); Criel and Waelkens (2003); Dekker and Wilms (2010); Devadasan *et al.* (2004b); Ranson *et al.* (2006); Sinha *et al.* (2006).

⁹⁵ See Cohen and Sebstad (2005).

⁹⁶ See Linnerooth-Bayer and Amendola (2000).

⁹⁷ See Linnerooth-Bayer *et al.* (2005).

The problems associated with the lack of an insurance culture discussed above in relation to health insurance also exist to some extent in non-life insurance field.⁹⁸

(9) Legal restrictions

A country's laws and regulations applicable to the insurance business can have a great impact on the success of the microinsurance market in that country. Legal restrictions include, among other things, limits on types of activities in which insurers are permitted to engage and prohibitions against insuring certain risks or particular forms of insurance schemes.

Tight regulation, regulation-induced transaction costs, limited enforcement of legal contracts, and uncertainty as to the stability of the legal environment are problems that affect every line of business in the microinsurance industry.⁹⁹ However, there are regulations that also support the implementation and development of microinsurance programs. For example, in India, every insurer is required by law to sell a portion of its policies to low-income clients.¹⁰⁰

Health and **non-life** insurance schemes in developing countries often run up against problems rooted in legal restrictions. In particular, we find tight regulation schemes¹⁰¹ and associated regulation-induced transaction costs in many countries¹⁰² that affect microinsurers operating as licensed insurers under national insurance law. Microinsurers operating as private for-profit schemes are particularly likely to encounter a strict regulatory framework in many countries. In some cases, for-profit insurance is explicitly prohibited by law or implicitly not permitted by the regulatory process.¹⁰³ Microinsurers not registered with the national insurance regulation authorities bypass this obstacle, but suffer severe limits on their market activity as a consequence.¹⁰⁴ However, strict regulations do not necessarily imply strict enforcement. The inability of the insurance regulatory authority to enforce its regulations and uncertainty in legal

⁹⁸ See Linnerooth-Bayer *et al.* (2009); Linnerooth-Bayer and Mechler (2006).

⁹⁹ See Ayorinde (2001); Barnett *et al.* (2008); Churchill (2007); Llanto (2007).

¹⁰⁰ See, e.g., Churchill (2007); Roth *et al.* (2007).

¹⁰¹ See Asfaw and Jütting (2007).

¹⁰² See Drechsler and Jütting (2007); Pauly (2008); Pauly *et al.* (2006).

¹⁰³ See Pauly *et al.* (2006).

¹⁰⁴ Many microinsurers are probably unable to qualify for an insurance license due to various barriers to entry; see Devadasan *et al.* (2004b); Dror and Armstrong (2006).

restrictions can result in an erosion of trust in the authority.¹⁰⁵ Hence, it is an obstacle to market development. Indeed, the microinsurance target population demands the regulatory authority to play an active role in establishing trust in microinsurance institutions.¹⁰⁶

5 Discussion of potential solutions

As shown in Section 4, life insurance is least affected by problems of insurability,¹⁰⁷ whereas health and non-life insurance have a high degree of vulnerability to nearly all criteria.^{108/109}

We also observe that the degree of violation of insurability criteria is inversely related to market coverage. Life insurance is by far the most successful type of insurance in developing countries; health and non-life insurance are less common. The fundamental principles reflected by Berliner's insurability criteria are thus of importance also in microinsurance markets.¹¹⁰

Many authors discuss solutions for overcoming the problems outlined in this paper. In this section, we provide a synthesis of the solutions found both in the insurance literature as well as in studies on microinsurance not included in the literature review. It should be emphasized that the solutions discussed here are not new. What is new is their integrated presentation, systematization and discussion in this work. The strategies presented in Table 3 can be divided into four categories: *capacity building*, *increasing information flows*, *employment of disciplinary measures*, and *utilization of subsidies*. The assessment of whether a strategy has an impact on compliance with the insurability criteria is grounded in our understanding of microinsurance markets and the literature we review. The results in Table 3 thus can be inter-

¹⁰⁵See Barnett and Mahul (2007); Bennett (2004); Dlugolecki (2008); Pannarunothai *et al.* (2004).

¹⁰⁶See Schneider (2005).

¹⁰⁷Among the main impediments to the provision of life insurance are the lack of data (e.g., mortality tables), unknown and volatile risk patterns (e.g., HIV/AIDS mortality rates), too small insurance schemes for achieving a sufficient degree of risk pooling, and affordability of insurance premiums.

¹⁰⁸Among the key issues in the provision of health insurance are those discussed for life insurance plus covariant risks, a high degree of moral hazard and adverse selection (especially for larger insurers), the accessibility to, and low quality of, health services, possible systematic medical cost inflation induced by health insurance, a lack of understanding of insurance mechanisms, tight regulations of insurance schemes, high transaction costs, and highly restricted insurance capacity and access to reinsurance.

¹⁰⁹The key problems in non-life insurance include those discussed for life insurance plus covariant risks, increasing variability in loss frequency and severity, insufficient financial capacity to cover high severity risks, possible crowding out of humanitarian aid and the creation of incentives for criminal acts by insurance, tight regulation of insurance schemes and legal uncertainty, and a lack of asset control, especially in the case of women.

¹¹⁰A more detailed synthesis of results by line of business is available upon request.

puted as hypotheses that need further examination. In particular, empirical tests of these hypotheses may be important for a better understanding of microinsurance markets, but such are beyond the scope of this review paper.

Table 3 Strategies for microinsurance schemes affecting insurability problems

Strategy	Insurability criteria								
	(1) Random- ness of loss occurrence	(2) Maximum possible loss	(3) Average loss per event	(4) Loss exposure	(5) Information asymmetry	(6) Insurance premium	(7) Cover limits	(8) Public policy	(9) Legal restrictions
Capacity	Market consolidation	+	+	0	+	0	+	0	+
	Larger risk pools	+	+	0	+	0	+	0	0
	Reinsurance	+	+	0	0	0	+	0	0
	Index-based reinsurance	+	+	0	0	0	+	0	0
	Derivatives	+	+	0	0	0	+	0	+
	Contingent capital	+	+	0	0	0	+	0	0
Information	Data collection	+	0	0	0	0	+	0	0
	Index-based insurance	+	0	0	0	+	+	0	0
	Signaling	0	0	+	0	+	+	0	0
	Screening	0	0	+	0	+	+	0	0
Discipline	Group policies	0	0	+	0	+	+	0	0
	Utilization of local infrastructure	0	0	+	0	+	+	0	+
	Incentives for loss prevention	0	0	+	0	+	+	0	+
	Waiting periods	0	0	0	0	+	+	0	0
	Deductibles	0	0	+	0	+	+	+	0
	Benefit ceilings	0	+	+	0	+	+	+	0
	Claim revision	0	0	+	0	+	+	0	0
	Supervision of providers	0	0	+	0	+	+	0	0
Subsidization	Compulsory insurance	+	0	+	+	+	+	0	+
	Social insurance benefits	0	0	0	0	+	+	0	+
	Price differentiation	0	0	0	0	0	+	0	+
	Donor involvement	0	+	0	0	0	+	0	0

Note: + = may have the potential to meet insurability criterion, 0 = does not affect compliance with insurability criterion.

Capacity: The review clearly confirms the need to increase industry capacity, particularly with respect to the size of insurance schemes and their financial capacity. The former can be addressed by increasing merger activity among local insurance schemes and increasing the range of operation; i.e., expanding the target market of local microinsurers to a larger area or expanding the range of risks covered. Both options support compliance with the law of large numbers, increase the capacity to bear large losses, and decrease the premium loading that accounts for fluctuations of expected losses. However, growth per se does not create value;

efficiency is also crucial.¹¹¹ Furthermore, there is a tradeoff between size and proximity to customers. We thus expect that there exists an optimal size for a microinsurer.

Increasing the financial capacity of microinsurers can, however, also be achieved by various means of risk transfer or risk financing, such as reinsurance, index-based reinsurance, derivatives, and contingent capital. Dror and Armstrong show in a simulation exercise that reinsurance has high potential to decrease premiums for microinsurance schemes since reinsurance is cheaper than the capital loading for external financing.¹¹² Bonnevey *et al.* illustrate that reinsurance can stabilize a microinsurer's solvency level.¹¹³ Furthermore, reinsurance provides a means to access professional assistance, such as sharing information, statistical expertise, and managerial experience, that would normally not be affordable.¹¹⁴ In this respect, the World Bank's efforts to provide reinsurance against drought losses are very promising.¹¹⁵ For extremely rare and high losses exceeding the capacity of private insurers, such as some catastrophic risks, the state can act as reinsurer of last resort.¹¹⁶

Information and discipline: As is apparent from the review, information asymmetries have a strong impact on the viability of microinsurance schemes. It is thus imperative to increase the information available for classifying risks, limiting adverse selection, and to have disciplinary measures in place that will decrease the probability of moral hazard.

The most obvious way of increasing the informational basis and correctly classifying risks is to encourage data collection efforts that reveal the underlying characteristics of risks; however, data on risks in microinsurance markets are rare. Public institutions, international development agencies, and donor organizations could be crucial players in improving this situation and aggregate data from various sources. At the level of individual microinsurance schemes, expert opinions and household surveys may be suitable for providing data on specific risks

¹¹¹See Biener and Eling (2011) for a discussion of efficiency and microinsurance. Also see Sinha *et al.* (2007), who report an excessive increase in transaction costs as a result of scaling up an insurance scheme in India.

¹¹²See Dror and Armstrong (2006).

¹¹³See Bonnevey *et al.* (2002).

¹¹⁴See Dror (2001).

¹¹⁵See World Food Programme (2006).

¹¹⁶See Smolka (2006).

and the costs of those risks.¹¹⁷ In the absence of information, index-based insurance can be an attractive substitute for traditional insurance for some risks. If insurance claims are tied to an index, it is not necessary to price individual risks since payouts are dependent on the respective index. Problems of adverse selection and moral hazard are also eliminated since there is no hidden information and individuals cannot manipulate claims (hidden action). Non-life risks such as agricultural risks are the most suitable for index-based insurance. A drawback is the basis risk of index products, i.e., the risk that individual losses significantly deviate from the index loss, a concept that is very hard to communicate to policyholders.

By employing strategies such as signaling and screening, microinsurers can succeed in making insured provide information about their individual risk that is usually not available and thus limit the adverse selection problem.¹¹⁸ These strategies have found wide acceptance in traditional insurance markets and could be an option for microinsurance schemes as well. Signaling and screening are, however, costly. Thus the costs and benefits of such activities need to be carefully weighed for an efficient provision of insurance.

Disciplinary measures that help overcome the imbalance of information between contracting parties are of great importance. Traditional solutions, such as deductibles, ceilings on benefits, waiting periods, vigorous claim investigation, and incentives for loss prevention and reduction (e.g., bonus-malus contracts), might be workable in the microinsurance market, but there are other mechanisms specifically designed for these markets. Traditional explicit control and enforcement measures are captured in insurance contracts and applied and enforced by the insurance firms themselves; microinsurance-specific disciplinary measures are based on mutual control and enforcement mechanisms in social groups. For example, a group policy is sold to a definite group of people such as a family, a village, or the members of an association, which is very different from the traditional insurance policy that insures an individual.

¹¹⁷See, e.g., Auray and Fonteneau (2002); Dror *et al.* (2008, 2009b).

¹¹⁸Signaling is a means to reduce asymmetric information between potential insured and insurers by providing a signal of the individual risk type (good, bad) to the insurer. An insurer can apply screening by offering a set of contracts varying in prices and deductibles to induce self-selection of a contract appropriate for the potential insured risk type (see, e.g., Shapira and Venezia, 1999).

Group policies are conducive to mutual monitoring, thus reducing the potential for moral hazard. Adverse selection can also be addressed effectively in this manner, since it is not only the high-risk individuals of a group that seek insurance coverage but the entire group.¹¹⁹

A similar impact might be achieved by utilizing local infrastructure, including associations and development aid organizations. Microinsurers that rely on local infrastructure when distributing insurance products, collecting premiums, and processing claims have smaller average transaction costs.¹²⁰ This decentralized approach also allows the insurer to access the high information environment of local communities, which can be enormously beneficial in addressing problems of adverse selection and moral hazard. These measures are thus likely to reduce overall costs and, consequently, insurance premiums. A similar mechanism may be applied at the provider level (e.g., health-care provider). As the review shows, providers have an incentive to charge higher prices to insured customers and provide poor-quality services, incentives that can only be overcome by thorough supervision and control of provider pricing and service quality.

Subsidization: Subsidization could play a leading role in achieving affordability of insurance coverage and viability of insurance schemes. Many programs fail because premium income is not sufficient to cover costs. Subsidized premiums may be a way of decreasing the insured's financial burden and achieving affordability on a large scale. Subsidies may be necessary for only a finite period since increasing size of operation will result in decreased costs and reductions in premium loadings if economies of scale are achieved. Thus, premium reductions will begin to occur "naturally" and subsidies will no longer be necessary. Subsidization could be a means of reaching scale and keeping costs low, especially during the start-up phase.¹²¹ Indeed, it is very important that subsidies are available only temporarily because an overprovision of subsidies will adversely affect incentives to provide viable products. A further important issue is the level at which subsidies are applied; i.e., direct premium subsidization or indi-

¹¹⁹Biener and Eling (2011) find higher efficiency for microinsurers providing group policies.

¹²⁰See Bryant and Prohm (2002); Cohen and Sebstad (2005).

¹²¹Dror and Armstrong (2006) show significant differences in capital loadings for external financing between microinsurers of different sizes.

rect subsidization of premiums through, e.g. reinsurance. Subsidies can be relevant at much broader levels and used to stimulate investments in infrastructure, such as health services, improve the microinsurer's capacity, and promote the relaxation of market barriers.¹²²

Under a compulsory insurance scheme, all individuals of a certain group are obliged to buy an insurance policy covering certain risks. This measure is highly effective in limiting adverse selection and enhances risk pooling.¹²³ However, as Faure argues, there is a drawback to compulsory insurance when moral hazard is present and insurance is not sufficiently available.¹²⁴ It is thus essential to first ensure competitive insurance markets and effective prevention of moral hazard before considering compulsory insurance.

Social insurance is different from compulsory insurance in that premiums are typically collected by the government and often subsidized by taxes. Social insurance can be an effective way of providing affordable insurance coverage and limiting adverse selection when doing so is beneficial from a social policy perspective. Given these characteristics, social insurance can be effective in providing health, unemployment, and retirement insurance among others.

A similar balancing can be achieved by microinsurers themselves. As some studies reviewed in this paper found, there is a potential for price differentiation even within the low-income target audiences of microinsurance schemes. "Higher" low-income individuals could contribute a relatively higher share of total premium income and thus subsidize the "lower" low-income individuals. Furthermore, for health insurance, those insured living close to health care facilities may pay higher premiums than those living further away, since their costs for accessing health services are higher.¹²⁵

Donor organizations are becoming increasingly involved in microinsurance markets as doing so provides them with a way of helping the low-income population in developing countries manage risks and reduce their vulnerability. The funds available from donor organizations may have great potential for helping microinsurance schemes reach the necessary scale of

¹²²See Latortue (2006).

¹²³See Smolka (2006).

¹²⁴See Faure (2006).

¹²⁵See Ranson *et al.* (2006); Sinha *et al.* (2006).

operation. This can be achieved by providing capital and knowledge to the microinsurer itself, or to intermediaries and research institutions that advance business knowledge and capacity.

Cooperative strategy as a synthesis of different solutions

Based on the above discussion, we see one integrated approach that has the potential to solve some of the significant problems. We have broadly discussed the tradeoff between decentralization and centralization in microinsurance markets. For example, decentralization can overcome information asymmetries; centralization can lead to more sufficient financial capacity. Transactions cost economists discuss one promising solution in this context—a cooperative architecture.¹²⁶ A cooperative microinsurance architecture could combine the advantages of both centralization and decentralization while limiting the disadvantages of each.

The essential idea of the cooperative architecture is to bring together a large number of local organizations under the roof of one parent organization. The local organizations are the typical microinsurers that distribute insurance products, collect premiums, and settle claims locally but cover only small fractions of the market. The parent organization is owned and operated by these microinsurers, assumes central management functions, and realizes economies of scale. This architecture makes it possible to address the central issues of capacity building, information flows, disciplinary measures, and subsidies by combining the advantages of a large, centralized organization with those found in the local organizations that already exist in microinsurance markets. Large, centralized organizations can realize scale economies, diversify risks, have access to reinsurance and other financing sources, and can synthesize management and actuarial knowledge. Governments, reinsurers, large insurers, and donor organizations can play a significant role in initiating such schemes. The “roof” section of the cooperative design will need to be monitored very carefully and management needs to be lean, transparent, and follow strict rules. In addition to the local institutions, national regulators as well as international institutions could be involved in such monitoring.

¹²⁶See Mariti and Smiley (1983); Mladovsky and Mossialos (2008); Williamson (1975).

Local schemes, on the other hand, are known, accepted, and have access to local infrastructure, exist within a high information environment, and understand the social enforcement mechanisms of local communities. They are able to achieve significantly lower transaction costs for distributing insurance products, collecting premiums, and settling claims, and may be able to limit adverse selection and moral hazard.

We are, of course, not the first to think of organizing microinsurance activity in a cooperative design. For example, there is Concertation,¹²⁷ a partnership of organizations that promotes mutual health organizations in West Africa. Its objective is to share experiences, competencies, and information on development work in West and Central Africa. The cooperative design can thus encompass a range of intensity, from flimsy networks (e.g., exchange of some data) to very intensive collaborations such as joint reinsurance. A large centralized roof for a group of microinsurers might also enhance the self-insurance capabilities. Furthermore, it might serve as a risk carrier itself, e.g., by covering the basis risk of index-linked products.¹²⁸

6 Conclusion

This paper makes both practical and theoretical contributions to the field of microinsurance. We first aggregate existing knowledge about the problems of insurability in microinsurance markets from a comprehensive set of studies and extract the most significant problems. In a second step, we discuss traditional and innovative solutions to these problems from an insurance economics perspective. To our knowledge, this is the first attempt to systematically analyze the problems in microinsurance markets on an aggregate level based on insurance economics principles. The contribution of this paper is not to present new solutions, but to be a synthesis of the existing knowledge from a variety of fields.

In the literature review, we find that health and non-life insurance are highly prone to problems of insurability, which might explain their relatively low market coverage. In contrast,

¹²⁷For further details, see La Concertation (2010).

¹²⁸While a cooperative microinsurance architecture might be helpful in some cases, it cannot provide a solution to all problems in all lines of business. For example, it is possible that, in some cases, only meso (e.g., reinsurance) or macro level (e.g., legislation, regulation) solutions are possible in the long run and no microinsurance at all. More empirical studies are needed to identify the optimal level to provide most efficient solutions.

life insurance has relatively high market coverage and is less affected by insurability problems. These results indicate that fundamental principles regarding the insurability of risks as discussed in Berliner¹²⁹ are of high relevance for microinsurance and that approaches from life microinsurance may provide solutions for other lines of business. A synthesis of the findings reveals that the central issues in the insurability of risks in microinsurance markets stem from noncompliance with actuarial conditions (information asymmetries, small risk pools, insufficient risk evaluation) and widely unaffordable insurance premiums.

We discuss potential solutions to these problems and systematize these in the four categories *capacity building, increase of information flows, employment of disciplinary measures, and utilization of subsidies*. We discuss a cooperative architecture of microinsurance schemes that provides an integrated solution to some of the problems in this market. Setting up microinsurers as cooperatives may be a way of combining the advantages of large institutions (e.g., diversification, economies of scale, and access to reinsurance) with those of local organizations (e.g., low transaction costs, access to information, and social enforcement mechanisms).

We hope that this paper encourages other researchers to conduct more work on microinsurance. A significant need for future research can be derived from the discussion provided in this paper. The first aspect is the need to empirically investigate the hypotheses developed in Table 3, especially the effectiveness of cooperatives and other solutions at the micro, meso, and macro level. A second aspect might be to expand and redefine the criteria catalogue by Berliner to more closely meet the special environment in which microinsurance operates.

Discrimination between insurable and uninsurable risks basically constitutes a sound underwriting policy that assures the viable and sustainable provision of insurance coverage. Microinsurance markets today lack such soundly based underwriting practices and need to focus more on insurable risks and strategies that have the potential to expand the limits of insurability. We find no reason to believe that the fundamentals of insurance economics are any less applicable to microinsurance markets than they are to any other insurance market.

¹²⁹See Berliner (1982).

Appendix Insurability criteria in lines of business

Table A1 Insurability criteria in lines of business

<i>Panel A: Randomness of loss occurrence</i>						
<i>Health insurance</i>		<i>Life insurance</i>				
Asia	Achary and Ranson (2005)	Africa	Cohen and Sebstad (2005)	Africa	Cohen and Sebstad (2005)	- Smolka (2006)
-	Cohen and Sebstad (2005)	Africa	Dercon <i>et al.</i> (2006)	-	Dlugolecki (2008)	Unspecified
-	Dror and Jacquier (1999)	<i>Non-life insurance</i>		Asia	Francisco (2008)	- Churchill (2002)
Asia	Dror <i>et al.</i> (2008)	-	Barnett and Mahul (2007)	Asia	Giné <i>et al.</i> (2007)	Asia Llanto (2007)
Africa	McCord (2007)	-	Barnett <i>et al.</i> (2008)	-	Linnerooth-Bayer <i>et al.</i> (2009)	Asia Torkestani and Ahadi (2008)
Africa	Wiesmann and Jütting (2000)	-	Chantararat <i>et al.</i> (2007)	-	Linnerooth-Bayer and Mechler (2006)	
				-	Linnerooth-Bayer <i>et al.</i> (2005)	
<i>Panel B: Maximum possible loss</i>						
<i>Health insurance</i>		-	Chantararat <i>et al.</i> (2007)	-	Linnerooth-Bayer and Mechler (2006)	
Asia	Hamid <i>et al.</i> (2011)	Asia	Giné <i>et al.</i> (2007)	Africa	Meze-Hausken <i>et al.</i> (2009)	
<i>Non-life insurance</i>		-	Linnerooth-Bayer and Amendola (2000)	Asia	Yanli (2009)	
<i>Panel C: Loss exposure</i>						
<i>Health insurance</i>		-	Dror and Armstrong (2006)	Asia	Pannarunothai <i>et al.</i> (2000)	<i>Life insurance</i>
-	Carrin <i>et al.</i> (2005)	Africa	Jütting (2004)	Asia	Poletti <i>et al.</i> (2007)	Africa Dercon <i>et al.</i> (2006)
Asia	Devadasan <i>et al.</i> (2004a)	Africa	McCord and Osinde (2005)	Asia	Polonsky <i>et al.</i> (2009)	<i>Non-life insurance</i>
Africa	Drechsler and Jütting (2007)	Africa	Msuya <i>et al.</i> (2007)	Asia	Wagstaff and Lindelow (2008)	- Chantararat <i>et al.</i> (2007)
-	Dror (2001)	Asia	Obermann <i>et al.</i> (2006)	Asia	Wagstaff <i>et al.</i> (2009)	Asia Giné <i>et al.</i> (2007)
<i>Panel D: Information asymmetry</i>						
<i>Health insurance</i>		-	Dror and Jacquier (1999)	Asia	Polonsky <i>et al.</i> (2009)	<i>Non-life insurance</i>
Asia	Achary and Ranson (2005)	Asia	Ensor (1999)	Asia	Ranson and John (2002)	- Barnett and Mahul (2007)
Africa	Allegri <i>et al.</i> (2006)	Asia	Ito and Kono (2010)	Latin America	Sapelli and Vial (2003)	- Barnett <i>et al.</i> (2008)
Africa	Atim (1999)	Asia	Jowett <i>et al.</i> (2003)	Africa	Schneider and Hanson (2006)	Africa Cohen and Sebstad (2005)
-	Carrin (2002)	Asia	Jowett <i>et al.</i> (2004)	Africa	Schneider and Hanson (2007)	Asia Francisco (2008)
-	Carrin <i>et al.</i> (2005)	Africa	Jütting (2004)	Asia	Sepehri <i>et al.</i> (2006)	- Linnerooth-Bayer <i>et al.</i> (2009)
Africa	Chankova <i>et al.</i> (2008)	Africa	Kiwarra (2007)	Asia	Supakankunti (2000)	- Linnerooth-Bayer and Mechler (2006)
-	Churchill (2002)	Africa, Asia	McCord (2001)	Asia	Wagstaff <i>et al.</i> (2009)	Africa Linnerooth-Bayer <i>et al.</i> (2005)
Africa	Cohen and Sebstad (2005)	Africa	McCord (2007)	Asia	Wang <i>et al.</i> (2006)	Unspecified
Africa	Criel and Waelkens (2003)	Africa	McCord and Osinde (2005)	Africa	Wiesmann and Jütting (2000)	- Churchill (2007)
Africa	Criel <i>et al.</i> (1999)	Africa	Msuya <i>et al.</i> (2007)	Africa	Wiesmann and Jütting (2001)	- Cohen and Sebstad (2005)
Africa	Dercon <i>et al.</i> (2006)	Asia	Obermann <i>et al.</i> (2006)	Asia	Zhang <i>et al.</i> (2006)	- Cohen <i>et al.</i> (2005)
Asia	Devadasan <i>et al.</i> (2004a)	Asia	Pannarunothai <i>et al.</i> (2000)	<i>Life insurance</i>		Asia Llanto (2007)
Asia	Devadasan <i>et al.</i> (2004b)	Asia	Pauly (2008)	Asia	Bryant and Prohmmo (2002)	
Asia	Dong <i>et al.</i> (1999)	-	Pauly <i>et al.</i> (2006)	Africa	Dercon <i>et al.</i> (2006)	
Africa	Drechsler and Jütting (2007)	Asia	Poletti <i>et al.</i> (2007)	Africa	Giesbert <i>et al.</i> (2011)	

Table A1 (continued) Insurability criteria in lines of business

<i>Panel E: Insurance premium</i>							
<i>Health insurance</i>		Africa	Dong <i>et al.</i> (2004)	Asia	Poletti <i>et al.</i> (2007)	-	Barnett <i>et al.</i> (2008)
Asia	Acharya and Ranson (2005)	-	Drechsler and Jütting (2007)	Asia	Polonsky <i>et al.</i> (2009)	-	Dlugolecki (2008)
Africa	Atim (1999)	-	Dror and Armstrong (2006)	Asia	Ranson <i>et al.</i> (2007)	Asia	Francisco (2008)
-	Bennett (2004)	Asia	Dror <i>et al.</i> (2005)	Africa	Schneider and Hanson (2006)	Asia	Giné <i>et al.</i> (2007)
-	Carrin <i>et al.</i> (2005)	-	Ekman (2004)	Asia	Sinha <i>et al.</i> (2006)	-	Linnerooth-Bayer <i>et al.</i> (2009)
Africa	Chankova <i>et al.</i> (2008)	Asia	Ensor (1999)	Asia	Sinha <i>et al.</i> (2007)	-	Linnerooth-Bayer and Mechler (2006)
Africa	Cohen and Sebstad (2005)	Asia	Jowett <i>et al.</i> (2003)	Asia	Wang <i>et al.</i> (2006)	-	Linnerooth-Bayer <i>et al.</i> (2005)
Africa	Criel and Waelkens (2003)	Asia	Jowett <i>et al.</i> (2004)	Africa	Wiesmann and Jütting (2000)	Africa	Patt <i>et al.</i> (2010)
Africa	Dekker and Wilms (2010)	Africa	Jütting (2004)	Africa	Wiesmann and Jütting (2001)	<i>Unspecified</i>	
Asia	Desmet <i>et al.</i> (1999)	Africa	Kiwarra (2007)	<i>Life insurance</i>		-	Churchill (2007)
Asia	Devadasan <i>et al.</i> (2004a)	Africa, Asia	McCord (2001)	Asia	Bryant and Prohmmo (2002)	Africa	Cohen <i>et al.</i> (2005)
Asia	Devadasan <i>et al.</i> (2004b)	Africa	McCord (2007)	-	Cohen and Sebstad (2005)	Asia	Llanto (2007)
Asia	Devadasan <i>et al.</i> (2007)	-	Mladovsky and Mossialos (2008)	<i>Non-life insurance</i>		-	Murgai <i>et al.</i> (2002)
Asia	Devadasan <i>et al.</i> (2006)	-	Pauly <i>et al.</i> (2006)	-	Barnett and Mahul (2007)		
<i>Panel F: Cover limits</i>							
<i>Health insurance</i>		Africa	Chankova <i>et al.</i> (2008)	Asia	Devadasan <i>et al.</i> (2007)	Asia	Polonsky <i>et al.</i> (2009)
Africa	Allegri <i>et al.</i> (2006)	Africa	Cohen <i>et al.</i> (2005)	Africa	Drechsler and Jütting (2007)	Africa	Schneider and Hanson (2006)
Africa	Atim (1999)	Asia	Cohen and Sebstad (2005)	Asia	Dror <i>et al.</i> (2008)	Asia	Sepehri <i>et al.</i> (2006)
-	Bennett (2004)	Africa	Criel and Waelkens (2003)	Asia	Dror <i>et al.</i> (2009a)	Asia	Sinha <i>et al.</i> (2006)
-	Carrin <i>et al.</i> (2005)	Africa	Dekker and Wilms (2010)	Asia	Dror <i>et al.</i> (2009b)	Asia	Wagstaff <i>et al.</i> (2009)
<i>Panel G: Public policy</i>							
<i>Health insurance</i>		Asia	Devadasan <i>et al.</i> (2006)	Asia	Poletti <i>et al.</i> (2007)	-	Linnerooth-Bayer and Amendola (2000)
-	Carrin (2002)	Asia	Dong <i>et al.</i> (1999)	Asia	Ranson <i>et al.</i> (2006)	-	Linnerooth-Bayer <i>et al.</i> (2009)
Africa	Criel and Waelkens (2003)	Africa	Ekman (2007)	Asia	Sinha <i>et al.</i> (2007)	-	Linnerooth-Bayer and Mechler (2006)
Africa	Dekker and Wilms (2010)	Africa	Kiwarra (2007)	Asia	Wagstaff and Lindelow (2008)	-	Linnerooth-Bayer <i>et al.</i> (2005)
Asia	Desmet <i>et al.</i> (1999)	Africa	McCord and Osinde (2005)	Africa	Wiesmann and Jütting (2000)	<i>Unspecified</i>	
Asia	Devadasan <i>et al.</i> (2004a)	Asia	Obermann <i>et al.</i> (2006)	<i>Non-life</i>		Africa	Ayorinde (2001)
Asia	Devadasan <i>et al.</i> (2004b)	-	Pauly <i>et al.</i> (2006)	Africa	Cohen and Sebstad (2005)		
<i>Panel H: Legal restrictions</i>							
<i>Health insurance</i>		-	Dror and Armstrong (2006)	<i>Non-life insurance</i>		-	Barnett <i>et al.</i> (2008)
Africa	Asfaw and Jütting (2007)	Asia	Pannarunothai <i>et al.</i> (2004)	-	Barnett, and Mahul (2007)	-	Churchill (2007)
-	Bennett (2004)	Asia	Pauly (2008)	-	Cohen and Sebstad (2005)	Asia	Llanto (2007)
-	Carrin (2002)	-	Pauly <i>et al.</i> (2006)	-	Dlugolecki (2008)		
Asia	Devadasan <i>et al.</i> (2004b)	<i>Life insurance</i>		<i>Unspecified</i>			
-	Drechsler and Jütting (2007)	Africa	Dercon <i>et al.</i> (2006)	Africa	Ayorinde (2001)		

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